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R290
no. 348
p. 68-143

1-67 Dec 1955
from this set

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

[Reports - Open file series]
W. E. Wrather, Director

[Detailed logs of 28 wildcat wells
in Lee, Wise, Buchanan, Montgomery,
and Dickenson Counties, Virginia]

The Clinchfield Coal Company No. 102 well, Buchanan County,

Virginia

by

Mary Beth McFarlan and Eloise T. Jacobsen

Nov. 2, 1955

Prepared in Cooperation with the Division of Geology of
the Virginia Department of Conservation and Development

OPEN FILE

This report is preliminary and has not
been edited or reviewed for conformity
with U. S. Geological Survey standards
and nomenclature.

Released Oct 11 1955

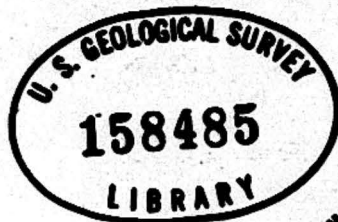
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R290

No. 348, pt. 1

U.S. Geological survey.

Reports, Open file.



JUL 20 1958

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The Clinchfield Coal Company No. 102 well, Buchanan County,
Virginia

by

Mary McFarlan and Eloise T. Jacobsen

The Clinchfield Coal Company No. 102 well was drilled in the western part of Buchanan County near the Dickinson County line. The well started in the Pennsylvanian Norton formation and originally stopped in the Big Stone Gap shale. It was later deepened during 1950 to a total depth of 5847 but the samples from the deepened hole were not available for study when this report was prepared. The Clinchfield Coal Company kindly made available for study and publication the samples from the surface to a depth of 4508 feet.

CLINCHFIELD COAL COMPANY NO. 102 WELL

Buchanan County, Virginia

Clinchfield Coal Corporation

Located 5000 ft W. of 82°10'; 4500 ft S. of 37°10', Bucu Quadrangle.

Elevation, 137320 ft

Total depth, 5847 ft

Drilling commenced November 16, 1948; deepened February 1, 1950 to April 7, 1950.

Production: none

Coal at 268-275, 350-354, 375-392, 553-555, 898-905, 1052-1060, 1080-1090,

1103-1114, 1440-1450, 1470-1500, 1529-1543, 1592-1610, 2769-2771 ft

Samples described by Eloise T. Jacobsen, 0-530 ft, January 1949;

Mary Beth McFarlan, 530-4508 ft, May, 1949.

Sample Library Reference: Virginia Geological Survey and Kentucky Geological Survey

Depth (feet)	Thickness (feet)	
0-10	10	Gravel.
10-23	13	No sample.
		<u>Norton formation</u> - 23-35
23-35	12	Shale and siltstone: shale, silty, micaceous, medium-gray (N5); siltstone, micaceous, light- gray (N7), slightly calcareous cement, minutely peppered with black mineral.
35-43	8	Sandstone, siltstone, shale: sandstone, micaceous, mottled tan, fine- to medium-grained, subrounded,

**Depth
(feet)**

**Thickness
(feet)**

Poorly sorted, much calcareous cement
(approaches very sandy, crystalline limestone),
numerous green and black minerals; siltstone
and shale, like 23-35.

Depth (feet)	Thickness (feet)	
43-50	7	Sandstone: micaceous, white (N9), fine-grained, subrounded, rather well sorted, friable, slightly calcareous cement, numerous green (glauconite?) and black minerals.
50-56	6	Shale, siltstone: shale, silty, micaceous, medium-gray (N5), chunky; some siltstone, micaceous, tan, peppered with black and reddish grains.
56-61	5	Shale: silty, micaceous, medium-gray (N5), chunky.
61-65	4	Siltstone: micaceous, light-gray (N7), subangular to subrounded grains, medium well sorted, slightly calcareous cement, peppered with black and some green minerals.
65-73	8	Sandstone: micaceous, white (N9) to light-gray (N7), fine-grained, subangular to subrounded, medium well sorted, very slightly calcareous cement, numerous black minerals and some light green mineral.
73-77	4	Like 65-73.
77-79	2	Shale: micaceous, silty, medium-gray (N5).
79-84	5	Sandstone: micaceous, light-gray (N7), very fine grained to fine-grained, subrounded, rather well sorted, very slightly calcareous, numerous black and some light-green minerals; some shale like 77-79 (cavings?).
84-90	6	Shale; sandstone: shale, silty micaceous, medium-gray (N5), chunky; some sandstone like 79-84 (cavings?).

Depth (feet)	Thickness (feet)	
90-95	5	Shale: like 84-90
95-105	10	Shale: micaceous, medium-gray (N5), chunky.
105-112	7	Sandstone, shale: sandstone, micaceous, light-gray (N7), very fine grained, subrounded, rather poorly sorted, numerous black minerals; shale, like 95-105 (cavings?).
112-117	5	No samples. Like 105-112.
117-124	7	Shale: micaceous, silty, light-gray (N7), chunky, very slightly calcareous.
124-129	5	Like 117-124 but more calcareous.
129-135	6	Shale: calcareous, silty, micaceous, light-gray (N7), chunky.
135-142	7	Shale: micaceous, light-gray (N7), chunky.
142-148	6	Shale: micaceous, medium-gray (N5), chunky. slightly silty.
148-158	10	Shale: brown to medium-gray (N ₂), slightly micaceous, several chunks of coal.
158-165	7	No samples: driller's log has coal from 155-158, sandy shale 158-203.
165-173	8	Siltstone: very micaceous, very light gray (N8), subrounded, rather poorly sorted, numerous grains of black mineral, friable.
173-177	4	Sandstone: micaceous, white (N9), fine-grained, sub-angular to subrounded, friable, little with siliceous cement, numerous reddish-orange (staining?) grains, and few light purplish and brownish grains, peppered with black and green (glauconite?) minerals.

Depth (feet)	Thickness (feet)	
172-185	13?	Like 173-177, less friable. shale, medium dark-gray
185-190	5	Siltstone, sandstone: siltstone, micaceous, very fine, subrounded, friable, finely peppered with black mineral; some sandstone, like 173-177 (cavings?).
190-195	5	Siltstone: like 185-190.
195-203	8	Siltstone: like 185-190. calcined, slightly calcareous
203-207	4	Siltstone: like 185-190, slightly calcareous.
207-215	8	Shale: medium-gray (N5), hard, slightly silty and micaceous. dark-gray (N3) (cavings?).
215-220	5	Like 207-215.
220-225	5	Like 207-215.
225-230	5	Shale: silty, micaceous, hard, medium-gray (N5).
230-235	5	Like 225-230.
235-240	5	Like 225-230.
240-245	5	Like 225-230.
245-250	5	Like 225-230.
250- ?		Like 225-230, chunk of sandstone, clear, red, orange (stain), medium grained, mottled, quartz, black and green mineral grains.
255-263	8	Shale, sandstone: shale, like 225-230; some sandstone, light-green (5G 7/4), fine-grained, peppered with black mineral, trace pyrite.

Depth Depth (feet)	Thickness Thickness (feet)	
263-268	5	Shale: like 255-263; some shale, medium dark-gray (N4), slightly micaceous, considerable pyrite.
268-275	7	Siltstone: very micaceous, light-gray (N7), subrounded, rather well sorted, some green and black minerals, several pieces of coal - Jawbone coal?.
275-281	6	Sandstone, shale: sandstone, very micaceous, very light gray (N8), fine-grained, slightly calcareous cement, mottled with brown grains and peppered with black and few green (glauconite?) minerals; some shale, dark-gray (N3) (cavings?).
281-286	5	Sandstone, shale: sandstone, like 275-281, cement more calcareous; some shale, dark-gray (N3) to black (N1) and little coal (cavings?).
286-291	5	Sandstone, shale: sandstone, like 275-281; some shale, carbonaceous, dark-gray (N3) to black (N1) (cavings?).
291-300	9	Like 286-291.
300-307	7	Sandstone, shale: sandstone, micaceous, white (N9), medium-grained, subangular to subrounded, rather well sorted, very slight calcareous cement, peppered with black and green (glauconite?) minerals; some shale, micaceous and carbonaceous, medium-gray (N5), fine-grained, subrounded, well sorted (cavings?).

Depth (feet)	Thickness (feet)	
307-314	7	Like 300-307, with brown grains, also piece orange micaceous shale, and trace calcite.
314-318	4	Sandstone: like 300-307, friable, more calcite, with brown grains, also piece orange micaceous shale.
318-330	12	Sandstone, shale: sandstone, like 300-307 with brown grains, some orange-red grains, some larger fragments of quartz, white, pinkish and greenish; shale, carbonaceous, dark-gray (N3) to black (N1), few small pieces of coal (cavings?), trace pyrite, conglomerate zone?
330-340	10	Like 318-330, larger quartz fragments.
340-350	10	Like 318-330, larger quartz fragments; sandstone has calcareous cement, trace "ironstone".
350-354	4	Siltstone: calcareous, micaceous, light-gray (N7), well sorted, several pieces of coal.
354-357	3	Sandstone, shale: sandstone, white (N9), very fine grained to medium-grained, slightly calcareous; shale, dark-gray (N3), slightly micaceous.
357-362	5	Shale: dark-gray (N3), slightly micaceous.
362-367	5	No samples.
367-375	8	Sandstone, shale: sandstone, micaceous, white (N9) to light-gray (N7), fine-grained, moderately well sorted, some black minerals; shale, micaceous, medium-gray (N5) to dark-gray (N3).

Depth (feet)	Thickness (feet)	
375-383	8	Sandstone, shale: sandstone, micaceous, white (N9) to light-gray (N7), fine-grained to medium-grained, some with slightly calcareous cement, peppered with black mineral; shale, dark-gray (N3), trace pyrite, several pieces of coal.
383-392	9	Sandstone, shale: sandstone, micaceous, white (N9) to light-gray (N7), fine-grained to medium-grained, some with calcareous cement, peppered with black mineral; shale, micaceous, dark-gray (N3), trace pyrite, few pieces of coal.
392-396	4	Sandstone, shale: sandstone, white (N9) to light-gray (N7), fine-grained to medium-grained, peppered with black mineral; shale, dark-gray (N3), slightly micaceous.
396-400	4	Sandstone, shale: sandstone, micaceous, white (N9) to very light gray (N8), very fine grained to fine-grained, poorly sorted; shale, dark-gray (N3).
400-412	12	Shale: medium dark-gray (N4), slightly micaceous.
412-419	7	Like 400-412, some pieces carbonaceous.
419-427	8	Like 400-412.
427-435	8	Like 400-412, slightly calcareous.
435-440	5	Like 400-412, slightly silty, slightly calcareous.
440-445	5	Like 400-412, slightly silty, slightly calcareous.
445-453	8	Shale: medium dark-gray (N4), very slightly calcareous.

Depth (feet) (feet)	Thickness (feet)	
453-458 530-535	5	Shale: medium dark-gray (N4), very slightly calcareous.
458-464	6	Shale: medium dark-gray (N4), slightly calcareous, few pieces of coal.
464-473	9	Shale: like 458-464, slightly micaceous.
473-482 535-540	9	Shale: like 453-458, slightly micaceous.
482-490	8	Sandstone, shale: sandstone, light-gray (N7), very fine grained to fine-grained, slightly peppered with black mineral; shale, dark-gray (N3), trace "ironstone".
540-545 490-495 545-550	5	Sandstone, shale: sandstone, white (N9) to very light gray (N8), fine-grained, fairly well sorted, slightly calcareous cement, peppered with black mineral; shale, dark-gray (N3).
495-501 550-555	6	Sandstone, shale: sandstone, micaceous, white (N9) to light-gray (N7), fine-grained, fairly well sorted, cement slightly calcareous, peppered with black mineral; shale, micaceous, dark-gray (N3).
501-509 555-560	8	Shale; sandstone: shale, silty, medium dark-gray (N4); some sandstone, fine-grained, slightly calcareous.
509-515	6	Shale: silty, medium dark-gray (N4).
515-521	6	Shale: silty, medium dark-gray (N4).
521-530	9	Shale, sandstone: shale, silty, micaceous, medium-gray (N5) to dark-gray (N3); sandstone, very light gray (N8) to medium-gray (N5), very fine grained, some cementing material calcareous.

Depth
Depth
(feet)
530-535

Thickness
Thickness
(feet)

5

Shale, sandstone: shale, silty, micaceous, medium dark-gray (N4) to dark-gray (N3); sandstone, very light gray (N8) to medium light-gray (N6), very fine grained.

Lee formation — ~~1103 feet~~ ~~4.4~~

535-540

5

Sandstone, shale: sandstone, white (N9), fine-grained, well sorted, scattered black minerals; shale, micaceous, dark-gray (N3), very slightly carbonaceous.

540-545

5

Like 535-540.

545-552

7

Sandstone, shale: sandstone, white (N9), very fine grained to fine-grained, some grains show limonitic staining, scattered black minerals, trace pyrite; shale, dark-gray (N3), slightly silty, trace "ironstone".

552-553

1

Sandstone, shale: sandstone, white (N9), little medium-gray (N5), very fine grained to fine-grained, scattered black minerals; some shale, dark-gray (N3), trace "ironstone".

553-555

2

Sandstone, shale: sandstone, white (N9) to light-gray (N7), very fine grained to fine-grained, slightly micaceous, scattered black minerals; shale, dark-gray (N3), few pieces of coal.

Depth (feet)	Thickness (feet)	
555-560	5	Sandstone, shale: sandstone, white (N9) to light-gray (N7), fine-grained, well sorted, slightly micaceous, scattered black minerals; little shale, dark-gray (N3).
560-563	3	Sandstone; shale: sandstone, white (N9), fine-grained to medium-grained, fairly well sorted, slightly micaceous, some grains stained with limonite; shale, dark-gray (N3) to grayish-black (N2), trace "ironstone".
563-566	3	Sandstone, shale: sandstone, white (N9), very fine grained to medium-grained, little scattered black mineral and light-green mineral; shale, grayish-black (N2).
566-571	5	Sandstone, shale: sandstone, white (N9) to light-gray (N7), fine-grained, slightly micaceous, scattered black minerals; shale, medium dark-gray (N4) to grayish-black (N2).
571-576	5	Like 566-571.
576-578	2	Sandstone, shale: sandstone, white (N9) to light-gray (N7), fine-grained, slightly silty, scattered black minerals and light-green mineral; little shale, medium dark-gray (N4), trace pyrite.
578-582	4	Sandstone, shale: sandstone, silty, white (N9) to light-gray (N7), fine-grained, scattered black minerals; little shale, medium dark-gray (N4), trace "ironstone".

582-588

(feet)

631-636

588-593

593-599

641-647

599-604

647-652

604-610

652-658

653-659

610-617

617-629

629-631

6

(feet)

5

6

5

6

7

12

2

Sandstone: white (N9), fine-grained to coarse-grained, some grains partially frosted; few pieces shale, dark-gray (N3).

Sandstone: white (N9), fine-grained to coarse-grained, some grains stained with limonite, scattered black minerals.

Sandstone: white (N9) to yellow (limonite stain), fine-grained to coarse-grained, slightly silty, few scattered black minerals.

Sandstone: white (N9), fine-grained to medium-grained, few scattered black minerals, some grains stained with limonite, few quartz fragments (larger).

Sandstone, shale: sandstone, white (N9) to light-gray (N7), fine-grained to coarse-grained, poorly sorted, scattered black minerals; shale, dark-gray (N3).

Sandstone: white (N9), fine-grained to medium-grained, scattered black minerals.

No samples.

Sandstone: white (N9) to light-gray (N7), some grains slightly yellow (limonite staining), fine-grained to coarse-grained, scattered black mineral and little light-green minerals; few pieces shale, dark-gray (N3).

Depth
(feet)

Thickness
(feet)

631-636

5

Sandstone: white (N9), fine-grained to coarse-grained, limonite staining, few pieces of black mineral.

636-641

5

Sandstone: white (N9), medium-grained to coarse-grained, some grains stained by limonite, scattered black minerals and few pieces of green mineral; few pieces of shale, dark-gray (N3).

641-647

6

Sandstone: white (N9) medium-grained to coarse-grained, badly stained by limonite, scattered black minerals.

647-652

5

Sandstone, shale: sandstone, white (N9), medium-grained to coarse-grained, stained by limonite; shale, dark-gray (N3).

652-663

11

Shale: medium dark-gray (N4), slightly micaceous, little sand.

663-669

3

Shale: medium dark-gray (N4), slightly micaceous, little sandy.

669-676

7

Sandstone, shale: sandstone, argillaceous, white (N9) to medium-gray (N5), fine-grained to coarse-grained, scattered black and light-green minerals; shale, medium-gray (N5) to dark-gray (N3), slightly micaceous.

676-682

6

Like 669-676.

Depth
(feet)

Thickness
(feet)

682-687

5

Sandstone; shale: sandstone, white (N9), fine-grained to coarse-grained, scattered black and light-green minerals, few pieces limonite; shale, medium-gray (N5) to medium dark-gray (N4).

687-693

6

Sandstone: white (N9) to light-gray (N7), fine-grained to medium-grained, slightly micaceous, scattered black minerals; few pieces of shale, dark-gray (N3) (cavings?).

693-700

7

Sandstone: white (N9), fine-grained, angular, well sorted, scattered black minerals, trace "ironstone", few pieces of shale (cavings?).

700-703

3

Sandstone: white (N9), fine-grained to medium-grained, angular to subangular, few larger quartz fragments, few yellowish grains (limonite stain), very slightly micaceous, peppered with black minerals.

703-706

3

Like 700-703, few pieces dark-gray (N3) shale, trace "ironstone".

706-711

5

Sandstone: white (N9) to light-gray (N7), many grains yellow to reddish-brown (limonite stain?), some black minerals; few pieces shale, dark-gray (N3), trace pyrite.

711-716

5

Shale, sandstone: shale, very micaceous, dark-gray (N3); sandstone, argillaceous (or sandy shale), micaceous, light-gray (N7) to dark-gray (N3), fine-grained, few pieces black mineral; sandstone, white (N9) to yellow (limonitic stain?), medium-grained.

Depth (feet) (feet)	Thickness Thi(feet) (feet)	
716-720 812-820	4	Sandstone, shale: sandstone, argillaceous, medium-gray (N5), very fine grained to fine-grained; shale, dark-gray (N3), few pieces of coal.
720-725 830-842	5	Shale: medium dark-gray (N4), slightly micaceous, few pieces of sandstone like 716-720 (cavings?).
725-730	5	Shale: micaceous, medium dark-gray (N4).
730-735 842-859	5	Like 725-730, trace pyrite.
735-740	5	Like 725-730, only slightly micaceous.
740-745	5	Like 725-730, only very slightly micaceous.
745-750	5	Like 725-730, only very slightly micaceous.
750-755	5	Shale, micaceous, medium dark-gray (N4), slightly silty.
755-760	5	Like 750-755.
760-765	5	Like 750-755.
765-773	8	Like 750-755.
773-778 869-875	5	Like 750-755.
778-782	4	Shale, sandstone: shale, like 750-755; sandstone, argillaceous, micaceous, medium-gray (N5), very fine grained.
782-790 875-885	8	Shale, sandstone: shale, like 750-755; sandstone, like 778-782.
790-800 885-892	10	Sandstone, shale: sandstone, micaceous, light-gray (N7) to tan: shale, micaceous, medium dark-gray (N3) to grayish-black (N2).
800-812	12	Shale: micaceous, light-gray (N7) to medium dark-gray (N4), silty to sandy.

Depth (feet)	Thickness (feet)	
812-820	8	Like 800-812.
820-830	10	Shale: medium-gray (N5) to medium dark-gray (N4), slightly micaceous.
830-842	12	Like 820-830.
842-852	10	Shale: micaceous, medium dark-gray (N4), few pieces have banding of lighter shale, slightly silty.
852-859	7	Shale, sandstone: shale, medium dark-gray (N4), slightly micaceous; and sandstone, very light gray (N8) to medium light-gray (N6), fine-grained, fairly well sorted, slightly micaceous, some black and a few light-green minerals.
859-869	10	Sandstone, shale: sandstone, micaceous, white (N9) to medium light-gray (N6), fine-grained, fairly well sorted, peppered with black and some light-green minerals; shale, medium dark-gray (N4).
869-875	6	Sandstone, shale: sandstone, argillaceous, micaceous, light-gray (N7) to medium-gray (N5), very fine-grained to fine-grained, some black minerals; shale, micaceous, silty, medium dark-gray (N4).
875-885	10	Shale: micaceous, medium dark-gray (N4), some is sandy.
885-898	13	Shale, sandstone: shale, micaceous, medium dark-gray (N4), slightly silty; some sandstone, light-gray (N7) to medium-gray (N5), very fine grained, some black mineral.

Depth (feet)	Thickness (feet)	
898-905	7	Sandstone, shale: sandstone, argillaceous, very light gray (N8) to medium-gray (N ₇), very fine grained, rather well sorted, peppered with black minerals; some shale, silty, micaceous, medium dark-gray (N4), few pieces coal.
905-911	6	Sandstone, shale: sandstone, micaceous, very light gray (N8) to medium-gray (N5), very fine grained, fairly well sorted, peppered with black minerals; little shale, micaceous, silty, medium dark-gray (N4).
911-919	8	Sandstone: micaceous, very light gray (N8) to tan to medium dark-gray (N3), very fine grained, well sorted, peppered with black and some light-green minerals; few pieces of shale, micaceous, grayish-black (N2), (cavings?).
919-928	9	Shale: dark-gray (N3), very slightly silty, slightly micaceous.
928-935	7	Like 919-928.
935-942	7	Shale: medium dark-gray (N4), very slightly silty, slightly micaceous.
942-950	8	Like 919-928.
950-960	10	Like 919-928.
960-970	10	Like 919-928.
970-980	10	Shale, sandstone: shale, like 919-928; some sandstone, very argillaceous, micaceous, light-gray (N7) to dark-gray (N3), very fine grained.

Depth (feet)	Thickness (feet)	
980-989	9	Shale, sandstone: shale like 919-928; sandstone, like 970-980.
989-995	6	Shale, sandstone: shale, sandy, micaceous, medium dark-gray (N4); sandstone, micaceous, tan to light-gray (N7) to medium-gray (N5), very fine grained, well sorted.
995-1002	7	Like 989-995, some larger fragments of quartz.
1002-1015	13	Shale, sandstone: shale, medium dark-gray (N4), slightly silty, very slightly micaceous; sandstone, very argillaceous, micaceous, light-gray (N7) to medium-gray (N5), very fine grained, cement slightly calcareous.
1015-1025	10	Shale, sandstone: shale, medium dark-gray (N4) to dark-gray (N3), slightly silty, slightly micaceous; sandstone, argillaceous, micaceous, light-gray (N7) to medium-gray (N5), very fine grained, some cement slightly calcareous.
1025-1035	10	Shale: medium dark-gray (N4), slightly silty, very slightly micaceous.
1035-1045	10	Like 1025-1035; few pieces sandstone, argillaceous, medium-gray (N5), very fine grained, cement slightly calcareous.
1045-1052	7	Shale: micaceous, medium-gray (N5) to medium dark-gray (N4), silty to sandy.

Depth
(feet)

Thickness
(feet)

1052-1060

8

Shale, sandstone: shale, medium-gray (N5) to medium dark-gray (N4), very slightly micaceous; and sandstone, white (N9) to medium-gray (N5), very fine grained, well sorted; some argillaceous, very slightly micaceous, several pieces of coal.

1060-1070

10

Sandstone, shale: sandstone, micaceous, white (N9) to medium-gray (N5), very fine grained, well sorted, few larger fragments of quartz, some cementing material slightly calcareous, scattered black minerals; shale, dark-gray (N3).

1070-1080

10

Sandstone, shale: sandstone, white (N9) to light-gray (N7), fine-grained, few larger fragments quartz, slightly micaceous, few grains show limonitic staining, scattered black and few light-green minerals; shale, medium-gray (N5) to dark-gray (N3).

1080-1090

10

Sandstone, shale: sandstone, very light gray (N8) to medium-gray (N5), fine-grained, rather well sorted, slightly micaceous, few grains stained with limonite, scattered black and few green minerals; shale, dark-gray (N3), slightly micaceous, few pieces coal.

1090-1096

6

Sandstone, shale: sandstone, white (N9) to medium-gray (N5), fine-grained, rather well sorted, slightly micaceous, scattered black mineral, few grains have limonitic staining, scattered black minerals; shale, dark-gray (N3), slightly micaceous.

Depth (feet)	Thickness (feet)	
1096-1103	7	Sandstone: white (N9), fine-grained, well sorted, slightly micaceous, cement slightly calcareous, scattered black and few green (glauconite?) minerals; few pieces shale, dark-gray (N3) (cavings?).
1103-1114	11	Sandstone, shale: sandstone white (N9) to light-gray (N7), fine-grained, few grains with limonitic staining, few black and green (glauconite?) minerals; little shale (cavings?) like 1096-1103, few pieces coal.
1114-1125	11	Shale: medium dark-gray (N3), silty to sandy, very slightly micaceous; few pieces sandstone, medium-gray (N5), very fine grained.
1125-1135	10	Shale, sandstone: shale, silty, medium dark-gray (N4); sandstone, argillaceous, light-gray (N7) to medium-gray (N5), very slightly micaceous.
1135-1145	10	Shale: medium-gray (N5) to medium dark-gray (N4), silty to sandy, very slightly calcareous.
1145-1152	7	Shale, sandstone: shale, sandy, medium dark-gray (N4), slightly micaceous; and some sandstone, argillaceous, medium-gray (N5), very fine grained, cement slightly calcareous.
1152-1160	8	Sandstone, shale: sandstone, light-gray (N7) to medium-gray (N5), very fine grained, well sorted, scattered black minerals; shale, dark-gray (N3), silty to sandy, very slightly micaceous.

Depth (feet)	Thickness (feet)	
1160-1169	9	Siltstone: argillaceous, medium-gray (N5) to medium dark-gray (N4).
1169-1179	10	Siltstone, sandstone: siltstone grading into sandstone, argillaceous, medium-gray (N5) to medium dark-gray (N4)
1179-1192	13	Sandstone, shale: sandstone, light-gray (N7) to medium-gray (N5), very fine grained, some scattered black minerals; shale, medium dark-gray (N4).
1192-1200	8	Sandstone, shale: sandstone, tan to medium-gray (N5), very fine grained; shale, medium dark-gray (N4).
1200-1210	10	Shale: medium dark-gray (N4), slightly silty, very slightly micaceous.
1210-1222	12	Shale: like 1200-1210, few pieces sandstone, medium-gray (N5) to tan, very fine grained (cavings?).
1222-1230	8	Shale: like 1200-1210; and sandy shale or argillaceous sandstone, tan to medium dark-gray (N4).
1230-1248	18	Sandstone, shale: sandstone, white (N9) to medium-gray (N5), very fine grained, well sorted, slightly micaceous, cementing material calcareous, some scattered black minerals; shale, medium dark-gray (N4) to dark-gray (N3), slightly micaceous.
1248-1250	2	Sandstone, shale: sandstone, white (N9) to medium-gray (N5), very fine grained, well sorted, slightly micaceous, scattered black minerals; shale dark-gray (N3), some pieces shale, sandy, medium dark-gray (N4).

Depth (feet)	Thickness (feet)	
1250-1260	10	Sandstone: like 1248-1250, silty, medium dark-gray (N4).
1260-1270	10	Sandstone: white (N9) to medium-gray (N5), very fine grained, well sorted, slightly micaceous, cement slightly calcareous, scattered black minerals; few pieces dark-gray (N3) shale (cavings?).
1270-1280	10	Sandstone: white (N9), fine-grained, well sorted, scattered black minerals, few pieces dark-gray (N3) shale (cavings?).
1280-1285	5	Sandstone: white (N9) to light-gray (N7) to tan, very fine grained, slightly micaceous, scattered black minerals; few pieces shale, dark-gray (N3) (cavings?).
1285-1295	10	Sandstone, shale: sandstone, light-gray (N7) to medium-gray (N5), fine-grained to medium-grained, slightly micaceous, few grains stained yellow to reddish-brown (limonite?), scattered black minerals; shale, medium dark-gray (N4) to dark-gray (N3), slightly silty.
1295-1300	5	Sandstone, shale: sandstone, white (N9), fine-grained to coarse-grained, larger fragments of quartz, some is slightly micaceous, scattered black minerals; shale, medium dark-gray (N4) to dark-gray (N3), some is silty.

Depth (feet)	Thickness (feet)	
1300-1306	6	Sandstone, shale: sandstone, white (N9), fine-grained to medium-grained, larger fragments of quartz, some is slightly micaceous, scattered black minerals; shale, medium dark-gray (N4) to dark-gray (N3), some is silty.
1306-1309	3	Sandstone: white (N9), very fine grained to medium-grained, subangular to angular, some pieces stained with limonite, few scattered black minerals; few pieces shale, medium dark-gray (N4) (cavings?).
1309-1314	5	Like 1306-1309, trace "ironstone".
1314-1316	2	Sandstone: white (N9), fine-grained to medium-grained, subangular to angular, some grains stained with limonite; few pieces shale, dark-gray (N3) (cavings?).
1316-1324	8	Sandstone: white (N9), fine-grained to coarse-grained, subangular to angular, some grains stained with limonite; few pieces shale, grayish-black (N2), trace "ironstone".
1324-1331	7	Like 1316-1324, few pieces sandstone medium-gray (N5), few pieces black mineral.
1331-1338	7	Sandstone: white (N9), fine-grained to medium-grained, few larger quartz fragments, few grains show limonitic staining, trace "ironstone"; few pieces shale, grayish-black (N2).

Depth (feet)	Thickness (feet)	
1338-1342	4	Sandstone: white (N9), fine-grained to coarse-grained, subangular to angular; few pieces shale, grayish-black (N2).
1342-1348	6	Like 1338-1342.
1348-1354	6	Like 1338-1342, little limonitic staining, trace "ironstone".
1354-1360	6	Like 1338-1342, little limonitic staining, trace "ironstone".
1360-1364	4	Like 1338-1342, few scattered light-green and black minerals.
1364-1368	4	Sandstone, shale: sandstone, white (N9), fine-grained to coarse-grained, much limonitic staining; shale, grayish-black (N2).
1368-1370	2	Sandstone: white (N9), fine-grained to coarse-grained, subangular to angular, few grains stained by limonite; few pieces shale, grayish-black (N2).
1370-1377	7	Like 1368-1370, trace "ironstone".
1377-1382	5	Like 1368-1370, few scattered green (glauconite?) and black minerals, trace "ironstone".
1382-1386	4	Sandstone, shale: sandstone, white (N9), fine-grained to medium-grained, few grains with limonitic staining, few scattered black minerals; little shale, dark-gray (N3), trace "ironstone".

Depth (feet)	Thickness (feet)	
1386-1390 1440-	4	Sandstone, shale: sandstone, white (N9), fine-grained to coarse-grained, very few grains stained with limonite, few scattered black minerals; some shale, dark-gray (N3), trace "ironstone".
1390-1396	6	Sandstone: like 1386-1390; few pieces shale, dark-gray (N3) (cavings?).
1396-1400	4	Like 1390-1396, trace "ironstone".
1400-1407	7	Like 1390-1396, trace "ironstone".
1407-1411	4	Sandstone: white (N9), fine-grained to coarse-grained, few grains stained with limonite, very few scattered black and light-green minerals; very few pieces shale, dark-gray (N3) (cavings?), trace "ironstone".
1411-1415 1477-	4	Sandstone, shale: sandstone, white (N9) to brownish tint, fine-grained to coarse-grained, subangular to angular, little limonitic staining; shale, grayish-black (N2), trace "ironstone".
1415-1421	6	Like 1411-1415.
1421-1427	6	Sandstone: white (N9), fine-grained to medium-grained, few larger quartz fragments, subangular to angular, little limonitic staining; few pieces shale, dark-gray (N3), trace "ironstone".
1427-1433	6	Sandstone: like 1421-1427, very few pieces light-green minerals; very few pieces shale, dark-gray (N3) (cavings?), trace "ironstone".

Depth (feet)	Thickness (feet)	
1433-1440	7	Like 1427-1433.
1440-1450	10	Shale, sandstone: shale, silty, medium dark-gray (N4); some sandstone, very argillaceous, light-gray (N7) to medium-gray (N5), very fine grained, slightly micaceous, few larger quartz grains (cavings?), several pieces of coal.
1450-1460	10	Like 1440-1450, no coal.
1460-1470	10	Like 1440-1450, no coal.
1470-1477	7	Sandstone, shale: Sandstone, white (N9) to light-gray (N7), very fine grained to fine-grained, little limonitic staining, slightly micaceous, some cement slightly calcareous, scattered black minerals; shale, silty, medium dark-gray (N4), slightly micaceous, several pieces coal.
1477-1487	10	Sandstone, siltstone: sandstone grading into siltstone, argillaceous, medium-gray (N5) to medium dark-gray (N4), slightly micaceous, several pieces coal.
1487-1500	13	Shale 60%, sandstone 40%: shale, medium dark-gray (N4), slightly silty, slightly micaceous; sandstone, argillaceous, medium-gray (N5), very fine grained, slightly micaceous, few pieces coal.
1500-1513	13	Shale: medium-gray (N5), slightly silty, very slightly micaceous.

Depth (feet)	Thickness (feet)	
1513-1523	10	Shale 50%, sandstone 50%: shale, medium dark-gray (N ₄) to dark-gray (N ₃), slightly micaceous, some slightly silty; sandstone, light-gray (N ₇), to medium-gray (N ₆), very fine grained to fine-grained, slightly micaceous, few scattered black minerals.
1523-1529	6	Sandstone 90%, shale 10%: sandstone, white (N ₉) to medium-gray (N ₅), very fine grained to fine-grained, few grains show limonitic staining, scattered black minerals; shale, medium dark-gray (N ₄), slightly silty, slightly micaceous.
1529-1538	9	Sandstone 80%, shale 20%: sandstone, white (N ₉) to medium-gray (N ₅), fine-grained, subangular to angular, slightly micaceous, scattered black and few light-green minerals; shale, sandy, medium dark-gray (N ₄) to dark-gray (N ₃), slightly micaceous, several pieces coal.
1538-1543	5	Shale 99%, sandstone 1%: shale, medium-gray (N ₅) to medium dark-gray (N ₄), very slightly micaceous; sandstone, white (N ₉) to medium-gray (N ₅), fine-grained (cavings?), few pieces coal.
1543-1550	7	Sandstone 70%, shale 30%: sandstone, white (N ₉) to light-gray (N ₇), fine-grained to medium-grained, slightly micaceous; shale, medium-gray (N ₅) to dark-gray (N ₃), slightly micaceous.

Depth (feet)	Thickness (feet)	
1550-1560	10	Sandstone 99%, shale 1%: sandstone, white (N9) to light-gray (N7), very fine grained to medium-grained, slightly micaceous, scattered black and green (glauconite?) minerals; little shale, dark-gray (N3), few pieces coal (cavings?).
1560-1570	10	Like 1550-1560.
1570-1575	5	Like 1550-1560.
1575-1582	7	Sandstone 99%, shale 1%: sandstone, white (N9) to medium-gray (N5), fine-grained, scattered black and green (glauconite?) minerals; little dark-gray shale and few pieces coal (cavings?).
1582-1592	10	Shale: silty, medium-gray (N5) to medium dark-gray (N4), very slightly micaceous.
1592-1599	7	Sandstone 70%, shale 30%: sandstone, white (N9) to medium-gray (N5), very fine grained, well sorted, some grains show limonitic staining, scattered black minerals; shale, medium dark-gray (N4) to dark-gray (N3), slightly micaceous, trace "ironstone", several pieces coal.
1599-1610	11	Sandstone 95%, shale 5%: sandstone, very light gray (N8) to medium-gray (N5), very fine grained, well sorted, very slightly micaceous, slightly calcareous cementing material, scattered black minerals; some shale, medium-gray (N5) to medium dark-gray (N4), slightly silty and slightly micaceous, few pieces coal.

Depth (feet)	Thickness (feet)	
1610-1615 1615-1665	5	Sandstone 99%, shale 1%: sandstone, white (N9) to medium-gray (N5), very fine grained, well sorted, very slightly micaceous, scattered black minerals; little shale, sandy, medium-gray (N5) to dark-gray (N3).
1665-1675 1675-1687 1615-1622 1622-1697	7	Sandstone: white (N9) to medium gray (N5), very fine-grained to fine-grained, few grains show limonitic staining, scattered black and few light-green minerals; several pieces shale, dark-gray (N3) (cavings?).
1697-1707 1707-1714 1714-1733 1622-1632	10	Like 1615-1622, more limonitic staining, trace "ironstone".
1733-1740 1632-1638	6	Sandstone 99%, shale 1%: sandstone, white (N9), very fine grained to fine-grained, some yellowish grains (limonite stain?); few pieces grayish-black (N2) shale (cavings?).
1740-1750		<u>Bluestone formation</u> — 580 feet thick
1638-1645 1750-1758	7	Sandstone 60%, shale 40%: sandstone, white (N9), to medium-gray (N5), very fine grained to fine grained, few larger pieces yellowish-brown, few scattered black minerals; shale, medium dark-gray (N4), slightly silty, very slightly micaceous.
1645-1655 1758-1765	10	Shale: medium dark-gray (N4), very slightly micaceous.

Depth (feet)	Thickness (feet)	
1655-1665	10	Shale: medium-gray (N5) to medium dark-gray (N4), slightly silty, very slightly micaceous.
1665-1675	10	Like 1655-1665, few pieces slightly brownish.
1675-1687	12	Like 1645-1655.
1687-1697	10	Like 1645-1655.
1697-1707	10	Shale: medium-gray (N5), very slightly silty, very slightly micaceous.
1707-1714	7	Shale: medium dark-gray (N4), very slightly micaceous.
1714-1723	9	Shale: silty, medium-gray (N5), slightly micaceous, some calcareous.
1723-1740	7	Shale: medium light-gray (N6) to medium-gray (N5), slightly silty, slightly calcareous.
1740-1750	10	Shale: silty, medium-gray (N5) to reddish-gray to greenish-gray (5G 6/1), some is calcareous.
1750-1759	9	Shale: silty, medium dark-gray (N4) to reddish-gray to greenish-gray (5G 6/1), some pieces argillaceous limestone or calcareous shale.
1759-1765	6	Shale 95%, sandstone 5%: shale, micaceous, medium dark-gray (N4), some reddish-gray, silty to sandy; and sandstone, calcareous, light-gray (N7), very fine grained.
1765-1770	5	Shale: medium dark-gray (N4) to dark-gray (N3), very slightly silty and very slightly micaceous.

Depth (feet)	Thickness (feet)	
1770-1775	5	Shale: medium light-gray (N6) to medium dark-gray (N4) to reddish-gray to greenish-gray (5G 6/1), few pieces calcareous, few pieces sandy.
1775-1785	10	Shale: medium-gray (N5) to medium dark-gray (N4) to reddish-gray to greenish-gray (5GY 6/1), some sandy and slightly micaceous and calcareous, trace pyrite.
1785-1790	5	Like 1775-1785, little more pyrite.
1790-1800	10	Shale: medium-gray (N5) to dark-gray (N3) to reddish-gray, some very slightly micaceous, very slightly silty, little pyrite.
1800-1810	10	Like 1790-1800, no pyrite.
1810-1815	5	Like 1790-1800, no pyrite, few pieces tan limestone.
1815-1823	8	Shale 95%, sandstone and siltstone 5%: shale, medium-gray (N5) to reddish-gray; sandstone grading into siltstone, medium-gray (N5) to greenish-gray (5GY 6/1), scattered black minerals; few pieces limestone, tan to medium-gray (N5), trace pyrite.
1823-1836	13	Like 1815-1823 except more sandstone (30%), few light-green minerals, no pyrite.
1836-1843	7	Shale: medium-gray (N5) to reddish-gray, very finely micaceous, very slightly calcareous, few pieces very calcareous, slightly silty.

Depth (feet)	Thickness (feet)	
1843-1846	3	Shale 60%, sandstone and siltstone 40%: shale, medium-gray (N5) to medium dark-gray (N4) to grayish-red, some finely micaceous; sandstone grading into siltstone, medium-gray (N3) to greenish tint, slightly calcareous, very slightly micaceous, trace pyrite.
1846-1851	5	Shale: medium dark-gray (N4), slightly calcareous; few pieces sandstone, white (N9), very fine grained (cavings?).
1851-1858	7	Shale 95%, sandstone 5%: shale, medium dark-gray (N4) to dark-gray (N3), slightly calcareous; sandstone, very light gray (N8) to medium-gray (N5) to greenish tint, very fine grained, slightly calcareous, few scattered black minerals.
1858-1868	10	Sandstone 60%, shale 40%: sandstone, white (N9) to light-gray (N7) to greenish tint, few grains show limonitic staining, few scattered black minerals; shale, medium-gray (N5) to dark-gray (N3).
1868-1878	10	Like 1858-1868 except shale 20%.
1878-1888	10	Like 1858-1868 except shale 20%, very slightly micaceous.
1888-1898	10	Sandstone 80%, shale 20%: sandstone, white (N9) to medium-gray (N5) to some with greenish tint, few scattered black minerals; shale, medium-gray (N5) to medium dark-gray (N4), very slightly micaceous.

Depth (feet)	Thickness (feet)	
1898-1904	6	Shale 85%, sandstone 15%: shale, medium dark-gray (N4) to dark-gray (N3), slightly micaceous; sandstone, light-gray (N7) to medium-gray (N5), few pieces with greenish tint, very fine grained, several pieces pyrite.
1904-1908	4	Shale 50%, sandstone 50%: shale, dark-gray (N3) to grayish-black (N2), few pieces green; sandstone, white (N9) to dark-gray (N3) (argillaceous), few scattered black minerals, several pieces pyrite.
1908-1915	7	Sandstone, shale: sandstone, white (N9) to light-gray (N7), very fine grained, scattered black minerals; shale, dark-gray (N3), finely micaceous, few pieces show schistosity.
1915-1918	3	Sandstone 99%, shale 1%: sandstone, light-gray (N7), very fine grained, some grains stained by limonite, scattered black minerals; shale, medium-gray (N5) to dark-gray (N3).
1918-1926	8	Sandstone 99%, shale 1%: sandstone, white (N9), very fine grained, well sorted, few pieces medium dark-gray (N4) shale (cavings?).
1926-1934	8	Sandstone 80%, shale 20%: sandstone, white (N9) to light-gray (N7), very fine grained, some limonitic staining, scattered black minerals; shale, medium-gray (N5) to dark-gray (N4), some finely micaceous.

Depth
(feet)

Thickness
(feet)

1934-1941

7 Shale 90%, sandstone 10%: shale, silty, medium dark-gray (N4), finely micaceous; sandstone, argillaceous, light-gray (N7) to medium-gray (N5), few scattered black minerals.

1941-1950

9 Shale, sandstone: shale, medium dark-gray (N4), finely micaceous, some silty to sandy, some argillaceous; sandstone, medium-gray (N5), very fine grained.

1950-1955

1955-1960

1950-1960

10 Shale 70%, sandstone 30%: shale, silty, medium dark-gray (N4), finely micaceous; sandstone, white (N9) to medium-gray (N5), some argillaceous, few scattered black minerals.

1960-1966

6 Shale 90%, sandstone 10%: like 1950-1960, trace pyrite.

1966-1972

6 Sandstone 50%, shale 50%: sandstone, calcareous, white (N9) to tan to medium-gray (N5), few pieces greenish, very fine grained, slightly micaceous, few scattered black minerals; shale, silty, medium dark-gray (N4) to dark-gray (N3), finely micaceous.

1972-1977

5 Like 1966-1972.

1977-1982

5 Sandstone 85%, shale 15%: sandstone, white (N9) to medium-gray (N5) (argillaceous), very slightly micaceous; shale, silty, medium dark-gray (N4), finely micaceous.

Depth (feet)	Thickness (feet)	
1982-1988	6	Sandstone 60%, shale 40%: sandstone, very light gray (N8) to medium-gray (N5) to brownish-gray (5YR 4/1), very fine grained, very slightly micaceous, scattered black minerals; shale, silty, micaceous, dark-gray (N3).
2120-2125		
2130-2135		
2140-2145		
1988-1999	11	Sandstone 70%, shale 30%: like 1982-1988.
1999-2009	10	Sandstone 50%, shale 50%: like 1982-1988; some pieces shale very slightly calcareous.
2161-2166		
2009-2017	8	Sandstone 99%, shale 1%: sandstone, very light gray (N8) to medium-gray (N5), very fine grained, slightly calcareous, scattered black minerals; shale, silty, micaceous, dark-gray (N3).
2171-2176		
2176-2181		
2017-2028	11?	Sandstone 95%, shale 5%: like 2009-2017, few greenish grains of sandstone.
2028-2039	11	Shale 99%, sandstone 1%: shale, medium dark-gray (N4), finely micaceous; little sandstone like 2009-2017 (cavings?).
2039-2049	10	Like 2028-2039.
2049-2060	11	Like 2028-2039, less sandstone.
2060-2070	10	Shale, medium dark-gray (N4), very finely micaceous.
2070-2080	10	Like 2060-2070.
2080-2090	10	Like 2060-2070.
2090-2100	10	No samples.
2100-2113	13	Like 2060-2070, few brownish pieces.

Depth (feet)	Thickness (feet)	
2113-2123	10	Like 2060-2070.
2123-2131	8	Shale: dark-gray (N3), white spots in it, very slightly calcareous, very finely micaceous.
2131-2144	13	Shale: dark-gray (N3), very finely micaceous.
2144-2152	8	Shale: dark-gray (N3), very finely micaceous.
2152-2161	9	Shale: medium dark-gray (N4), very finely micaceous, slightly silty.
2161-2171	10	Shale: medium dark-gray (N4) to dark-gray (N3) to reddish-gray, finely micaceous, some is slightly silty, one piece sandy.
2171-2179	8?	Like 2161-2171, none sandy.
2179- ?		Shale, medium-gray (N5) to dark-gray (N3), finely micaceous, some slightly silty, few pieces calcareous.
2188-2193	5	Shale 70%, sandstone 30%: shale, medium dark-gray (N4) to dark-gray (N3), few pieces reddish-gray, some slightly silty and finely micaceous; sandstone, white (N9) to medium-gray (N5), very fine grained, scattered black minerals.
2193-2198	5	Shale 95%, sandstone 5%: shale, medium dark-gray (N4), finely micaceous, slightly silty; sandstone, white (N9) to medium-gray (N5), very fine grained, few scattered black minerals.

Depth
(feet)

Thickness
(feet)

2198-2209

11

Shale 95%, sandstone 5%: shale, medium dark-gray (N4) to dark-gray (N3) to reddish-brown, slightly silty, finely micaceous, some pieces very micaceous; sandstone, white (N9) to medium-gray (N5) to reddish-brown, few scattered black minerals.

2209-2218

9

Shale 95%, sandstone 5%: shale, medium dark-gray (N4), finely micaceous, slightly silty; sandstone, light-gray (N7) to medium-gray (N5), slightly micaceous, few scattered black minerals.

Princeton sandstone ~~—67 feet thick~~

2218-2223

5

Shale 50%, sandstone 50%: shale, medium dark-gray (N4) to dark-gray (N3), some finely micaceous and silty; sandstone, white (N9) to light-gray (N7), very fine grained, scattered black minerals, very slightly micaceous.

2223-2230

7

Shale 80%, sandstone 20%: shale, medium dark-gray (N4) to dark-gray (N3), very slightly micaceous; sandstone, white (N9) to light-gray (N7), very fine grained, scattered black minerals.

2230-2233

3

Sandstone 60%, shale 40%: sandstone, white (N9) to medium-gray (N5), very fine grained, some argillaceous, very slightly micaceous, few scattered black minerals; shale, medium dark-gray (N4) to dark-gray (N3), some silty and finely micaceous.

2233-2237

4

Sandstone 95%, shale 5%: sandstone, white (N9), fine-grained, subrounded to angular; shale, dark-gray (N3).

Depth (feet)	Thickness (feet)	
2237-2241	4	Sandstone 50%, shale 50%: sandstone, white (N9), fine-grained, well sorted, some grains show limonitic staining, few scattered black and light-green minerals; shale, dark-gray (N3), few pieces green, very finely micaceous.
2241-2243	2	Sandstone 60%, shale 40%: sandstone, white (N9), fine-grained, scattered black and few green minerals, several pieces grayish-black (N2) magnetic mineral (magnetite?); shale, medium dark-gray (N4) to grayish-black (N2), some finely micaceous.
2243-2250	7	Sandstone 80%, shale 20%: sandstone, white (N9) to very light gray (N8), fine-grained, few scattered black minerals, several pieces grayish-black (N2) magnetic mineral (magnetite?); shale, medium dark-gray (N4) to grayish-black (N2), few pieces slightly micaceous.
2250-2253	3	Sandstone 85%, shale 15% sandstone, white (N9), fine-grained to medium-grained, angular to sub-angular, few larger pieces quartz, some limonitic staining; shale, grayish-black (N2) to medium-gray (N5) (little), some pieces finely micaceous, several pieces grayish-black (N2) magnetic mineral (magnetite?), some pyrite.

Depth (feet)	Thickness (feet)	
2253-2258	5	Sandstone 90%, shale 10%: like 2250-2253, no pyrite, some very fine grained sandstone.
2258-2263	5	Sandstone 90%, shale 10%: sandstone, white (N9), very fine grained to fine-grained, few larger pieces, subrounded to angular; shale, dark-gray (N3) to grayish-black (N2); some pieces grayish-black magnetic mineral (magnetite?).
2263-2267	4	Sandstone 90%, shale 10%: sandstone, white (N9), fine-grained to coarse-grained, poorly sorted, angular to subangular, limonitic staining; shale, medium dark-gray (N4) to dark-gray (N3) to reddish-gray, few pieces dark-gray (N3) magnetic mineral (magnetite?), few pieces pink earthy limestone.
2267-2269	2	Like 2263-2267.
2269-2275	6	Sandstone 90%, shale 10%: sandstone, white (N9), very fine grained to coarse-grained, angular to subangular; shale, dark-gray (N3) to grayish-black (N2), trace pyrite.
2275-2278	3	Like 2269-2275, no pyrite.

continued

Depth
(feet)

Thickness
(feet)

2278-2285

7

Sandstone 85%, shale 15%: sandstone, white (N9), fine-grained to coarse-grained, angular to sub-angular, some pieces argillaceous, limonitic staining; shale, medium dark-gray (N4) to grayish black (N2), ostracod.

Hinton formation (Avis limestone member of Reger) — 57 feet thick

2285-2291

6

Limestone and shale 60%, sandstone 40%: argillaceous limestone grading into calcareous shale, medium dark-gray (N4), finely micaceous; sandstone, white (N9), fine-grained to coarse-grained, angular to subangular, some pyrite.

2291-2297

6

Limestone and shale: argillaceous limestone grading into calcareous shale, like 2285-2291; few pieces limestone, light-gray (N7); few pieces sandstone, white (N9), medium-grained (cavings?), trace pyrite.

2297-2304

7

Like 2291-2297, no pyrite.

2304-2310

6

Like 2291-2297, no pyrite, no sandstone.

2310-2320

10

Like 2291-2297, no pyrite, no sandstone.

2320-2333

13

Limestone and shale: argillaceous limestone grading into calcareous shale; light-gray (N7) to medium dark-gray (N4), some finely micaceous and very slightly silty, some pyrite.

2333-2342

9

Like 2320-2333, crinoid stem.

Depth
(feet)

Thickness
(feet)

Hinton formation undivided ~~243 feet thick~~

2342-2350

8

Shale: medium-gray (N5) to medium dark-gray (N4) to grayish-red (5R 4/2), few pieces calcareous, light-gray (N7), very soft; trace pyrite.

2350-2355

5

Shale 60%, sandstone 40%: shale, medium-gray (N5) to medium dark-gray (N4) to reddish-gray, some finely micaceous; sandstone, light-gray (N7) to medium-gray (N5) to brownish tint, very fine grained, some argillaceous, some micaceous.

2355-2360

5

Sandstone 75%, shale 25%: sandstone, light-gray (N7) to medium-gray (N5), very fine grained, very slightly micaceous; shale, medium dark-gray (N4) to dark-gray (N3) to reddish-gray, some finely micaceous, trace pyrite.

2360-2365

5

Sandstone 98%, shale 2%: sandstone, light-gray (N7), very fine grained, scattered black minerals; shale, medium dark-gray (N4) to dark-gray (N3) to reddish-gray, some pyrite.

2365-2375

10

No samples.

2375-2381

6

Sandstone 65%, shale 35%: sandstone, white (N9), fine-grained, few scattered black minerals; shale, medium dark-gray (N4) to grayish-black (N2), few pieces reddish-gray, some finely micaceous.

Depth
(feet)

Thickness
(feet)

2381-2387

6

Sandstone 60%, shale 40%: sandstone, white (N9)

to some medium-gray (N5), fine-grained, angular to subangular, few pieces argillaceous and micaceous, few scattered black minerals; shale, medium dark-gray (N4) to grayish-black (N2), few pieces reddish, some micaceous, some finely micaceous, and some silty.

2393-2405

2405-2430

2430-2440

2440-2450

Depth (feet)	Thickness (feet)	
2387-2395	8	Sandstone 75%, shale 25%: like 2381-2387, some green minerals (glauconite?), little limonitic staining.
2395-2398	3	Sandstone, shale: sandstone, white (N9) to light-gray (N7), fine-grained, some pieces argillaceous, few pieces slightly calcareous, scattered black and few green (glauconite?) minerals; shale, medium dark-gray (N4) to dark-gray (N3) to grayish-red (5R 4/2).
2398-2405	7	Sandstone 95%, shale 5%: sandstone, white (N9) to light-gray (N7), fine-grained, scattered black minerals; shale, medium dark-gray (N4) to grayish-black (N2) to reddish-gray.
2405-2410	5	Sandstone 85%, shale 15%: like 2398-2405, few pieces dark-gray (N3) magnetic mineral (magnetite?), some limonitic (?) staining.
2410-2418	8	Shale 60%, sandstone 40%: shale, medium dark-gray (N4), mostly finely micaceous, some silty; sandstone, white (N9) to medium-gray (N5), some argillaceous, few scattered black minerals, few grains show limonitic (?) staining.
2418-2425	7	Sandstone 60%, shale 40%: sandstone, white (N9) to very light gray (N8), very fine-grained to fine-grained, subangular to angular; shale, dark-gray (N3).

Depth (feet)	Thickness (feet)	
2425-2431	6	Shale 85%, sandstone 15%: shale, medium-gray (N5) to dark-gray (N3), some pieces very micaceous, some silty to sandy, slightly calcareous; sandstone, white (N9) to medium-gray (N5), very fine grained, some argillaceous, slightly calcareous, few scattered black and green (glauconite?) minerals.
2431-2440	9	Shale: medium-gray (N5) to dark-gray (N3) to grayish-red (5R 4/2), some silty to sandy, some very micaceous, some calcareous; few pieces sandstone, white (N9), fine-grained.
2440-2444	4	Shale: medium-gray (N5) to medium dark-gray (N4) to reddish-gray, very calcareous to noncalcareous, very slightly micaceous, some silty to sandy; few pieces limestone, light-gray (N7).
2444-2448	4	Shale: medium-gray (N5) to medium dark-gray (N4) to reddish-gray, some micaceous, some silty to sandy; few pieces sandstone, white (N9), fine-grained, few pieces calcareous.
2448-2455	7	Shale: light-gray (N7) to medium dark-gray (N4) to grayish-red (5R 4/2), some very micaceous, some silty, some calcareous.
2455-2465	10	Shale: grayish-red (5R 4/2) to dark-gray (N3), about 50% very micaceous, few pieces silty.
2465-2475	10	Like 2455-2465.

Depth (feet)	Thickness (feet)	
2475-2485	10	Shale 80%, shale 20%: shale, medium dark-gray (N4) to dark-gray (N3) to grayish-red (5R 4/2), finely micaceous, some very micaceous, slightly calcareous; sandstone, calcareous, argillaceous, medium-gray (N4), very fine grained, some slightly micaceous, scattered black mineral, little pyrite.
2485-2490	5	Shale 90%, sandstone 10%: shale, medium dark-gray (N4) to dark-gray (N3), few pieces grayish-red (5R 4/2), slightly calcareous, some finely micaceous; sandstone, like 2475-2485, little pyrite.
2490-2495	5	Shale 99%, sandstone 1%: shale, silty, medium dark-gray (N4) to grayish-red (5R 4/2) to brownish-gray (5YR 4/1), some finely micaceous; sandstone, argillaceous, medium-gray (N5), very fine grained.
2495-2500	5	Sandstone 70%, shale 30%: sandstone, brownish-gray (5YR 6/1), very fine grained, slightly micaceous, scattered black minerals; shale, medium dark-gray (N4) to grayish-black (N2) to reddish-gray to brown, some silty and finely micaceous.
2500-2505	5	Like 2495-2500.
2505-2512	7	Sandstone 90%, shale 10%: sandstone, medium-gray (N5), very fine grained, slightly micaceous, scattered black minerals; shale, medium dark-gray (N4) to grayish-black (N2) to reddish-gray, some pieces micaceous, little limonitic staining.

Depth (feet)	Thickness (feet)	
2512-2518	6	Sandstone 95%, shale 5%: like 2505-2512, few green minerals (glauconite?).
2518-2528	10	Shale: medium dark-gray (N4) to dark-gray (N3), few pieces reddish-gray, some finely micaceous, some silty to sandy.
2528-2538	10	Shale 80%, sandstone 20%: shale, medium dark-gray (N4) to dark-gray (N3) to dark-red to brown, very slightly micaceous; sandstone, white (N9) to brown to medium-gray (N5), very fine grained.
2538-2545	7	Shale: medium-gray (N5) to dark-gray (N3), few pieces red, few with greenish tint, about 25% silty to sandy, very slightly micaceous, some pyrite.
2545-2555	10	Like 2538-2545.
2555-2565	10	Shale: medium dark-gray (N4) to reddish-gray, very slightly micaceous, very slightly calcareous, some slightly silty.
2565-2575	10	Shale, medium dark-gray (N4), very finely micaceous, some pieces slightly silty, very slightly calcareous to calcareous.
2575-2596	21	Shale 60%, sandstone and siltstone 40%: shale, medium-gray (N5) to medium dark-gray (N4), few pieces reddish-gray, very slightly micaceous, some very slightly calcareous; sandstone grading into siltstone, white (N9) to medium light-gray (N6), very slightly calcareous, few scattered black minerals.

Depth
(feet)

Thickness
(feet)

2575-2596. Reddish-gray.

Hinton formation (Stony Gap sandstone member) - ~~263 feet thick~~

2585-2596

11

Sandstone 60%, shale 40%: sandstone, white (N9) to medium light-gray (N6), very fine grained, scattered black minerals; shale, medium dark-gray (N4) to dark-gray (N3), some pieces slightly micaceous, few pieces slightly calcareous.

Like 2596-2600, fine-grained sandstone, some

Note: Insert for Clinchfield Coal Corporation well No. 102; follows interval 2575-2596 and precedes interval 2596-2600.

Why not
Stony Gap sandstone member of the Hinton
formation?
or if the name "Hinton formation continued"
is placed on the top of each page dealing with
the Hinton wouldn't the name of the
member be sufficient?

Depth (feet)	Thickness (feet)	
2596-2600	4	Like 2585-2596, few pieces shale, reddish-gray.
2600-2611	11	Sandstone 80%, shale 20%: sandstone, white (N9) to light-gray (N7), very fine grained to fine-grained, few scattered black minerals; shale, medium dark-gray (N4) to dark-gray (N3), few pieces red, very slightly micaceous, some pyrite.
2611-2616	5	Like 2600-2611, fine-grained sandstone, some limonitic staining.
2616-2620	4	Sandstone 90%, shale 10%: like 2600-2611, fine-grained sandstone, some limonitic staining, no pyrite.
2620-2625	5	Like 2600-2611, fine-grained sandstone, some limonitic staining, no pyrite.
2625-2635	10	Shale, dark-gray (N3) to medium dark-gray (N4), very slightly micaceous, pyrite.
2635-2645	10	Shale 99%, sandstone 1%: shale, medium dark-gray (N4), silty to sandy, very slightly micaceous; sandstone, white (N9) to light-gray (N7), very fine grained, pyrite.
2645-2652	7	Like 2635-2645, little pyrite.
2652-2655	3	Sandstone 60%, shale 40%: sandstone, white (N9) to medium-gray (N5), very fine grained, some argillaceous few scattered black minerals; shale, medium dark-gray (N4) to dark-gray (N3), pyrite.

Depth (feet)	Thickness (feet)	
2655-2659	4	Sandstone 60%, shale 40%: sandstone, white (N9) to medium-gray (N5), very fine grained, some argillaceous, some limonitic staining, scattered black minerals; shale, medium dark-gray (N4) to dark-gray (N3), few pieces reddish-gray, very slightly micaceous, few pieces silty, pyrite.
2659-2665	6	Sandstone 70%, shale 30%: like 2655-2659.
2665-2668	3	Like 2655-2659, cementing material in sandstone very slightly calcareous; piece limestone, white (N9), crystalline.
2668-2672	4	Sandstone 75%, shale 25%: sandstone, white (N9) to very light gray (N8), very fine grained, few grains slightly calcareous; shale, medium dark-gray (N4) to grayish-black (N2), several pieces reddish-gray, little pyrite.
2672-2677	5	Sandstone 97%, shale 3%: sandstone, white (N9), very fine grained, angular to subangular, free, very few clusters; shale, grayish-black (N2), trace pyrite.
2677-2682	5	Sandstone 95%, shale 5%: like 2672-2677, more clusters; shale, medium dark-gray (N4) to grayish-black (N2).

Depth (feet)	Thickness (feet)	
2682-2686	4	Sandstone 70%, shale 30%: sandstone, white (N9), very fine grained, angular, clustered, some cementing material very slightly calcareous, limonitic staining, few scattered black minerals; shale, medium dark-gray (N4) to dark-gray (N3), few pieces very slightly micaceous, trace pyrite.
2686-2690	4	Like 2682-2686, no pyrite.
2690-2693	3	Sandstone 55%, shale 45%: like 2682-2686, covered by light-tan calcareous silty to clayey material.
2693-2698	5	Sandstone 85%, shale 15%: sandstone, white (N9) to light-gray (N7), very fine grained, angular to subangular, free and in clusters (mostly free), few pieces slightly calcareous, few scattered black minerals; shale, medium dark-gray (N4) to black (N1), trace pyrite.
2698-2705	7	No samples.
2705-2708	3	Sandstone 60%, shale 40%: sandstone, white (N9) to medium-gray (N5), very fine grained, angular, few pieces very slightly calcareous, some limonitic staining, few scattered black and light-green minerals, sample is dirty; shale, medium dark-gray (N4) to dark-gray (N3), two or three reddish-brown pieces and two or three greenish-gray (5G 6/1) pieces, few pieces finely micaceous.

Depth
(feet)

Thickness
(feet)

2708-2710

2

Sandstone 60%, shale 40%: sandstone, white (N9) to few light-gray (N7), very fine grained, angular to subangular, free and clustered, some limonitic staining, few scattered black minerals; shale, medium dark-gray (N4) to dark-gray (N3), two or three pieces reddish-brown, some pieces very slightly micaceous, trace pyrite.

2710-2713

3

Sandstone 70%, shale 30%: like 2708-2710.

2713-2718

5

Sandstone 98%, shale 2%: sandstone, white (N9), fine-grained to some medium-grained, angular; shale, dark-gray (N3) to black (N1), trace coal.

2718-2721

3

Sandstone 95%, shale 5%: like 2713-2718, little limonitic staining, no coal.

2721-2724

3

Sandstone 90%, shale 10%: like 2713-2718, little limonite staining, no coal, few pieces soft white calcareous slightly silty material.

2724-2730

6

Shale 60%, sandstone 40%: shale, medium dark-gray (N4), silty to sandy, slightly micaceous; sandstone, argillaceous, white (N9) to medium-gray (N5), very fine-grained to fine-grained.

2730-2735

5

Sandstone 65%, shale 35%: sandstone, white (N9) to medium-gray (N5), very fine grained to some fine-grained, much is argillaceous, few scattered black minerals; shale, medium dark-gray (N4) to dark-gray (N3), silty to nonsilty, slightly micaceous.

Depth (feet)	Thickness (feet)	
2735-2740	5	Sandstone 70%, shale 30%: sandstone, white to some medium-gray (N5), very fine grained, few pieces argillaceous, few scattered black minerals; shale, medium dark-gray (N4) to several pieces medium-gray (N5), trace pyrite.
2740-2745	5	Sandstone 98%, shale 2%: like 2735-2740 except some limonitic staining and two or three pieces shale, reddish-gray.
2745-2748	3	Like 2735-2740, some limonitic staining, two or three pieces shale, reddish-gray.
2748-2750	2	Like 2735-2740, some limonite staining; some shale, grayish-black (N2).
2750-2755	5	Sandstone 97%, shale 3%: sandstone, white (N9), very fine-grained to fine-grained, angular to subangular, free, few clusters, transparent; shale, dark-gray (N3) to black (N1).
2755-2761	6	Sandstone, shale: sandstone, white (N9), very fine grained to little fine-grained; shale, dark-gray (N3) to black (N1), slight amount silty material on sample.
2761-2762	1	No samples.
2762-2769	7	Shale, sandstone: shale, medium dark-gray (N4) to dark-gray (N3); sandstone, white (N9), fine-grained to medium-grained, angular to subangular, some soft white calcareous silty material, cements some sand and shale fragments.

Depth (feet)	Thickness (feet)	
2769-2771	2	Sandstone 75%, shale 25%: sandstone, white (N9), fine-grained, angular to subangular; shale, medium-gray (N5) to medium dark-gray (N3), little limonitic staining; white (N9) to pink soft calcareous material (silty) covering sample, in pieces and cementing sandstone and shale fragments, several pieces coal.
2771-2773	2	Sandstone 95%, shale 5%: sandstone, white, fine-grained, angular to subangular, mostly free, some clusters, limonitic staining; shale, dark-gray (N3) to black (N1), one or two pieces red.
2773-2774	1	No samples.
2774-2778	4	Sandstone 75%, shale 25%: sandstone, white (N9), very fine-grained to fine-grained, angular to subangular; shale, medium dark-gray (N4), few pieces grayish-black (N2).
2778-2785	7	Sandstone 50%, shale 50%: sandstone, white (N9), fine-grained, angular to subangular, limonitic staining; shale, dark-gray (N3), several pieces medium-gray (N5) shale, few pieces finely micaceous, trace pyrite, trace coal.
2785-2790	5	Shale 99%, sandstone 1%: shale, medium dark-gray (N4), slightly finely micaceous; sandstone, argillaceous, medium-gray (N5), very fine grained, trace pyrite.

Depth (feet)	Thickness (feet)	
2790-2797	7	Shale 90%, sandstone 10%: shale, medium dark-gray (N4) to dark-gray (N3), some pieces finely micaceous (slightly); sandstone, white (N9) to medium-gray (N5), very fine grained, some argillaceous, some limonitic staining, few scattered black minerals, trace pyrite.
2797-2799	2	Like 2790-2797.
2799-2803	4	Sandstone 90%, shale 10%: sandstone, white (N9), very fine grained, angular, clustered, few pieces argillaceous, limonite staining, scattered black and few green (glauconite?) minerals; shale, medium dark-gray (N4) to grayish-black (N3), some pieces finely micaceous, trace coal.
2803-2808	5	Siltstone 99%, shale 1%: siltstone, very light gray (N8) to light-gray (N7), noncalcareous to very calcareous, very slightly micaceous, few scattered black minerals; shale, medium dark-gray (N4) to grayish-black (N2), trace coal.
2808-2815	7	Shale 95%, sandstone 5%: shale, medium-gray (N5) to medium dark-gray (N4), some pieces finely micaceous (slightly), some silty; sandstone, white (N9) to medium-gray (N5), very fine grained, very slightly calcareous, light silty calcareous material.

Depth (feet)	Thickness (feet)	
2815-2820	5	Sandstone 90%, shale 10%: sandstone, white (N9) to few pieces medium-gray (N5), very fine grained, angular, free to some clusters, few pieces calcareous; shale, grayish-black (N2), few pieces dark-gray (N3), several pieces micaceous.
2820-2824	4	Sandstone and siltstone, shale: sandstone (very fine grained) grading into siltstone (mostly sandstone), very light gray (N8) to light-gray (N7), free and clustered, few pieces calcareous, some scattered black minerals; shale, medium dark-gray (N4) to grayish-black (N2), two or three red pieces, several pieces calcareous.
2824-2828	4	Sandstone 95%, shale 5%: sandstone, white (N9), very fine grained, angular to subangular, free; shale, dark-gray (N3) to grayish-black (N2).
2828-2831	3	Sandstone 90%, shale 10%: sandstone, like 2824-2828 except clustered, few scattered black minerals; shale, like 2824-2828.
2831-2833	2	Sandstone 50%, shale 50%: sandstone, white (N9), very fine grained, angular, clustered, limonitic staining, few scattered black minerals; shale, medium dark-gray (N4) to dark-gray (N3), two or three red pieces; several pieces soft pink calcareous material.

Depth (feet)	Thickness (feet)	
2833-2836	3	Sandstone 70%, shale 30%: like 2831-2833, no red shale, no pink calcareous material.
2836-2837	1	Sandstone 95%, shale 5%: like 2831-2833, no red shale, no pink calcareous material.
2837-2841	4	Sandstone 97%, shale 3%: sandstone, white (N9), fine-grained, angular to subangular, free, few clusters, few scattered black minerals; shale, dark-gray (N3) to black (N1), two or three pieces soft white calcareous material.
2841-2843	2	Like 2837-2841.
2843-2848	5	Sandstone 95%, shale 5%: sandstone, white (N9) to tan, fine-grained, poorly sorted, mostly clustered, few pieces calcareous, some limonitic staining, few scattered black minerals; shale medium dark-gray (N4) to dark-gray (N3).
<u>Bluefield shale</u> — 502 feet thick		
2848-2851	3	Shale 55%, sandstone 45%: shale, medium dark-gray (N4), few pieces with reddish tint, few pieces lighter gray; sandstone, white (N9), very fine grained, much limonitic staining, few black minerals, trace pyrite.
2851-2855	4	Shale 96%, limestone 3%, pyrite 1%: shale, medium dark-gray (N4), very finely micaceous (slightly), noncalcareous to calcareous; sandstone, white (N9) to light-gray (N7), very fine grained, slightly calcareous, few black minerals; limestone to dolomite, argillaceous, medium-gray (N3), limonitic staining; pyrite.

Depth (feet)	Thickness (feet)	
2855-2860	5	Like 2851-2855.
2860-2867	7	Shale: calcareous, medium dark-gray (N4); trace sandstone like 2851-2855 (cavings?).
2867-2873	6	Like 2860-2867, except very slightly calcareous.
2873-2880	7	Like 2860-2867, slightly calcareous to calcareous to dolomitic.
2880-2890	10	Like 2860-2867, slightly calcareous to calcareous to dolomitic.
2890-2900	10	Like 2860-2867, only few pieces calcareous, trace pyrite.
2900-2905	5	Like 2860-2867, only few pieces calcareous, trace pyrite.
2905-2915	10	Like 2860-2867, only few pieces calcareous.
2915-2923	8	Shale 60%, sandstone 40%: shale, medium dark-gray (N4), few pieces medium-gray (N2), some pieces very finely micaceous (slightly); sandstone, white (N9) to some light-gray (N7), very fine grained, some pieces very slightly calcareous, limonite stain, several pieces pyrite.
2923-2927	4	Sandstone 75%, shale 25%: sandstone, white (N9), very fine grained, free, few clusters, few pieces slightly calcareous, limonite stain; shale, medium dark-gray (N4) to dark-gray (N3), trace pyrite.
2927-2935	8	Shale 99%, shale 1%: shale, medium dark-gray (N4) to some medium-gray (N5), few pieces silty; sandstone, white (N9) to light-gray (N7), very fine grained, trace pyrite.

Depth (feet)	Thickness (feet)	
2935-2942	7	Shale: medium-gray (N5) to little medium dark-gray (N4), some pieces very finely micaceous, some slightly silty, very little limonite stain.
2942-2951	9	Shale: medium dark-gray (N4).
2951-2959	8	Shale: medium dark-gray (N4), noncalcareous to very calcareous, few pieces silty, one very micaceous piece.
2959-2972	13	Like 2951-2959, nonmicaceous, few pieces limestone, trace pyrite.
2972-2977	5	Shale 85%, siltstone 15%: shale, medium-gray (N5) to medium dark-gray (N4) to several with greenish tint, noncalcareous to calcareous, mostly non-calcareous; siltstone, light-gray (N7) to tan to reddish-brown, slightly micaceous, very slightly calcareous to slightly calcareous, trace pyrite.
2977-2985	8	Shale 99%, shale 1%: shale, medium dark-gray (N4), noncalcareous to calcareous; siltstone, argillaceous, calcareous, light-gray (N7).
2985-2988	3	No samples.
2988-2995	7	Shale: medium dark-gray (N4), few very slightly calcareous; trace sandstone, white (N9), very fine grained, slightly calcareous, trace pyrite.
2995-3000	5	Shale: medium dark-gray (N4), noncalcareous to calcareous to few pieces argillaceous limestone.

Depth
(feet)

Thickness
(feet)

3000-3005

5

Limestone 60%, shale 40%: limestone, argillaceous, white (N9) to medium-gray (N5), few oolites; shale, medium dark-gray (N4), noncalcareous to slightly calcareous.

3005-3010

5

Like 3000-3005.

3010-3017

7

Shale 75%, sandstone 25%: shale, medium dark-gray (N4), noncalcareous to calcareous to argillaceous limestone; sandstone, argillaceous, white (N9) to medium-gray (N5), very fine grained, slightly calcareous.

3017-3025

8

Shale 70%, siltstone and sandstone 30%: shale, medium-gray (N5) to medium dark-gray (N4), noncalcareous to slightly calcareous; siltstone grading into very fine grained sandstone, calcareous, very light gray (N8), free and clusters; silty material very calcareous, light-gray (N7), covering sample.

3025-3029

4

Shale 50%, siltstone 50%: shale, medium-gray (N5), some very finely micaceous; siltstone, argillaceous, very light gray (N8) to medium light-gray (N6), very slightly calcareous.

3027-3035

8

Shale 85%, limestone 15%: shale, medium dark-gray (N4), noncalcareous to calcareous, slightly very finely micaceous; limestone, argillaceous, white (N9) to medium-gray (N5), very little limonite stain, trace pyrite.

3035-3039

4

No samples.

Depth
(feet)

Thickness
(feet)

3039-3047

8

Shale 75%, sandstone 25%: shale, medium dark-gray (N4), very slightly micaceous (very finely); sandstone, argillaceous, very light gray (N8) to medium-gray (N5), noncalcareous to calcareous, trace limonite stain.

3047-3050

3

No samples.

3050-3054

4

Sandstone 85%, shale 15%: sandstone, white (N9) to light-gray (N7), very fine grained, free and clusters, soft very calcareous cement in clusters, some limonite stain; shale, medium dark-gray (N4), noncalcareous to calcareous.

3054-3058

4

Sandstone 85%, shale 15%: sandstone, white (N9), clusters and free, few black minerals, noncalcareous to calcareous, limonite stain; shale, medium-gray (N5) to medium dark-gray (N4), two or three pieces with reddish tint.

3058-3061

3

No samples.

3061-3071

10

Shale 98%, sandstone 2%: shale, medium dark-gray (N4); sandstone, argillaceous, medium-gray (N5), very fine grained, slightly calcareous, trace pyrite.

3071-3078

7

Like 3061-3071, only trace sandstone.

3078-3080

2

Like 3061-3071, only trace sandstone, little pink to very light gray (N8) silty material, calcareous.

3080-3087

7

Shale 95%, sandstone 5%: like 3061-3071, sandstone slightly calcareous, very little silty calcareous material; shale, noncalcareous to very slightly calcareous.

Depth (feet)	Thickness (feet)	
3087-3100	13	Shale 99%, shale 1%: shale, medium dark-gray (N ₄), two or three pieces with brownish tint, few pieces very slightly calcareous; sandstone, argillaceous, medium-gray (N ₅), very fine grained, slightly calcareous.
3100-3110	10	Shale 98%, limestone 2%: shale, medium dark-gray (N ₄), very finely micaceous, noncalcareous to calcareous; limestone, argillaceous, medium-gray (N ₅) to white (N ₉), trace pyrite, one or two crinoid stems.
3110-3112	2	No samples.
3112-3126	14	Shale: medium dark-gray (N ₄).
3126-3160	34	No samples.
3160-3164	4	Shale 95%, limestone 5%: shale, medium-dark-gray (N ₄), noncalcareous to calcareous; limestone, argillaceous, medium-gray (N ₅) to white (N ₉), crystalline to noncrystalline, trace pyrite, trace fossils.
3164-3174	10	No samples.
3174-3178	4	Like 3160-3164, no pyrite, no fossils.
3178-3188	10	Shale 98%, limestone 2%: shale, medium dark-gray (N ₄), some pieces calcareous to noncalcareous, very slightly micaceous; limestone, argillaceous, medium-gray (N ₅) to medium dark-gray (N ₄), trace pyrite.

Depth (feet)	Thickness (feet)	
3188-3197	9	Shale 90%, limestone 10%: shale, medium dark-gray (N4), noncalcareous to slightly calcareous; limestone, argillaceous, medium-gray (N5) to white (N9), crystalline, one or two pieces dense, very oolitic zones.
3197-3204	7	Shale 75%, limestone 25%: shale, like 3188-3197; limestone, medium-gray (N5) to white (N9), crystalline, few pieces dense, few oolites, most is argillaceous.
3204-3211	7	Shale 75%, limestone: shale, medium dark-gray (N4), some calcareous shale, most is noncalcareous; limestone, argillaceous, medium-gray (N5) to white (N9), some crystalline.
3211-3217	6	Shale and limestone: shale, medium dark-gray (N4); calcareous shale grading into argillaceous limestone (25%), medium-gray (N5) to white (N9).
3217-3226	9	Shale 99%, limestone 1%: shale, medium dark-gray (N4), noncalcareous to slightly calcareous; few pieces limestone, medium-gray (N5), argillaceous.
3226-3237	11	Shale: like 3217-3226; few pieces limestone, little light-gray (N7) silty material, calcareous.
3237-3245	8	Shale 90%, limestone 10%: shale, dark-gray (N3); limestone, argillaceous, medium-gray (N5) to white (N9), trace fossil.
3245-3250	5	Shale 85%, limestone 15%: like 3237-3245, few pieces calcite.

Depth (feet)	Thickness (feet)	
3250-3257	7	Shale 85%, limestone 15%: like 3237-3245; shale, medium dark-gray (N4); few oolites, few pieces calcite.
3257-3266	9	Shale 99%, limestone 1%: shale, medium dark-gray (N4), very finely micaceous, calcareous to dolomitic, several pieces noncalcareous; limestone, white (N9) to medium-gray (N5), crystalline, trace pyrite.
3266-3274	8	Like 3257-3266.
3274-3278	4	Shale 90%, limestone 10%: like 3257-3266.
3278-3281	3	Shale 97%, limestone 3%: shale, medium dark-gray (N4) to dark-gray (N3), noncalcareous to calcareous; limestone, argillaceous, crystalline, trace pyrite.
3281-3287	6	Shale 50%, limestone 50%: like 3278-3281 except no shale, dark-gray (N3), more limestone, no pyrite.
3287-3292	5	Limestone 65%, shale 35%: limestone, dark-gray (N3) to white (N9), crystalline, much is argillaceous, very few oolites; shale, dark-gray (N3) to medium dark-gray (N4).
3292-3297	5	Limestone 95%, shale 5%: limestone, argillaceous, medium dark-gray (N3) to white (N9); shale, medium dark-gray (N4).
3297-3304	7	Limestone 80%, shale 20%: limestone, medium-gray (N5) to white (N9), crystalline, few pieces dense, slightly oolitic, some argillaceous; shale, dark-gray (N3) to medium dark-gray (N4), noncalcareous to calcareous.

Depth (feet)	Thickness (feet)	
3304-3310	6	Limestone 95%, shale 5%: limestone, argillaceous, medium dark-gray (N4) to white (N9), some crystalline, few oolites, one or two pieces calcite; shale, medium dark-gray (N4), trace pyrite.
3310-3314	4	Limestone 99%, shale 1%: like 3304-3310.
3314-3321	7	Limestone 60%, shale 40%: limestone, argillaceous, medium-gray (N5) to white (N9), few pieces brownish-gray (5YR 4/1), some crystalline, one or two pieces dense; shale, medium dark-gray (N4) to some dark-gray (N3), noncalcareous.
3321-3327	6	Limestone 50%, shale 50%: like 3314-3321, no brownish-gray (5YR 4/1) or dense limestone.
3327-3338	11	Shale 95%, limestone 5%: shale, very calcareous, dark-gray (N3) to medium dark-gray (N4); limestone, argillaceous, white (N9) to medium-gray (N5), little very soft earthy calcareous material, light-gray (N7), trace pyrite.
3338-3350	12	Like 3327-3338, except shale is medium dark-gray (N4), no pyrite, no soft earthy material.
<u>Greenbrier limestone</u> ³⁴⁶ 210 feet thick		
3350-3358	8	Limestone 97%, shale 3%: limestone, argillaceous, dark-gray (N3) to light-gray (N7), some crystalline; shale, calcareous, dark-gray (N3).

Depth (feet)	Thickness (feet)	
3358-3363	5	Limestone: very argillaceous, medium dark-gray (N4) to light-gray (N7), some crystalline.
3363-3367	4	Limestone: dark-gray (N3) to white (N9), crystalline and dense, oolitic zones; few pieces shale, dark-gray (N4).
3367-3373	6	Like 3363-3367.
3373-3380	7	Limestone: medium brownish-gray (5YR 5/1) to white (N9), dense to few crystalline, few pieces very very finely crystalline, few pieces oolitic.
3380-3386	6	Like 3373-3380, none oolitic.
3386-3390	4	Limestone: brownish-gray (5YR 4/1) to white (N9), dense to crystalline, few pieces oolitic, some reddish-brown iron material.
3390-3392	2	Like 3386-3390, no iron material.
3392-3395	3	Limestone: dark-gray (N3) to white (N9), dense and crystalline, few pieces oolitic; few pieces shale, dark-gray (N3).
3395-3400	5	Like 3392-3395, little more is crystalline, few pieces very finely crystalline.
3400-3405	5	Like 3392-3395.
3405-3410	5	Limestone: medium-gray (N5) to medium brownish-gray (N5YR 5/1) to white (N9), dense and crystalline, few pieces oolitic, one or two pieces of calcite.
3410-3418	8	Like 3405-3410, no calcite.
3418-3422	4	Like 3392-3395.

Thickness (feet)	Thickness (feet)	
3422-3429	7	Limestone: medium dark-gray (N4) to white (N9); dense to crystalline, few oolites, some argillaceous, few pieces soft and earthy.
3429-3433	4	Like 3422-3429; few pieces shale, medium dark-gray (N4), one piece pink soft earthy limestone, piece calcite.
3433-3436	3	Limestone: medium-gray (N5) to white (N9) to little brownish-gray (5YR 4/1), crystalline to very finely crystalline, few pieces dense, some pieces oolitic, some pieces argillaceous.
3436-3442	6	Like 3433-3436, only few oolites.
3442-3452	10	Limestone, medium dark-gray (N4) to white (N9), crystalline to dense, moderately oolitic.
3452-3457	5	Like 3442-3452, one or two calcite crystals.
3457-3463	6	Limestone: medium dark-gray (N4) to white (N9), very finely crystalline to medium crystalline, few oolites, some argillaceous, little very light gray (N8), soft silty material, calcareous; trace pyrite.
3463-3475	12	Like 3457-3463, no pyrite.
3475-3482	7	Limestone: argillaceous, medium dark-gray (N4) to white (N9), medium crystalline to finely crystalline.
3482-3487	5	Like 3475-3482, one or two pieces calcite.
3487-3497	15	Limestone: dark-gray (N3) to white (N9), dense to some very finely crystalline, some medium crystalline, few oolites.

Depth (feet)	Thickness (feet)	
3497-3503	6	Limestone: dark-gray (N3) to white (N9), dense to very finely crystalline, some medium crystalline, some argillaceous.
3503-3512	9	Limestone: white (N9) to medium-gray (N5) to light brownish-gray (5YR 6/1), crystalline, moderately oolitic.
3512-3516	4	Like 3503-3512, moderately oolitic zones, some is dense; trace shale, dark-gray (N3).
3516-3521	5	Limestone: white (N9) to medium-gray (N5), medium crystalline to some very finely crystalline.
3521-3531	10	Limestone: medium-gray (N5) to white (N9) to little brownish-gray (5YR 4/1), medium crystalline, some very finely crystalline to dense.
3531-3536	5	Limestone: brownish-gray (5YR 4/1) to white (N9), dense to very finely crystalline, little medium crystalline.
3536-3543	7	Limestone: brownish-gray (5YR 4/1), crystalline, little dense, oolitic zones; few pieces shale, dark-gray (N3).
3543-3549	6	Like 3536-3543, little powdery calcareous material over sample, no shale, piece calcite.
3549-3555	6	Like 3536-3543, little powdery calcareous material on sample, no shale, piece calcite.
3555-3562	7	Limestone: medium brownish-gray (5YR 5/1) to white (N9), dense to very finely crystalline, few pieces medium crystalline.

Depth (feet)	Thickness (feet)	
3562-3571	9	Limestone: medium brownish-gray (5YR 5/1) to white (N9), medium crystalline, some pieces finely crystalline to dense, oolitic, one or two pieces calcite.
3571-3579	8	Like 3562-3571.
3579-3583	4	Limestone: brownish-gray (5YR 4/1) to white (N9), crystalline to dense to very slightly oolitic.
3583-3588	5	Like 3579-3583, only few oolites, little silty calcareous material.
3588-3597	9	Limestone: brownish-gray (5YR 4/1) to white (N9), dense to very finely crystalline, few pieces chalky, few pieces medium crystalline, limonite stain.
3597-3603	6	Like 3588-3597, few oolites.
3603-3608	5	Like 3588-3597, few oolites.
3608-3621	13	Like 3588-3597, mostly dense, few pieces very oolitic.
3621-3628	7	Like 3588-3597, very few oolites, mostly dense.
3628-3635	7	Like 3588-3597, very few oolites, mostly dense, limestone, medium brownish-gray (5YR 5/1) to white (N9).
3635-3645	10	Like 3628-3635, limestone, more gray, several pieces quartz, white (N9) to orange tint, transparent to milky.
3645-3654	9	Like 3628-3635, limestone more gray, one piece quartz.

Depth (feet)	Thickness (feet)	
3654-3663	9	Limestone: medium-gray (N5) (little brownish tint) to white (N9), dense, few pieces crystalline, few pieces soft, earthy, two or three pieces calcite, two or three pieces quartz like 3635-3645.
3663-3671	8	Limestone: medium-gray (N5) to white (N9), dense to very finely crystalline, some is medium crystalline and oolitic, piece of calcite, fragment of quartz like 3635-3645.
3671-3676	5	Like 3663-3671 except not oolitic, only few pieces medium crystalline no calcite or quartz, trace iron stain.
3676-3686	10	Like 3671-3676, one or two pieces calcite, one or two pieces soft earthy limestone.
3686-3691	5	Like 3671-3676, brownish tint to some limestone, one or two pieces calcite, one or two pieces soft earthy limestone.
3691-3703	12	Limestone: medium dark-gray (N4) to white (N9), dense to few pieces crystalline, few pieces soft earthy, little silty material.
3703-3709	6	Limestone: medium-gray (N5) to medium dark-gray (N4) to very light gray (N8), dense, few pieces crystalline, argillaceous to nonargillaceous, little silty material, some pieces soft, earthy.
3709-3720	11	Limestone: argillaceous, medium dark-gray (N4) to very light gray (N8), few pieces soft earthy; few pieces shale, medium dark-gray (N4), one or two oolites.

Depth (feet)	Thickness (feet)	
3720-3723	3	Limestone: like 3703-3709, very few oolites.
3723-3730	7	Limestone: medium dark-gray (N4) to very light gray (N8), few pieces with brownish tint, dense, few pieces crystalline, argillaceous to nonargillaceous, few pieces earthy (very light gray (N8), several pieces chert, grayish-brown (5YR 3/2).
3730-3736	6	Like 3723-3730, limestone argillaceous.
		<u>Maccrady shale</u> ← 57 feet thick
3736-3747	11	Shale: medium dark-gray (N4) to medium-gray (N5), noncalcareous to slightly calcareous, little silty calcareous material used as cementing material in one or two pieces, trace pyrite.
3747-3758	11	Like 3736-3747, no silty cementing material, some shale very finely micaceous, two or three pieces limestone (cavings?).
3758-3768	10	Shale: medium-gray (N5) to little medium dark-gray (N4), few pieces very slightly calcareous, few pieces very finely micaceous, little silty calcareous material, glauconite (?); very few pieces limestone, white (N9) to medium-gray (N5), one soft earthy piece limestone.
3768-3774	6	Shale: medium dark-gray (N4), slightly silty, very slightly micaceous, one piece reddish-gray, one piece reddish-orange, one piece calcite, broken piece of quartz (cavings?).

Depth (feet)	Thickness (feet)	
3774-3780	6	Like 3768-3774 except no calcite, no red or reddish-orange shale.
3780-3787	7	Like 3768-3774, shale, more silty to sandy, no calcite, no red or reddish-orange shale.
3787-3793	6	Like 3768-3774, shale more silty to sandy, no reddish-orange shale, several pieces soft earthy limestone, two or three pieces calcite, several pieces red shale.
3857-		Price sandstone Pocono formation - 347 feet thick
3793-3800	7	Shale: medium dark-gray (N4) to medium-gray (N5) to few pieces light-gray (N7), very slightly micaceous, few pieces very slightly calcareous; few pieces limestone, brownish-gray (5YR 4/1), trace pyrite, little limonite stain.
3800-3806	6	Shale 97%, limestone 3%: shale, medium dark-gray (N4) to medium-gray (N5), some with reddish tint, slightly silty; limestone, white (N9) to medium-gray (N5), mostly soft, white, earthy, other is medium-gray, crystalline to dense; slightly limonite stained.
3806-3815	9	Shale: medium-gray (N5) to medium dark-gray (N4), slightly silty, very slightly micaceous, trace pyrite; trace limestone, medium-gray (N5) (cavings?).
3815-3823	8	Shale: medium-gray (N5), slightly silty, very slightly micaceous, little silty material.

Depth (feet)	Thickness (feet)	
3823-3830	7	Like 3815-3823, except very slightly silty, some pieces very slightly calcareous, trace pyrite.
3830-3839	9	Like 3815-3823, only slightly silty, some pieces very slightly calcareous, one piece soft earthy limestone.
3839-3857	18	Like 3830-3839, only slightly silty, some pieces very slightly calcareous, one or two pieces soft earthy limestone.
3857-3863	6	Shale 99%, limestone 1%: shale, medium-gray (N5), much very calcareous silty material covering shale; limestone, brownish-gray (N5YR 4/1) to white (N9).
3863-3877	14	Like 3857-3863, not as much silty material, trace pyrite.
3877-3884	7	Shale: medium dark-gray (N4) to some medium-gray (N5); 50% silty to sandy, noncalcareous to slightly calcareous; trace limestone, two or three pieces broken quartz, trace pyrite.
3884-3890	6	Like 3877-3884, no quartz.
3890-3902	12	Shale 95%, siltstone 5%: shale, medium dark-gray (N4) to medium-gray (N5), slightly micaceous; siltstone, very light gray (N8) to light-gray (N7), slightly calcareous.
3902-3917	15	Shale 99%, siltstone 1%: shale, medium dark-gray (N4) to medium light-gray (N6), one or two with brownish tint, slightly finely micaceous, few pieces slightly silty; siltstone, like 3890-3902.

Depth (feet)	Thickness (feet)	
3917-3922	5	Like 3902-3917, trace pyrite.
3922-3928	6	Sandstone and siltstone 60%, shale 40%: very fine grained sandstone grading into siltstone, argillaceous, very light gray (N8) to medium light-gray (N6), slightly calcareous; shale, medium dark-gray (N4), some silty, slightly finely micaceous; pyrite, disseminated.
3928-3940	12	Shale 95%, siltstone 5%: shale, silty, medium dark-gray (N4) to light brownish-gray (5YR 6/1), slightly micaceous, some slightly calcareous, little brownish silty material; siltstone, argillaceous, medium dark-gray (N4) to brownish-gray (5YR 4/1), slightly calcareous.
3940-3951	11	Siltstone 90%, shale 10%: siltstone, argillaceous, medium-gray (N5) to pale yellowish-brown (10YR 5/6) to light-gray (N7), slightly micaceous, few pieces very slightly calcareous; shale, medium dark-gray (N4), trace pyrite.
3951-3958	7	Siltstone and sandstone 85%, shale 15%: siltstone grading into very fine grained sandstone (15%), very light gray (N8) to medium dark-gray (N4), slightly calcareous, some pieces slightly micaceous; shale, medium dark-gray (N4), trace pyrite.
3958-3968	10	Like 3951-3958, scattered black minerals.

Depth (feet)	Thickness (feet)	
3968-3981	13	Shale 70%, siltstone 30%: shale, medium dark-gray (N4), much is silty, micaceous to nonmicaceous, few pieces slightly calcareous; siltstone, argillaceous, very light gray (N8) to medium dark-gray (N4), some slightly calcareous, some slightly micaceous.
3981-3985	4	Shale 95%, siltstone 5%: shale, medium dark-gray (N4), some slightly calcareous; siltstone, very light gray (N8) to medium dark-gray (N4), slightly calcareous, trace coal, trace pyrite.
3985-3990	5	Siltstone 60%, shale 40%: siltstone, argillaceous, very light gray (N8) to medium-gray (N5), some pieces slightly calcareous, few pieces slightly micaceous; shale, medium dark-gray (N4) to medium-gray (N5), few pieces brownish-gray (5YR 4/1), some silty, slightly finely micaceous, few pieces slightly calcareous; trace pyrite.
3990-4000	10	Shale 70%, siltstone 30%: like 3985-3990.
4000-4018	18	Shale 90%, siltstone 10%: shale, medium-gray (N5), very slightly micaceous, few pieces very slightly calcareous; siltstone, argillaceous, medium light-gray (N6), slightly calcareous.
4018-4036	18	Like 4000-4018, some medium dark-gray (N4) shale, one soft clayey piece.
4036-4047	11	Like 4000-4018, some medium dark-gray (N4) shale.

Depth (feet)	Thickness (feet)	
4047-4060	13	Shale 90%, siltstone 10%: shale, medium dark-gray (N4) to few pieces brownish-gray (5YR 4/1) to two or three pieces reddish-gray; siltstone, very light gray (N8) to medium-gray (N5), few pieces calcareous.
4060-4073	13	Shale: medium dark-gray (N4), little white (N9) silty material, slightly very finely micaceous.
4073-4085	12	Like 4060-4073, very little silty material.
4085-4091	6	Shale: medium-gray (N5), little tan silty material.
4091-4107	16	Like 4085-4091.
4107-4125	18	Like 4085-4091.
4125-4140	15	Like 4085-4091.
<u>Big Stone Gap shale</u>		
4140-4150	10	Shale: medium dark-gray (N4), very little tan silty material.
4150-4164	14	Like 4140-4150.
4164-4176	12	Like 4140-4150.
4176-4188	12	Like 4140-4150.
4188-4201	13	Shale: medium dark-gray (N4).
4201-4210	9	Shale: medium-gray (N5), very little tan silty material.
4210-4220	10	Like 4201-4210.
4220-4235	15	Like 4201-4210.
4235-4245	10	Like 4201-4210.
4245-4256	11	Shale: medium-gray (N5), little tan silty material.

Depth (feet)	Thickness (feet)	
4256-4267	11	Shale: medium dark-gray (N4).
4267-4284	17	Shale: medium dark-gray (N4), few pieces with silty material.
4284-4297	13	Shale: medium-gray (N5), trace tan silty material.
4297-4312	15	Like 4284-4297.
4312-4328	16	Like 4284-4297, few pieces slightly micaceous.
4328-4343	15	Shale: medium dark-gray (N4), trace tan silty material.
4343-4361	18	Shale: medium-gray (N5), trace tan silty material.
4361-4378	17	Shale: medium dark-gray (N4).
4378-4399	21	Like 4361-4378, trace pyrite.
4399-4415	16	Shale: medium dark-gray (N4), one or two pieces white opaque quartz fragments.
4415-4433	18	Like 4399-4415.
4433-4450	17	Shale: medium dark-gray (N4), several pieces slightly silty and very slightly calcareous, some pieces slightly micaceous, trace pyrite.
4450-4456	6	Shale: between medium dark-gray (N4) and dark-gray (N3), slightly micaceous, some pieces silty and slightly calcareous.
4456-4472	16	Shale 95%, siltstone 5%: shale, dark-gray (N3) to some medium dark-gray (N4), some slightly silty; siltstone, argillaceous, medium-gray (N5), slightly calcareous.

Depth
(feet)

Thickness
(feet)

4472-4493

21

Shale: medium-gray (N₅) to medium dark-gray (N₄),
few pieces silty, few slightly micaceous.

4508- ?

Shale: medium-gray (N₅) to some medium dark-gray
(N₄), few pieces slightly micaceous.

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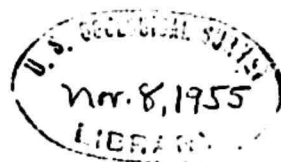
W. E. Wrather, Director

(Detailed logs of 28 wildcat wells in Virginia)

Sample Record of the Yukon-Pocahontas Coal Company No. 2-1466 well,
Buchanan County, Virginia

by

Eloise T. Jacobsen and A. D. Williamson



OPEN FILE

Prepared in Cooperation with the Division of Geology of
the Virginia Department of Conservation and Development

This report is preliminary and has not
been edited or reviewed for conformity
with U. S. Geological Survey standards
and nomenclature.

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Sample Record of the Yukon-Pocahontas Coal Company No. 2-1466 well,
Buchanan County, Virginia

by

Eloise T. Jacobsen and A. D. Williamson

The Yukon-Pocahontas Coal Company No. 2-1466 well was drilled about 5 miles southwest of the Keen Mountain gas field. The United Producing Company kindly made the samples available for study and for description. The well started in the Pennsylvanian Norton formation and probably stopped in the Devonian Chemung formation.

Summary of Clinchfield Coal Corporation No. 102 Well 41

	Depth (feet)	Thickness (feet)
Norton formation	23- 535	512 (error)
Lee formation	535-1638	1103
Bluestone formation	1638-2218	580
Princeton sandstone	2218-2285	67
Hinton formation		
Avis limestone member of Reger	2285-2342	57
Hinton formation undivided	2342-2585	243
Stony Gap sandstone member	2585-2848	263
Bluefield shale	2848-3350	502
Greenbrier limestone	3350-3736	386 (error)
Maccrady shale	3736-3793	57
Price sandstone	3793-4140	347
Big Stone Gap shale	4140-4508	368 +

YUKON POCAHONTAS COAL COMPANY NO. 2-1466 WELL

Buchanan County, Virginia.

United Producing Company.

Located 200 ft S. of 37°10'; 13,800 ft E. of 82°05'.

Elevation, 1751 ft Gr.

Total depth, 5100 ft; filled back to 4216 ft

Drilling commenced November 13, 1947; completed July 7, 1948.

Production: ^{max} 30 MCF open flow ~~E-1-P~~

Gas shows at 1585, 3062-3076, 4058, 4375 ft

Oil show at 1086 ft

Coal at 390-400, 424-435, 484-493, 581-592, 750-756, 769-775, 852-863,
957-963, 971-978, 1119-1125, 1147-1157, 1214-1220, 1258-1269, 1280-
1287, 1373-1383, 1475-1484, 1563-1572, 1647-1652, 169-21700, 1700-
1706, 1883-1887, 1887-1893, 2275-2287 ft

Samples examined by Eloise T. Jacobsen, 79-2786 ft, October 1949;

by Allen D. Williamson, 2786-5100 ft, April 1950.

Sample Library Reference: Virginia Geological Survey.

Depth (feet)	Thickness (feet)	
		<u>Norton formation</u> 502 feet thick
79-83	4	Sandstone: very light gray (N8), fine-grained, slightly angular to angular, poorly sorted, slightly micaceous, black mineral, trace of green mineral, 66% quartz.

Depth (feet)	Thickness (feet)	
83-89	6	Shale: silty, medium dark-gray (N4), slightly micaceous.
89-94	5	Sandstone: light-gray (N7), very fine grained, subrounded to subangular, poorly sorted, moderately micaceous, abundant fine-grained black mineral, clay cement, slight porosity.
94-100	6	Siltstone: micaceous, light-gray (N7), coarse-grained, subrounded to subangular, very poorly sorted, peppered with black mineral, friable.
100-105	5	Shale: silty, medium-gray (N5), finely micaceous.
105-110	5	Sandstone: silty, micaceous, medium light-gray (N6), very fine grained, poorly sorted, very fine grained black mineral, clay cement, no porosity.
110-115	5	Sandstone: like 105-110; less silty, better sorting, some porosity.
115-122	7	Sandstone: like 105-110 except fine-grained, moderately friable, greenish mineral inclusions.
122-127	5	Like 105-110; friable.
127-133	6	Sandstone 95%, shale 5%: sandstone, slightly calcareous cement; shale, dark-gray (N3), carbonaceous; sample contains laminated coal.
133-138	5	Sandstone: very slightly calcareous, better cemented.
138-145	7	Shale: medium dark-gray (N4), finely micaceous, part slightly silty.

Depth
(feet)

Thickness
(feet)

145-150

- 5 Sandstone 90%, coal 5%, shale 5%: sandstone, light-gray (N7), very fine grained, subangular to subrounded, poorly sorted, micaceous (muscovite ?), black mineral, very fine grained, peppery clay cement, slightly porous; coal, conchoidal, high luster; shale, carbonaceous, dark-gray (N3).

150-155

- 5 No sample.

155-161

- 6 Sandstone: like 145-150, fine- to medium-grained, moderately friable.

161-167

- 6 Sandstone: like 145-150.

167-174

- 7 Sandstone: like 145-150.

174-179

- 5 Sandstone: very light gray (N8), fine- to medium-grained, subangular, micaceous, slightly calcareous, abundant black mineral, some green mineral, moderately friable, calcareous cement.

179-200

- 21 No sample.

200-205

- 5 Sandstone: very light gray (N8), very fine grained, subangular to subrounded, moderately well sorted, some black mineral, slightly peppered with black mineral, 80% quartz, clay cement, friable.

205-212

- 7 Sandstone: like 200-204, fine- to medium-grained, poorly sorted, some green mineral.

212-218

Depth (feet)	Thickness (feet)	
212-219	7	Sandstone: like 200-204, fine-grained, 75% quartz.
219-225	6	Shale: medium-gray (N5), finely micaceous.
225-231	6	Sandstone: very light gray (N8), fine- to medium-grained, slightly micaceous, abundant black mineral, some green and brown mineral, 70% quartz, friable.
231-236	5	Sandstone: like 225-231; with trace of calcareous cement.
236-243	7	Sandstone: like 225-231.
243-248	5	Sandstone: like 225-231.
248-249	1	No sample.
249-252	3	Sandstone: like 225-231, very fine grained, slightly calcareous cement, very friable.
252-257	5	Sandstone: like 225-231, very fine grained, slightly calcareous cement.
257-263	6	Sandstone: very light gray (N8), medium-grained, subangular, poorly sorted, some angular, coarse-grained quartz, micaceous, black and some green minerals, peppered with black and brown minerals, 66% quartz, friable.
263-270	7	Sandstone: like 257-263.
270-276	6	Sandstone: like 257-263, very fine grained.
276-283	7	Sandstone: like 257-263, fine-grained, poorly sorted.

Depth
(feet)

Thickness
(feet)

283-292	9	Siltstone: argillaceous, medium light gray (N6), medium-grained, subrounded, subangular, micaceous.
292-300	8	Shale: medium dark-gray (N4), micaceous, silty to sandy.
300-305	5	Shale: like 292-300.
305-309	4	Shale: like 292-300, slightly silty to nonsilty.
309-318	9	Shale: like 292-300.
318-325	7	Shale: like 292-300.
325-332	7	Sandstone: very light gray (N8), very fine to fine grained, subangular, poorly sorted, micaceous, abundant black, brown, green mineral, 60% quartz, clay cement, slight porosity, friable.
332-340	8	Sandstone: like 325-332.
340-346	6	Shale: medium-gray (N5), finely micaceous, particles slightly silty.
346-350	4	Sandstone: very light gray (N8), very fine to fine-grained, poorly sorted, micaceous, abundant black, brown, and greenish minerals, 60% quartz, clay cement, slight porosity, friable.
350-359	9	Sandstone: like 346-350, fine-grained, 50% quartz, moderately calcareous cement, less friable.

Depth (feet)	Thickness (feet)	
359-367	8	Like 346-350; part medium-grained, 40% quartz.
367-374	7	Like 346-350; noncalcareous, some green mineral grains.
374-380	6	Like 346-350; light brownish-gray (5YR 6/1), calcareous cement.
380-390	10	Shale: medium dark-gray (N4), very finely micaceous.
390-400	10	Sandstone 90%, coal 5%, shale 5%: sandstone, light-gray (N7), fine- to medium-grained, subangular, poorly sorted, micaceous, abundant black, brown, and some greenish minerals, 40% quartz, clay cement, slight porosity, moderately friable; coal, light luster; shale, dark-gray (N3), part carbonaceous.
400-408	8	Sandstone: very light gray (N8), fine- to medium-grained, poorly sorted, few coarse-grained angular quartz fragments, appearing freshly broken, possible conglomeratic, trace of mica, some black and dark minerals, 85% quartz, clay cement with a trace of calcareous cement, friable.
408-414	6	Sandstone: medium-grained, like 400-408.
414-424	10	Sandstone: like 400-408, numerous very coarse grained, angular, black quartz fragments (conglomerate ?).

Depth (feet)	Thickness (feet)	
424-435	11	Shale 95%, coal 5%: shale, medium-gray (N5) to dark-gray (N3), finely micaceous, carbonaceous; coal, conchoidal fracture, high luster.
435-445	10	Shale: medium dark-gray (N4), finely micaceous.
445-455	10	Shale: like 435-445, silty.
455-467	12	Sandstone: light-gray (N7), fine-grained, subangular to subrounded, poorly sorted, numerous brown, black, and green minerals, 40% quartz, clay cement, friable.
467-475	8	Sandstone: like 455-467.
475-484	9	Sandstone: like 455-467; with many medium- to very coarse grained, broken, angular quartz fragments (conglomerate?).
484-493	9	Shale 80%, coal 20%: shale, dark-gray (N3), finely micaceous; shale, dark-gray (N3), carbonaceous; coal, conchoidal fracture, high luster.
492-500	8	Sandstone: micaceous, light-gray (N7), fine-grained, subangular to subrounded, poorly sorted, abundant black and dark minerals, 50% quartz, clay cement, slight porosity, friable.
500-506	6	Sandstone: like 492-500; less friable.
506-515	9	Shale: medium-gray (N5), finely micaceous, slightly silty.

Depth
(feet)

Thickness
(feet)

515-525

10 Shale: medium-gray (N5), finely micaceous.

525-533

8 Shale: medium dark-gray (N4), silty to slightly silty, micaceous.

533-540

7 Shale: medium-gray (N5).

540-548

8 Shale: like 533-540.

548-558

10 Shale: medium-gray (N5), very finely micaceous.

558-566

8 Shale: like 548-558.

566-574

8 Shale: like 548-558.

574-581

7 Shale: like 548-558.

Lee formation — 1369 feet —

581-592

11 Sandstone 85%, coal 15%: sandstone, very light gray (N8), fine- to medium-grained, subangular to subrounded, poorly sorted, micaceous, abundant black and brown minerals, about 35% quartz, clay cement, slight porosity, moderately friable; coal, high luster.

592-600

8 Like 581-592; some green minerals, friable.

600-610

10 Sandstone: light-gray (N7), very fine to fine-grained, subangular, poorly sorted, micaceous (muscovite ?), considerable black, some green, and dark minerals, 50% quartz, clay cement with a trace of calcareous material, moderately friable.

610-620

10 Sandstone: like 600-610, very slight trace of calcareous material.

Depth
(feet)

Thickness
(feet)

620-632

12 Shale: medium dark-gray (N4), finely micaceous, slightly silty, slightly carbonaceous.

632-644

12 Sandstone: light-gray (N7), medium-grained, sub-angular to angular, poorly sorted, slightly micaceous, some black and dark minerals, about 70% quartz, clay cement, moderately friable.

644-650

6 Sandstone: light-gray (N7), fine-grained, sub-angular, poorly sorted, micaceous, abundant black and dark minerals, about 50% quartz, clay cement with a trace of calcareous cement; sandstone, medium-gray (N5), very fine grained, subangular, poorly sorted, abundant fine black and brown mineral, clay cement, moderately well cemented.

650-656

6 Shale: medium-gray (N5), micaceous, part slightly silty.

656-663

7 Shale: like 650-656, half silty.

663-670

7 Shale: medium dark-gray (N4); sample contains a trace of very fine micaceous material.

670-676

6 Shale: like 663-670.

676-683

7 Shale: like 663-670.

683-690

7 Shale: medium light-gray (N6), very fine grained, subangular, very poorly sorted, abundant brown with some green and black minerals, about 50% quartz, clay cement with a trace of slightly calcareous material.

Depth
(feet)

Thickness
(feet)

- | | | |
|---------|----|---|
| 690-696 | 6 | Sandstone: very light gray (N8), like 683-690, 80% quartz, friable. |
| 696-702 | 6 | Shale: medium-gray (N5), very finely micaceous. |
| 702-709 | 7 | Sandstone: light-gray (N7), very fine grained, subangular, poorly sorted, slightly micaceous, some brown and black material, about 80% quartz, clay cement, friable. |
| 709-716 | 7 | Sandstone: light-gray (N7) to medium light-gray (N6), abundant brown and black minerals, about 50% quartz. |
| 716-726 | 10 | Siltstone: sandy, medium-gray (N5), coarse-grained, micaceous, moderately well cemented, part calcareous cement and part argillaceous cement. |
| 726-736 | 10 | Shale: medium dark-gray (N4), micaceous; sample contains a trace of carbonaceous material. |
| 736-743 | 7 | Sandstone 80%, siltstone 20%: siltstone, argillaceous, medium-gray (N5), grading into sandstone; sandstone, light-gray (N7), very fine grained, subangular to subrounded, very poorly sorted, micaceous, brown and green minerals, 50% quartz, clay cement, slightly calcareous cement, moderately well cemented. |

Depth
(feet)

Thickness
(feet)

743-750

- 7 Sandstone: argillaceous, medium-gray (N5), very fine grained, subangular, poorly sorted, micaceous, abundant brown and dark minerals, clay cement.

750-756

- 6 Coal 50%, shale 50%: coal, partly with conchoidal fracture, part argillaceous; shale, dark-gray (N3), carbonaceous, part silty and micaceous.

756-760

- 4 Sandstone: silty, medium light-gray (N6), very fine grained, subangular to subrounded, poorly sorted, micaceous, some dark mineral inclusions, a trace of calcareous material, 60% quartz, clay cement.

760-769

- 9 Shale: silty, medium-gray (N5), micaceous.

769-775

- 6 Coal and sandstone: coal, high luster, part blocky; sandstone, light-gray (N7), very fine grained, subangular to subrounded, poorly sorted, numerous small brown inclusions, 80% quartz.

775-783

- 8 Shale: medium dark-gray (N4), micaceous, small part argillaceous to silty.

783-796

- 7 Sandstone: light-gray (N7), very fine grained, subangular to subrounded, poorly sorted, some dark minerals, 80% quartz, clay cement.

Depth (feet)	Thickness (feet)	
796-800	4	Shale: medium-gray (N5), slightly silty to silty, finely micaceous.
800-806	6	Shale: medium dark-gray (N4), micaceous.
806-814	8	Siltstone: medium dark-gray (N4), coarse-grained, subangular to subrounded, very poorly sorted, argillaceous, micaceous, numerous dark mineral grains, clay cement, with a trace of calcareous material; sample contains a trace of coal.
814-820	6	Shale: silty, medium dark-gray (N4), micaceous.
820-827	7	Siltstone: argillaceous, medium dark-gray (N4), micaceous, numerous dark mineral grains, clay cement.
827-833	6	Shale: silty, micaceous, medium dark-gray (N4).
833-842	9	Shale: silty, medium dark-gray (N4), micaceous.
842-852	10	Shale and siltstone: shale, like 833-842, slightly micaceous; with lense of coarse-grained siltstone.
852-863	11	Shale 60%, coal 40%: shale, dark-gray (N3), carbonaceous; shale, medium-gray (N5), slightly micaceous, slightly silty; coal, high luster.
863-874	11	Shale: like 852-863, micaceous.
874-883	9	Shale: medium-gray (N5), very slightly silty, slightly micaceous.

Depth (feet)	Thickness (feet)	
883-890	7	Siltstone: medium-gray (N5), coarse-grained, subangular to subrounded, very poorly sorted, micaceous, numerous dark minerals.
890-895	5	Sandstone: medium light-gray (N6), fine-grained, subangular, very poorly sorted, micaceous, abundant brown and black with some green minerals, about 40% quartz, clay cement.
895-904	9	Sandstone: light-gray (N7), very fine grained, subangular, very poorly sorted, micaceous, numerous black and brown minerals with some green mineral, about 60% quartz, clay cement with traces of calcareous cement.
904-914	10	Sandstone: slightly more calcareous.
914-924	10	Shale: medium dark-gray (N4), micaceous.
924-933	9	Shale: like 914-924, silty.
933-942	9	Shale: like 914-924, very silty.
942-948	6	Shale: like 914-924, nonsilty to silty.
948-957	9	Shale 90%, coal 10%: shale, dark-gray (N3), part finely micaceous, part carbonaceous; coal, high luster.
957-963	6	Coal: high luster, conchoidal fracture.
963-971	8	Shale: medium-gray (N5) to medium dark-gray (N4), finely micaceous, partly slightly silty.
971-979	8	Coal: high luster, blocky.

Depth (feet)	Thickness (feet)	
979-985	6	Sandstone: light-gray (N7), fine-grained, micaceous, abundant dark and black minerals, clay cement, 80% quartz.
985-995	10	Siltstone: argillaceous, medium dark-gray (N4), micaceous.
995-1005	10	Shale: dark-gray (N3), micaceous to finely micaceous.
1005-1014	9	Sandstone 80%, shale 20%: sandstone, medium light-gray (N6) to medium dark-gray (N4), very fine grained, subangular to angular, micaceous, abundant black and dark minerals, 65% quartz, clay cement; shale, dark-gray (N3), carbonaceous.
1014-1022	8	Sandstone: very light gray (N8), fine-grained, angular to subangular, poorly sorted, slightly micaceous, some black, brown, and green minerals, 80% quartz, clay cement in part calcareous.
1022-1027	5	Sandstone: medium light-gray (N6), very fine grained, subangular to subrounded, poorly sorted, micaceous, numerous black grains, about 50% quartz, clay cement.
1027-1036	9	Sandstone: very light gray (N8), medium-grained, angular to subangular, very poorly sorted, slightly micaceous, brown, green, and some black minerals, 80% quartz, clay and silt cement.

Depth (feet)	Thickness (feet)	
1036-1045	9	Siltstone: medium-gray (N5), micaceous, moderately well cemented.
1045-1048	3	Sandstone: very light gray (N8), medium-grained, subangular, very poorly sorted, slightly micaceous, some black and green minerals, 80% quartz, clay and silt cement.
1048-1054	6	Siltstone: medium-gray (N5), coarse-grained, micaceous, partly argillaceous, moderately well cemented.
1054-1065	11	Siltstone: medium light-gray (N6) to medium-gray (N5), coarse-grained, micaceous.
1065-1072	7	Sandstone: very light gray (N8), fine-grained, poorly sorted, slightly micaceous, dark minerals, 70% quartz, clay and silt cement, moderately friable.
1072-1077	5	Sandstone: some green mineral; sample contains some coal, high luster, conchoidal fracture.
1077-1082	5	Like 1065-1072; friable.
1082-1089	7	Like 1065-1072; moderately friable.
1089-1095	6	Like 1065-1072; partly calcareous cement, friable.
1095-1102	7	Like 1065-1072; few dark grains.
1102-1107	5	Like 1065-1072.
1107-1112	5	Like 1065-1072.
1112-1119	7	Shale and coal: shale, micaceous, dark-gray (N3), partly sandy; coal, high luster, partly argillaceous.

Depth (feet)	Thickness (feet)	
1119-1125	6	Shale and coal: shale, like 1112-1119; coal, high luster, conchoidal fracture; sample contains a trace of pyrite.
1125-1132	7	Shale: silty, medium-gray (N5), micaceous.
1132-1140	8	Shale: like 1112-1119.
1140-1147	7	Shale: like 1112-1119; part very silty.
1147-1155	8	Shale and coal: shale, dark-gray (N3), carbonaceous, part with very fine micaceous material; coal, medium luster, part slightly argillaceous, part with high luster.
1155-1162	7	Sandstone 60%, siltstone 40%: sandstone, very light gray (N8), fine-grained, subangular to subrounded, poorly sorted, slightly micaceous, black and brown minerals, about 65% quartz, clay and silt cement; siltstone, medium dark-gray (N4), medium-grained, subrounded, medium well sorted.
1162-1171	9	Sandstone: like 1155-1162.
1171-1175	4	Like 1155-1162; friable.
1175-1183	8	Siltstone 80%, shale 20%: siltstone, medium dark-gray (N4), coarse-grained, well cemented; shale, medium dark-gray (N4), carbonaceous.
1183-1190	7	Sandstone: very light gray (N8), medium-grained, subangular to angular, very poorly sorted,

Depth
(feet)

Thickness
(feet)

slightly micaceous, numerous black, green,
brown, and reddish-brown minerals, some
bluish gray and cream chert fragments, about
65% quartz, clay and silt cement, friable.

Depth (feet)	Thickness (feet)	
1190-1200	10	Shale: silty, medium dark-gray (N4), micaceous.
1200-1207	7	Shale: medium dark-gray (N4), micaceous, part slightly silty.
1207-1214	7	Shale: like 1200-1207.
1214-1220	6	Coal 80%, shale 20%: coal, blocky, high luster; shale, silty, dark-gray (N3).
1220-1225	5	Siltstone: medium light-gray (N6) to medium-gray (N5), medium- to coarse-grained, slightly micaceous, well cemented, part finely laminated.
1225-1234	9	Sandstone: very light gray (N8), very fine grained, subangular to subrounded, moderately well sorted, very slightly micaceous, some very fine grained dark and brown minerals, 90% quartz, clay and silt cement, friable.
1234-1241	7	Sandstone: like 1225-1234, 80% quartz, less friable.
1241-1247	6	Shale: medium-gray (N5), micaceous.
1247-1252	5	Shale: like 1241-1247, silty.
1252-1258	6	Shale: carbonaceous, dark-gray (N3), slightly silty, micaceous.
1258-1269	11	Coal: part thinly laminated and argillaceous, part high luster with conchoidal fracture.
1269-1280	11	Siltstone 50%, shale 25%, sandstone 25%: siltstone, argillaceous, medium light-gray (N6),

Depth
(feet)

Thickness
(feet)

micaceous; shale, medium-gray (N5), micaceous
to finely micaceous, slightly silty to silty;
sandstone, very light gray (N8), very fine
grained, subangular to subrounded, moderately
well sorted, slightly micaceous, some dark
mineral inclusions, about 80% quartz.

Depth (feet)	Thickness (feet)	
1280-1287	7	Sandstone 50%, coal 50%: sandstone, like 1269-1280, 65% quartz; coal, blocky, part with a very high luster.
1287-1298	11	Sandstone: very light gray (N8).
1298-1304	6	Sandstone: very light gray (N8), subangular, poorly sorted, slightly micaceous, brown, dark, green, and black minerals, trace of pyrite, about 40% quartz, clay and silt cement, moderately friable.
1304-1311	7	Sandstone: like 1298-1304, 50% quartz.
1311-1318	7	Sandstone: like 1298-1304, poorer sorting, few medium grains, light-gray flakes, micaceous (muscovite), other minerals present, reddish minerals, about 40% quartz.
1318-1325	7	Sandstone: like 1298-1304, partly calcareous cement.
1325-1333	8	Sandstone: like 1298-1304, slight trace of calcareous cement.
1333-1339	6	Sandstone: like 1298-1304, very fine grained, predominantly black, with some green and brown minerals, noncalcareous.
1339-1349	10	Sandstone: like 1298-1304, very fine grained, better sorting, very few medium grains, slightly calcareous cement.

Depth (feet)	Thickness (feet)	
1349-1353	4	Sandstone: like 1296-1304.
1353-1363	10	Shale: light brownish-gray (5YR 6/1), very finely micaceous.
1363-1373	10	Shale: silty, medium-gray (N5), finely micaceous.
1373-1383	10	Shale 80%, coal 20%: shale, carbonaceous, dark-gray (N3), part slightly micaceous; coal, partly argillaceous.
1383-1393	10	Siltstone: light-gray (N7), slightly micaceous, some peppering of black mineral, slightly argillaceous.
1393-1402	9	Sandstone: very light gray (N8), very fine grained, subangular to subrounded, poorly sorted, slightly micaceous, some fine-grained dark, black, brown, and green minerals, about 65% quartz, clay and silt cement, moderately friable.
1402-1407	5	Sandstone: approaching quartzose sandstone, white (N9), fine-grained, subangular to subrounded, poorly sorted, slightly micaceous, few finely crystalline minerals, 90% quartz, some limonitic staining, silt and clay cement, friable.
1407-1413	6	Sandstone: like 1402-1407.
1413-1417	4	Sandstone: like 1402-1407.

Depth
(feet)

Thickness
(feet)

1417-1421	4	Sandstone: very light gray (N8), fine-grained, subrounded to subangular, poorly sorted, slightly micaceous, silt-sized to fine-grained black and brown minerals, limonitic staining, about 85% quartz, moderately friable.
1421-1424	3	Sandstone: like 1417-1412, friable.
1424-1428	4	Sandstone: white (N9), very fine grained, subrounded to subangular, trace of calcareous cement, little limonitic staining, 90% quartz.
1428-1432	4	Sandstone: like 1424-1428, more micaceous, calcareous cement.
1432-1435	3	Sandstone: like 1424-1428, 80% quartz, slightly calcareous cement.
1435-1439	4	Sandstone: like 1424-1428.
1439-1444	5	Sandstone: like 1424-1428.
1444-1450	6	Sandstone: like 1424-1428, trace calcareous cement, little limonitic stain.
1450-1455	5	Sandstone: very light gray (N8), very fine grained, subangular to subrounded, poorly sorted, finely micaceous, 80% quartz, clay cement, moderately well cemented.
1455-1463	8	Sandstone: like 1450-1455.
1463-1469	6	Shale: medium-gray (N5), very finely micaceous material, part with nodules 1/4 mm. in diameter.
1469-1475	6	Shale: like 1463-1469.

Depth (feet)	Thickness (feet)	
1475-1484	9	Shale 80%, coal 20%: shale, dark-gray (N3), partly carbonaceous; coal, laminated, partly argillaceous.
1484-1492	8	Shale: medium-gray (N5), finely micaceous.
1492-1501	9	Shale: like 1484-1492, slightly silty.
1501-1508	7	Sandstone: light-gray (N7), fine-grained, subangular, very poorly sorted, micaceous, brown, green, and black minerals, clay cement, 75% quartz, moderately friable.
1508-1513	5	Sandstone: like 1501-1508.
1513-1517	4	Sandstone: like 1501-1508.
1517-1522	5	Sandstone: white (N9), angular to subangular, approaching medium-grained, friable.
1522-1527	5	Sandstone: like 1517-1522.
1527-1534	7	Sandstone: like 1517-1522, few coarse grains, angular, apparently broken quartz pieces (conglomerate ?).
1534-1543	9	Siltstone: argillaceous, medium light-gray (N6), micaceous.
1543-1553	10	Shale: medium-gray (N5), slightly micaceous.
1553-1563	10	Shale: like 1543-1553.
1563-1572	9	Shale 85%, coal 15%: shale, carbonaceous, dark-gray (N3), part finely laminated; coal, part argillaceous, part with high luster.

Depth (feet)	Thickness (feet)	
1572-1581	9	Sandstone 80%, siltstone 20%: sandstone, light-gray (N7), very fine grained, subangular with some angular to subrounded, micaceous, poorly sorted, black, brown, and some green minerals, about 85% quartz; siltstone, micaceous, medium-gray (N5), coarse-grained, subangular to subrounded, poorly sorted, clay cement.
1581-1590	9	Sandstone: very light gray (N8), fine-grained, subangular, micaceous, poorly sorted, black, brown, reddish, and green minerals, about 75% quartz, clay cement, moderately friable.
1590-1594	4	Sandstone: like 1581-1590; with partly calcareous cement.
1594-1602	8	Sandstone: like 1581-1590; very poorly sorted, subangular to angular, 70% quartz.
1602-1609	7	Sandstone: like 1581-1590.
1609-1618	9	Sandstone: like 1581-1590; approaching medium-grained, slightly calcareous cement.
1618-1627	9	Sandstone: like 1581-1590; fine-grained.
1627-1637	10	Sandstone: like 1581-1590; to medium-grained.
1637-1647	10	Shale: medium-gray (N5), finely micaceous; shale, carbonaceous, dark-gray (N3).
1647-1652	5	Shale 80%, coal 20%: shale, carbonaceous, dark-gray (N3); coal, high luster, some blocky.

Depth (feet)	Thickness (feet)	
1652-1658	6	Shale: brownish-gray (5YR 4/1), finely mica- ceous, silty to very silty.
1658-1668	10	Shale: like 1652-1658.
1668-1680	12	Shale: like 1652-1658.
1680-1692	12	Shale: medium-gray (N5), part slightly silty, very finely micaceous.
1692-1700	8	Shale 50%, coal 50%: shale, carbonaceous, medium dark-gray (N4) to dark-gray (N3), very finely micaceous; coal, high luster.
1700-1706	6	Coal 75%, siltstone 25%: coal, high luster, conchoidal fracture; siltstone, medium light- gray (N6), coarse-grained, micaceous, slightly peppered with a black mineral.
1706-1717	11	Shale: medium-gray (N5), finely micaceous.
1717-1734	17	Shale: medium dark-gray (N4), trace of finely micaceous material.
1734-1742	8	Shale: like 1717-1734.
1742-1750	8	Shale: like 1717-1734.
1750-1760	10	Siltstone: medium light-gray (N6), medium-grained, slightly peppered with a black mineral.
1760-1767	7	Sandstone: light-gray (N7), fine-grained, subangular to angular, poorly sorted, mica- ceous, numerous brown, green and some black minerals, about 70% quartz, clay cement, slight trace calcareous cement.

Depth (feet)	Thickness (feet)	
1767-1777	10	Sandstone: like 1760-1767.
1777-1787	10	Shale: silty, medium dark-gray (N4), micaceous.
1787-1800	13	Shale: like 1777-1787.
1800-1810	10	Sandstone: light-gray (N7), very fine grained, subangular to subrounded, poorly sorted, slightly micaceous, numerous brown and dark minerals with some green mineral, about 80% quartz, clay cement with some slightly calcareous cement, moderately friable.
1810-1819	9	Sandstone: like 1800-1810.
1819-1825	6	Sandstone: like 1800-1810; very light gray (N8), some limonitic stain.
1825-1830	5	Sandstone: like 1800-1810.
1830-1835	5	Shale: medium dark-gray (N4), micaceous.
1835-1842	7	Sandstone: very light gray (N8), very fine grained, subangular, sorted, slightly micaceous, dark and black minerals with shale particles, about 85% quartz, clay cement, friable, limonitic stain..
1842-1847	5	Sandstone: like 1835-1842; very light gray (N8) to white (N9), 90% quartz.
1847-1850	3	Sandstone: like 1835-1842; very poorly sorted; sample contains numerous medium-grained white chert fragments.

Depth (feet)	Thickness (feet)	
1850-1856	6	Sandstone: like 1847-1850; approaching fine-grained, some reddish grains.
1856-1861	5	Sandstone: like 1847-1850; fine- to medium-grained, slightly less friable.
1861-1866	5	Sandstone: like 1847-1850; sample contains some very coarse grained, bluish angular chert fragments, larger flakes of mica (muscovite ?), conglomeratic ?.
1866-1871	5	Sandstone: like 1847-1850; with some coarse-grained quartz fragments.
1871-1877	6	Sandstone: like 1847-1850; white (N9), fine- to medium-grained, angular pieces.
1877-1882	5	Sandstone: like 1847-1850.
1882-1887	5	Coal: high luster.
1887-1893	6	Coal: slightly argillaceous.
1893-1900	7	Sandstone: light-gray (N7), very fine grained, subangular, poorly sorted, slightly micaceous, dark green and black particles, 60% quartz, clay cement, moderately friable.
1900-1907	7	Sandstone: like 1893-1900.
1907-1917	10	Sandstone: like 1893-1900.
1917-1927	10	Sandstone: very light gray (N8), fine-grained, angular to subangular, poorly sorted, numerous

Depth
(feet)

Thickness
(feet)

1927-1 medium-grained, angular, quartz fragments,
brown, green, and dark minerals, also dark
1937-1 shales, 85% quartz, friable, clay cement.

1950-1

1958-1

1967-1

1975-1

1985-1

1995-1

2000-1

2005-1

2010-1

Depth (feet)	Thickness (feet)	
1927-1937	10	Sandstone: like 1917-1927; medium-grained, 70% quartz.
1937-1950	13	Siltstone: light-gray (N7), coarse- to medium-grained, subrounded, moderately well sorted, slightly micaceous, peppered with black mineral, slightly calcareous cement, moderately well cemented.
<u>Bluestone formation - 482 feet thick</u>		
1950-1958	8	Shale: medium-gray (N5), very finely micaceous.
1958-1967	9	Shale: like 1950-1958.
1967-1975	8	Shale: medium brownish-gray (5YR 5/1), trace finely micaceous material.
1975-1985	10	Shale: silty, medium light-gray (N6), finely micaceous.
1985-1995	10	Shale: medium-gray (N5), part slightly silty, finely micaceous.
1995-2000	5	Shale: silty, medium-gray (N5), finely micaceous, slightly calcareous.
2000-2009	9	Shale: brownish-gray (5YR 4/1), calcareous to some noncalcareous.
2009-2017	8	Limestone: medium light-gray (N6), finely crystalline.
2017-2026	9	Shale: grayish-red (10R 4/2), slightly calcareous; shale, dark greenish-gray (5GY 4/1), slightly calcareous.

Depth (feet)	Thickness (feet)	
2026-2031	5	Shale: medium-grained, silty, calcareous.
2031-2041	10	Shale: grayish-red (10R 4/2), finely laminated, trace very finely micaceous material.
2041-2048	7	Shale and limestone: shale, like 2031-2041; brownish-gray (5YR 4/1), finely crystalline.
2048-2050	2	No sample.
2050-2055	5	Shale: calcareous, like 2031-2041.
2055-2060	5	Siltstone 75%, shale 25%: siltstone, dark greenish-gray (5GY 4/1), fine- to medium-grained, finely micaceous; siltstone, calcareous, greenish- gray (5GY 6/1), coarse-grained, finely micaceous; shale, silty, medium-gray (N5).
2060-2065	5	Siltstone: light greenish-gray (5GY 8/1), like 2055-2060.
2065-2069	4	Siltstone: like 2055-2060; very light gray (N8).
2069-2074	5	Shale: medium-gray (N5), slightly calcareous.
2074-2083	9	Shale: medium-gray (N5), silty to slightly silty.
2083-2090	7	Shale: medium brownish-gray (5YR 5/1), very finely micaceous.
2090-2097	7	Shale: medium-gray (N5), very finely micaceous.
2097-2104	7	Shale: silty, medium-gray (N5).
2104-2110	6	Sandstone: very light gray (N8), very fine grained, subangular to subrounded, poorly sorted, moderately well sorted, slightly micaceous, dark and brown particles, 90% quartz, clay and silt cement, moderately friable.

Depth (feet)	Thickness (feet)	
2110-2115	5	Sandstone: very light gray (N8), friable, limonitic, stain.
2115-2121	6	Sandstone: like 2110-2115.
2121-2128	7	Sandstone: like 2110-2115.
2128-2132	4	Shale: medium-gray (N5), partly carbonaceous, micaceous.
2132-2139	7	Siltstone: medium light-gray (N6), coarse-grained, subangular, slightly micaceous, peppered with dark and black minerals, clay cement, moderately well cemented; sample contains a trace of coal.
2139-2144	5	Sandstone: very light gray (N8), very fine grained, subrounded, moderately well sorted, slightly micaceous, peppered with dark and black minerals, clay cement, friable.
2144-2149	5	Sandstone: like 2139-2144.
2149-2154	5	Sandstone: like 2139-2144.
2154-2159	5	Sandstone 60%, siltstone 40%: sandstone, very light gray (N8), very fine grained, micaceous (muscovite), slightly peppered with dark and black, very fine grained material, 85% quartz, calcareous cement; siltstone, medium light-gray (N6), coarse-grained, micaceous, moderately well cemented, clay cement; sample contains crystals of calcite.

Depth (feet)	Thickness (feet)	
2159-2163	4	Shale: medium dark-gray (N4), slightly silty, micaceous, slightly fissile.
2163-2169	6	Siltstone: medium light-gray (N6), slightly peppered with black mineral, very well cemented, siliceous (?) cement.
2169-2174	5	Sandstone: very light gray (N8), very fine grained, subrounded to subangular, moderately well sorted, slightly peppered with dark and black material, some red inclusions, micaceous, 85% quartz, clay and slightly calcareous cement, friable.
2174-2180	6	Sandstone: like 2169-2174; approaching siltstone.
2180-2185	5	Sandstone: like 2169-2174; very fine-grained.
2185-2189	4	Sandstone: like 2169-2174; approaching siltstone.
2189-2192	3	Sandstone: like 2169-2174; noncalcareous.
2192-2195	3	Sandstone: like 2169-2174; noncalcareous cement.
2195-2200	5	Shale: medium dark-gray (N4), micaceous.
2200-2205	5	Sandstone: medium dark-gray (N4), micaceous, like 2192-2195.
2205-2212	7	Shale: medium dark-gray (N4), slightly micaceous, silty to nonsilty.
2212-2221	9	Shale: medium dark-gray (N4), finely micaceous.
2221-2227	6	Siltstone: medium light-gray (N6), coarse-grained, subrounded to subangular, peppered with black and dark materials, well cemented, moderately calcareous cement.

Depth (feet)	Thickness (feet)	
2227-2235	8	Shale: medium dark-gray (N4), finely micaceous; sample contains a trace of shale, grayish-red (5R 4/2), very finely micaceous.
2235-2243	8	Shale: like 2227-2235.
2243-2250	7	Shale: medium light-gray (N6), very finely micaceous, slightly silty.
2250-2256	6	Siltstone: medium light-gray (N6), coarse- grained, slightly calcareous, well cemented.
2256-2265	9	Shale: silty, medium light-gray (N6), very slightly calcareous.
2265-2275	10	Shale: like 2256-2265; nonsilty to slightly silty.
2275-2287	12	Shale 90%, coal 10%: shale, medium dark-gray (N4), nonmicaceous to very finely micaceous; coal, high luster.
2287-2293	6	Shale: medium dark-gray (N4), trace very finely micaceous material.
2293-2300	7	Shale: like 2287-2293.
2300-2310	10	Shale: calcareous, medium light-gray (N6), finely micaceous.
2310-2320	10	Shale: like 2300-2310.
2320-2326	6	Shale: medium-gray (N5), partly sandy, slightly calcareous, slightly micaceous.
2326-2336	10	Shale: medium dark-gray (N4).
2336-2345	9	Shale: like 2326-2336, finely laminated.

Depth (feet)	Thickness (feet)	
2345-2354	9	Shale: like 2326-2336; sample contains a trace of pyrite.
2354-2362	8	Shale: like 2326-2336.
2362-2371	9	Shale: medium-gray (N5), trace finely micaceous material.
2371-2380	9	Sandstone: medium light-gray (N6), very fine grained, subangular to subrounded, moderately well sorted, peppered with dark material, trace calcareous material, 50% quartz, clay cement, moderately well cemented, slight porosity.
2380-2387	7	Sandstone: like 2371-2380.
2387-2394	7	Sandstone: like 2371-2380; poorly sorted, pieces with calcite crystals.
2394-2404	10	Shale and limestone: shale, medium-gray (N5); sample contains a streak of limestone, light olive-gray (5Y 6/1), very finely crystalline.
2404-2414	10	Sandstone: medium light-gray (N6), like 2371-2380, calcareous cement.
2414-2425	11	Shale: medium light-gray (N6), very slightly calcareous.
2425-2432	7	Limestone: light olive-gray (5Y 6/1) to light-gray (N7) to medium light-gray (N6), finely crystalline; sample contains a trace of very light gray (N8) limestone and calcite.

Depth
(feet)

Thickness
(feet)

2497-		<u>Princeton sandstone</u> 148 feet thick
2432-2435	3	Sandstone: very light gray (N8), very fine grained, subangular to subrounded, moderately well sorted, some very fine grained, dark and black material included, 90% quartz, clay and calcareous cement, well cemented.
2435-2452	17	Sandstone: like 2432-2435; more friable.
2452-2456	4	Sandstone: like 2432-2435.
2456-2459	3	Sandstone: like 2432-2435; well cemented, slightly calcareous cement.
2459-2464	5	Sandstone: like 2432-2435; slightly micaceous, abundant limonitic stain.
2464-2467	3	Sandstone: like 2432-2435.
2467-2472	5	Sandstone: like 2432-2435; noncalcareous, moderately friable.
2472-2475	3	Sandstone: like 2432-2435; very slightly calcareous.
2475-2478	3	Sandstone: like 2432-2435.
2478-2485	7	Sandstone: like 2432-2435; very light gray (N8) to white (N9), moderately well cemented.
2485-2487	2	Sandstone: like 2432-2435; noncalcareous.
2487-2490	3	Sandstone: like 2432-2435.
2490-2493	3	Sandstone: like 2432-2435.
2493-2497	4	Sandstone: like 2432-2435; trace calcareous material.

Depth (feet)	Thickness (feet)	
2497-2500	3	Sandstone: like 2432-2435.
2500-2502	2	Sandstone: like 2432-2435; very fine to fine-grained, poorly sorted.
2502-2506	4	Sandstone: like 2432-2435; slightly calcareous.
2506-2510	4	Sandstone: like 2432-2435; sample contains a trace of red material.
2510-2513	3	Sandstone: like 2432-2435.
2513-2516	3	No sample.
2516-2521	5	Sandstone: like 2432-2435; very fine grained, more peppered with dark and red material, part well cemented.
2521-2527	6	Sandstone: like 2432-2435; moderately well sorted, with abundant silt-sized particles.
2526-2530	4	Shale: medium dark-gray (N4), micaceous, partly silty.
2530-2533	3	Sandstone: very light gray (N8), very fine grained, subangular to subrounded, moderately well sorted, with abundant silt-sized particles, abundant calcareous particles, few irregular shaped black particles, well cemented, clay cement.
2533-2538	5	Sandstone: like 2530-2533; slightly calcareous.
2538-2541	3	Sandstone: like 2530-2533.

Depth (feet)	Thickness (feet)	
2541-2544	3	Sandstone: like 2530-2533.
2544-2560	16	No sample.
2560-2567	7	Sandstone: like 2530-2533; slightly calcareous.
2567-2571	4	Sandstone: very light gray (N3) to white (N9), like 2530-2533.
2571-2575	4	Sandstone: like 2530-2533; calcareous.
2575-2580	5	No sample.

Hinton formation

(Avis limestone member of Reger) — ~~65 feet thick~~

2580-2585	5	Shale 80%, limestone 20%: shale, calcareous, medium dark-gray (N4), slightly micaceous; limestone, medium dark-gray (N4) to light-gray (N7), mottled with light-gray, finely crystalline, some coarsely crystalline calcite, fragments of megafossils.
2585-2592	7	Limestone: like 2580-2585; fossiliferous, macrofragments, ostracods and crinoids.
2592-2603	11	Shale: calcareous, medium dark-gray (N4), slightly micaceous, part slightly fossiliferous.
2603-2611	8	Limestone: medium-gray (N5), mottled with light-gray (N7), finely crystalline, slightly fossiliferous, crinoids and a few fragments.

Depth (feet)	Thickness (feet)	
2611-2620	9	Limestone: argillaceous, medium-gray (N5), very finely crystalline.
2620-2631	11	Limestone: like 2611-2620.
2631-2638	7	Limestone: like 2611-2620.
2638-2645	7	Limestone: like 2611-2620, with possible lens of light-gray (N7), finely crystalline, soft limestone.
Hinton formation (undivided) 385 feet thick		
2645-2655	10	Shale: ^{grayish-red} (10R 4/2), finely micaceous; sample contains a few dark-gray (N3) nodules.
2655-2670	15	Shale: like 2645-2655, grayish-red (5R 4/2), silty to sandy, slightly calcareous.
2670-2682	12	Shale: grayish-red (5R 4/2), finely micaceous.
2682-2692	10	Shale: grayish-red (5R 4/2), very finely micaceous.
2692-2702	10	Shale: greenish-gray (5GY 6/1), very finely micaceous.
2702-2713	11	Shale: medium light-gray (N6), very finely micaceous.
2713-2720	7	Shale: medium-gray (N5), finely micaceous, very slightly silty.
2720-2725	5	Sandstone: medium-gray (N5), very fine grained, subangular to subrounded, moderately well sorted, micaceous (muscovite), abundant black, dark, and reddish, very fine grained particles, 50% quartz, clay cement, well cemented; sandstone, very

light gray (N8), fine-grained, subangular,
very poorly sorted, micaceous (muscovite),
numerous poorly sorted green and black minerals,
70% quartz, calcareous cement, moderately well
cemented.

Depth (feet)	Thickness (feet)	
2725-2733	8	Sandstone: very light gray (N8), slightly calcareous, moderately friable.
2733-2738	5	Sandstone: like 2725-2733.
2738-2743	5	Sandstone: like 2725-2733; subangular to subrounded.
2743-2748	5	Sandstone: like 2725-2733; friable.
2748-2753	5	Sandstone: like 2725-2733; noncalcareous.
2753-2759	6	Shale 90%, limestone 10%: shale, calcareous, silty, medium brownish-gray (5YR 5/1), micaceous; limestone, moderate-brown (5YR 4/4) to dark yellow-brown (10YR 4/2), very finely crystalline.
2759-2768	9	Limestone 50%, shale 50%: limestone, medium light-gray (N6), very finely crystalline, slightly argillaceous; shale, medium-gray (N5), calcareous to slightly calcareous.
2768-2773	5	Shale: grayish-red (5R 4/2), finely micaceous, slightly to very slightly calcareous.
2773-2780	7	Shale: like 2768-2773.
2780-2786	6	Shale: medium light-gray (N6), trace of very finely micaceous material, slightly calcareous.
2786-2795	9	Shale and siltstone: shale, grayish-red (5R 4/2), silty, micaceous; siltstone, grayish-red (5R 4/2), micaceous, slightly calcareous.

Depth (feet)	Thickness (feet)	
2795-2800	5	Shale and siltstone: medium dark-gray (N4), with greenish tint, micaceous, slightly calcareous.
2800-2812	12	Like 2786-2795.
2812-2822	10	Like 2786-2795; with some siltstone, calcareous, medium dark-gray (N4), greenish tint.
2822-2827	5	Siltstone and limestone: siltstone, calcareous, medium-gray (N5) to medium dark-gray (N4) with greenish tint, micaceous; limestone, light olive-gray (5Y 6/1), silty, dense.
2827-2833	6	Shale: medium dark-gray (N4), silty, micaceous, with thin calcareous beds.
2833-2841	8	Like 2827-2833; calcareous.
2841-2851	10	Shale: grayish-red (5R 3/2), finely micaceous; shale, calcareous, light brownish-gray (5YR 6/1).
2851-2856	5	Shale: like 2841-2851; shale, calcareous, medium dark-gray (N4) with greenish tint, silty, micaceous.
2856-2866	10	Shale: like 2841-2851; shale, calcareous, dark greenish-gray. (5GY 4/1).
2866-2880	14	Shale: medium dark-gray (N4), finely micaceous.
2880-2890	10	Shale: calcareous, medium dark-gray (N4) to dark-gray (N3), fissile.
2890-2900	10	Shale and sandstone: shale, like 2866-2880; sandstone, silty, medium-gray (N5) with greenish-

Thickness
(feet)

tint, very fine grained, subangular, poorly
sorted, 50% quartz.

Depth (feet)	Thickness (feet)	
2900-2908	8	Siltstone and sandstone: siltstone, medium dark-gray (N4), finely micaceous; sandstone, like 2890-2900.
2908-2916	8	Shale and siltstone: shale, medium dark-gray (N4) to dark-gray (N3), silty, micaceous; siltstone, sandy, light-gray (N7), slightly calcareous.
2916-2921	5	Sandstone: light-gray (N7) with slight greenish tint, fine-grained, subangular, poorly sorted, silty, slightly calcareous, 75% quartz, very slightly porous.
2921-2931	10	Shale: medium dark-gray (N4), silty, with thin calcareous beds.
2931-2941	10	Shale: calcareous, medium dark-gray (N4), silty, micaceous; shale, calcareous, medium-gray (N5).
2941-2947	6	Like 2931-2941.
2947-2954	7	Like 2931-2941.
2954-2966	12	Sandstone: very light gray (N8), very fine grained, angular to subangular, moderately well sorted, silty, 70% quartz, slight porosity.
2966-2976	10	Shale: medium dark-gray (N4), slightly calcareous.
2976-2991	15	Like 2966-2976.
2991-3002	11	Shale and sandstone: shale, dark-gray (N3), fissile, noncalcareous; sandstone, light--

gray (N7) with greenish tint, very fine grained,
subangular, well sorted, small amount of green
mineral, 90% quartz, slight porosity.

Thick ness (feet)	Thickness (feet)	
3002-3016	14	Shale: calcareous, medium dark-gray (N4), silty.
3016-3024	8	Like 3002-3016.
3024-3030	6	Shale: dark-gray (N3), fissile, few tabular cuttings.
3030-3035	5	Sandstone: white (N9), very fine grained, sub-angular, moderately well sorted, silty, scattered black mineral, small amount of pyrite, 90% quartz.
3035-3043	8	Like 3030-3035.
3043-3049	6	Like 3030-3035.
3049-3056	7	Like 3030-3035.
3056-3062	6	Sandstone: white (N9), very fine grained, sub-angular, well sorted, slightly calcareous, 95% quartz.
3062-3068	6	Like 3056-3062.
3068-3079	11	Shale: medium dark-gray (N4), silty; to shale, dark-gray (N3), fissile, carbonaceous; abundant pyrite in sample.
3079-3085	6	Sandstone: white (N9), fine-grained, subangular, well sorted, scattered black mineral, 90% quartz, slight porosity.
3085-3086	1	Like 3079-3085.

formation, Stony Gap sandstone member - 100 feet



Thickness
(feet)

3085-3089	3	Sandstone: white (N9), very fine to fine-grained, angular to subangular, well sorted, slightly silty, 90% quartz, very slight porosity.
3089-3091	2	Like 3079-3085.
3091-3094	3	Like 3086-3089.
3094-3098	4	Like 3086-3089.
3098-3100	2	Like 3086-3089.
3100-3102	2	Like 3086-3089.
3102-3105	3	Like 3086-3089.
3105-3109	4	Like 3086-3089.
3109-3112	3	Siltstone: medium dark-gray (N4), sandy to argillaceous.
3112-3117	5	Like 3109-3112.
3117-3121	4	Like 3109-3112.
3121-3130	9	Like 3109-3112.
3130-3140	10	Like 3109-3112.
3140-3145	5	Like 3109-3112.
3145-3149	4	Sandstone: very light gray (N8), very fine to fine-grained, subangular, well sorted, 95% quartz, slight porosity.
3149-3152	3	Sandstone: calcareous, very light gray (N8), very fine grained, subangular, moderately well sorted, silty, 90% quartz, very slightly porous.
3152-3154	2	Sandstone: white (N9), subangular, well sorted, 95% quartz, slightly porous.

Depth (feet)	Thickness (feet)	
3154-3160	6	Like 3152-3154.
3160-3162	2	Like 3152-3154; staining from bit.
3162-3165	3	Sandstone: white (N9), very fine grained, sub- angular, well sorted, 95% quartz, slightly porous.
3165-3170	5	Like 3160-3162.
3170-3176	6	Sandstone: white (N9), very fine to fine-grained, subangular to subrounded, poorly sorted, silty, 90% quartz, slightly porous, staining from bit.
3176-3181	5	Like 3170-3176.
3181-3186	5	Sandstone: very light gray (N8), very fine to fine-grained, subangular, poorly sorted, silty, slightly calcareous, scattered black mineral, about 90% quartz.
3186-3190	4	Like 3181-3186.
3190-3200	10	Sandstone: white (N9), very fine grained, sub- angular, well sorted, slightly silty, scattered black mineral, 95% quartz, slightly porous.
3200-3207	7	Like 3190-3200.
3207-3210	3	Like 3190-3200.
3210-3215	5	Like 3190-3200.

Depth
(feet)

Thickness
(feet)

Bluefield shale ~~505 feet thick~~

3215-3220

- 5 Siltstone: medium light-gray (N6), sandy;
siltstone, medium dark-gray (N4), argillaceous,
micaceous.

3220-3230

- 10 Sandstone: very light gray (N8), very fine
grained, subangular, moderately well sorted,
slightly silty, 90% quartz, very slightly
porous.

3230-3231

- 1 Siltstone: medium-gray (N5) to medium dark-
gray (N4), sandy, micaceous.

3231-3235

- 4 Sandstone: white (N9), very fine to fine-
grained, subangular, well sorted, slightly
calcareous, 95% quartz, slightly porous; with
staining from bit.

3235-3240

- 5 Shale: medium-gray (N5) to medium dark-gray (N4),
moderately fissile.

3240-3246

- 6 Like 3235-3240.

3246-3258

- 12 Sandstone: medium dark-gray (N4), very fine
to fine-grained, subangular, poorly sorted,
silty, micaceous, thin carbonaceous beds,
90% quartz.

3258-3268

- 10 Shale: medium dark-gray (N4), silty; shale,
dark-gray (N3), partly carbonaceous.

3268-3278

- 10 Like 3258-3268; sample contains abundant pyrite.

Depth (feet)	Thickness (feet)	
3278-3288	10	Siltstone: medium dark-gray (N4), micaceous.
3288-3291	3	Sandstone and shale: sandstone, silty, very light gray (N8), very fine grained, angular to subangular, poorly sorted, 90% quartz, slightly porous; shale, dark-gray (N3).
3291-3300	9	Siltstone: medium-gray (N5), sandy, micaceous, abundant pyrite.
3300-3304	4	Sandstone: white (N9), very fine grained, sub-angular, well sorted, 95% quartz, slightly porous.
3304-3308	4	Like 3300-3304.
3308-3312	4	Siltstone: medium dark-gray (N4), sandy, scattered mica.
3312-3320	8	Like 3308-3312; shale, dark-gray (N3), silty.
3320-3330	10	Shale: medium dark-gray (N4), fissile.
3330-3340	10	Like 3320-3330.
3340-3347	7	Shale: calcareous, medium dark-gray (N4), lumpy.
3347-3357	10	Like 3340-3347.
3357-3370	13	Like 3340-3347.
3370-3380	10	Shale: medium dark-gray (N4), fissile, lumpy, noncalcareous to calcareous.
3380-3390	10	Like 3370-3380; sample contains scattered pyrite.
3390-3400	10	Like 3370-3380.
3400-3410	10	Siltstone and limestone: siltstone, calcareous, medium dark-gray (N4); with partings of limestone, medium-gray (N5), silty.

Depth (feet)	Thickness (feet)	
3410-3417	7	Sandstone: very light gray (N8), fine-grained, subangular, moderately well sorted, slightly silty, slightly calcareous, 90% quartz, slightly porous.
3417-3423	6	Sandstone: medium light-gray (N6), fine-grained, subangular, poorly sorted, silty, micaceous, scattered black mineral, 75% quartz, slightly porous.
3423-3427	4	No sample.
3427-3437	10	Like 3417-3423; shale, calcareous, medium dark-gray (N4), fissile.
3437-3448	11	Sandstone: white (N9), very fine grained, subangular, well sorted, 95% quartz, slightly porous; sandstone, medium-gray (N5), very fine grained, subangular, poorly sorted, argillaceous, abundant pyrite, 75% quartz.
3448-3458	10	No sample.
3458-3465	7	Sandstone: light-gray (N7), very fine grained, subangular, moderately well sorted, silty, 90% quartz, slightly porous.
3465-3475	10	Shale: medium dark-gray (N4), noncalcareous.
3475-3485	10	Like 3465-3475.
3485-3495	10	Siltstone: medium dark-gray (N4), argillaceous; sample contains scattered mica.

Depth (feet)	Thickness (feet)	
3495-3502	7	Shale: medium dark-gray (N4), like 3465-3475.
3502-3512	10	Like 3465-3475.
3512-3522	10	Like 3465-3475.
3522-3529	7	Like 3465-3475; sandstone, light-gray (N7), very fine grained, subangular, poorly sorted, silty, 90% quartz.
3529-3536	7	Like 3465-3475; with interbedded limestone, medium-gray (N5), medium crystalline, silty.
3536-3546	10	Like 3465-3475.
3546-3556	10	Shale: calcareous, medium dark-gray (N4), crinoidal.
3556-3561	5	Like 3546-3556.
3561-3568	7	Shale and limestone: shale, medium dark-gray (N4), silty, micaceous, slightly calcareous; limestone, light-gray (N7) to medium-gray (N5), dense to medium crystalline, silty, fossil- iferous (brachiopod fragments).
3568-3574	6	Like 3561-3568.
3574-3580	6	Like 3561-3568.
3580-3585	5	Limestone: white (N9) to brownish-gray (5YR 4/1), noncrystalline to medium crystalline, oolitic, silty.
3585-3592	7	Limestone: medium dark-gray (N4), silty.
3592-3600	8	Limestone: medium dark-gray (N4), very oolitic, noncrystalline.

Depth (feet)	Thickness (feet)	
3600-3608	8	Limestone: white (N9), medium crystalline;
3608-3614		limestone, medium dark-gray (N4), very
		finely crystalline, silty.
3608-3614	6	Limestone: medium dark-gray (N4) to dark-gray
		(N3), oolitic, dense to medium crystalline,
		silty.
3614-3620	6	Like 3608-3614.
3620-3625	5	Limestone: white (N9) to dark-gray (N3), slightly
		oolitic, dense, silty.
3625-3630	5	Like 3620-3625.
3630-3635	5	Like 3620-3625.
3635-3642	7	Limestone: medium dark-gray (N4), silty,
		slightly oolitic, composed largely of crinoid
		and brachiopod fragments.
3642-3650	8	Limestone: light brownish-gray (5YR 6/1), medium
		crystalline; limestone, dark-gray (N3), dense
		to noncrystalline, oolitic, crinoidal.
3650-3658	8	Like 3642-3650.
3658-3666	8	Like 3642-3650.
3666-3676	10	Like 3642-3650.
3676-3686	10	Shale: calcareous, medium dark-gray (N4),
		fossiliferous.
3686-3696	10	Like 3642-3650.
3696-3704	8	Like 3642-3650.
3704-3710	6	Like 3642-3650.

Depth (feet)	Thickness (feet)	
3710-3715	5	Like 3642-3650.
3715-3720	5	Like 3642-3650; with some limestone, medium dark-gray (N4), silty.
3650		<u>Greenbrier limestone</u> 603 feet thick
3720-3727	7	Limestone: medium light-gray (N6) to medium dark-gray (N4), oolitic, noncrystalline to dense, silty.
3727-3735	8	Limestone: white (N9) to medium dark-gray (N4), fine to medium crystalline, silty.
3735-3743	8	Like 3727-3735.
3743-3751	8	Like 3727-3735.
3751-3760	9	Shale and limestone: shale , like 3727-3735; limestone, medium dark-gray (N4), dense, silty.
3760-3770	10	Like 3751-3760.
3770-3780	10	Like 3751-3760.
3780-3790	10	Like 3751-3760.
3790-3800	10	Limestone: light-gray (N7) to medium dark-gray (N4), mottled, dense to medium crystalline, silty.
3800-3808	8	Like 3790-3800.
3808-3816	8	Limestone: medium-gray (N5) to medium dark-gray (N4), dense, silty, nodular, scattered pyrite crystals.
3816-3825	9	Limestone: white (N9) to medium dark-gray (N4), dense.

Depth (feet)	Thickness (feet)	
3825-3840	15	Like 3816-3825.
3840-3847	7	Like 3816-3825.
3847-3855	8	Limestone: medium dark-gray (N4), dense, silty.
3855-3860	5	Like 3847-3855.
3860-3865	5	Like 3847-3855.
3865-3870	5	Like 3847-3855; limestone, light-gray (N7), noncrystalline, slightly oolitic.
3870-3878	8	Limestone: light-gray (N7) to dark-gray (N3), dense, slightly oolitic; limestone, light brownish-gray (5YR 6/1), medium crystalline.
3878-3887	9	Like 3870-3878.
3887-3892	5	Like 3870-3878; non-oolitic.
3892-3900	8	Like 3870-3878.
3900-3908	8	Like 3870-3878.
3908-3915	7	Limestone: dark-gray (N3), argillaceous, scattered pyrite crystals, crinoidal.
3915-3922	7	Like 3908-3915.
3922-3927	5	Like 3908-3915.
3927-3932	5	Like 3908-3915.
3932-3938	6	Like 3908-3915.
3938-3948	10	Like 3908-3915.
3948-3958	10	Limestone: dark-gray (N3), silty, fossiliferous (bryozoa).
3958-3968	10	Limestone: very light gray (N8), noncrystalline; limestone, medium dark-gray (N4), dense, silty, crinoidal.

Depth (feet)	Thickness (feet)	
3968-3978	10	Limestone: white (N9) to medium dark-gray (N4), dense, oolitic, scattered pyrite crystals.
3978-3986	8	Like 3968-3978.
3986-3990	4	Like 3968-3978.
3990-3998	8	Like 3968-3978.
3998-4005	7	Limestone: white (N9), noncrystalline to medium crystalline; limestone, light brownish- gray (5YR 6/1), dense, oolitic.
4005-4015	10	Like 3998-4005.
4015-4022	7	Like 3998-4005, crinoidal.
4022-4028	6	Limestone: white (N9) to brownish-gray (5YR 4/1), noncrystalline to dense.
4028-4032	4	Limestone: light-gray (N7) to medium dark-gray (N4), noncrystalline to dense.
4032-4035	3	Limestone: brownish-gray (5YR 4/1), dense.
4035-4038	3	Like 4032-4035.
4038-4048	10	Limestone: brownish-gray (5YR 4/1), dense; sample contains a small amount of pyrite.
4048-4055	7	Limestone: white (N9) to brownish-gray (5YR 4/1), dense to finely crystalline.
4055-4061	6	Like 4048-4055; with abundant medium crystals of dolomite (?).
4061-4067	6	Limestone: light brownish-gray (5YR 6/1), dense, oolitic.

Depth (feet)	Thickness (feet)	
4067-4071	4	Like 4061-4067.
4071-4076	5	Like 4061-4067.
4076-4080	4	Like 4061-4067.
4080-4084	4	Limestone: light brownish-gray (5YR 5/1), dense to finely crystalline.
4084-4092	8	Limestone: white (N9) to light brownish- gray (5YR 5/1), dense.
4092-4097	5	Limestone: light brownish-gray (5YR 6/1) to brownish-gray (5YR 4/1), dense, oolitic.
4097-4102	5	Like 4092-4097.
4102-4107	5	Like 4092-4097.
4107-4113	6	Limestone: medium dark-gray (N4), dense, slightly oolitic.
4113-4120	7	Limestone: medium dark-gray (N4) with slight brownish tint, silty, oolitic, dense with some medium crystals.
4120-4130	10	Like 4113-4120; with a few crinoid stems.
4130-4135	5	Limestone: light brownish-gray (5YR 5/1), dense.
4135-4140	5	Like 4130-4135; some limestone, light-gray (N7), noncrystalline.
4140-4147	7	Like 4130-4135.
4147-4154	7	Like 4130-4135.
4154-4165	11	Limestone: brownish-gray (5YR 4/1), dense, with fine grainy texture.

Depth (feet)	Thickness (feet)	
4165-4175	10	Like 4154-4165.
4175-4182	7	Limestone: light-gray (N7) to brownish-gray (5YR 4/1), dense, slightly fossiliferous (bryozoa fragments ?).
4182-4190	8	Like 4175-4182.
4190-4195	5	Limestone: medium-gray (N5), with very abundant dark-gray (N3) oolites, and white (N9), medium to finely crystalline matrix.
4195-4198	3	Like 4190-4195.
4198-4206	8	Limestone: light-gray (N7) to brownish-gray (5YR 4/1), dense, slightly oolitic.
4206-4213	7	Like 4198-4206.
4213-4220	7	Like 4198-4206.
4220-4225	5	Limestone: medium dark-gray (N4) with brownish tint, dense.
4225-4230	5	Limestone: very light gray (N8), noncrystalline; limestone, medium dark-gray (N4), like 4220- 4225.
4230-4235	5	Limestone: medium-gray (N5), silty.
4235-4240	5	Like 4230-4235.
4240-4247	7	Limestone: medium dark-gray (N4), dense, slightly silty; limestone, very light gray (N8), non- crystalline.

Depth (feet)	Thickness (feet)	
4247-4255	8	Like 4240-4247; sample contains some chert, light brownish-gray (5YR 6/1), platy chips.
4255-4260	5	Like 4240-4247; sample contains slightly more chert.
4260-4265	5	Limestone: medium dark-gray (N4), argillaceous, dense to finely crystalline.
4265-4270	5	Like 4260-4265.
4270-4276	6	Like 4260-4265.
4276-4281	5	Limestone and siltstone: limestone, very light gray (N8) to medium dark-gray (N4), dense to finely crystalline; siltstone, calcareous, medium light-gray (N6) with slight greenish tint; also a few medium to coarse, rounded quartz grains.
4281-4286	5	Limestone: brownish-gray (5YR 4/1), dense.
4286-4295	9	Like 4281-4286.
4295-4302	7	Limestone: medium light-gray (N6) to medium dark-gray (N4), sandy.
4302-4309	7	Like 4295-4302.
4309-4316	7	Like 4295-4302.
4316-4323	7	Like 4295-4302.
		<u>Maccrady shale ? - 27 feet thick</u>
4323-4329	6	Like 4295-4302; trace of gypsum (?) (selenite).

Depth
(feet)

Thickness
(feet)

4329-4333 4 Like 4295-4302; silty.

4333-4340 7 Like 4295-4302.

Price sandstone

~~Pecora formation - 275 feet thick~~

4340-4346 6 Siltstone: calcareous, medium dark-gray (N4).

4346-4350 4 Siltstone: calcareous, medium-gray (N5) with
greenish tint; sample contains a trace of
gypsum.

4350-4355 5 Siltstone: medium-gray (N5); like 4346-4350.

4355-4360 5 Like 4350-4355; sample contains a small amount
of scattered, bluish-green mineral.

4360-4369 9 Siltstone: medium-gray (N5), noncalcareous.

4369-4375 6 Like 4360-4369.

4375-4378 3 Like 4360-4369.

4378-4383 5 Like 4360-4369.

4383-4389 6 Siltstone: medium dark-gray (N4), sandy,
slightly calcareous, contains abundant bright
green mineral.

4389-4392 3 Siltstone: calcareous, medium light-gray (N6),
sandy, slightly micaceous.

4392-4395 3 Like 4389-4392.

4395-4400 5 Like 4389-4392.

4400-4404 4 Like 4389-4392.

4404-4412 8 Like 4389-4392.

Depth (feet)	Thickness (feet)	
4412-4417	5	Siltstone: medium dark-gray (N4), argillaceous, micaceous.
4417-4424	7	Siltstone and shale: siltstone, like 4412-4417; shale, dark-gray (N3).
4424-4429	5	No samples.
4429-4434	5	Like 4412-4417.
4434-4439	5	Siltstone: medium-gray (N5), sandy, micaceous, noncalcareous.
4439-4445	6	Like 4434-4439.
4445-4450	5	Like 4434-4439.
4450-4455	5	Like 4434-4439.
4455-4460	5	Like 4434-4439.
4460-4465	5	Shale: medium dark-gray (N4), silty.
4465-4473	8	Like 4434-4439.
4473-4478	5	Siltstone: sandy, light-gray (N7), scattered mica.
4478-4483	5	Like 4473-4478.
4483-4488	5	Like 4473-4478.
4488-4496	8	Sandstone: medium dark-gray (N4), conglomeratic, very fine to coarse-grained, subangular to subrounded, very poorly sorted, argillaceous, slightly calcareous, 50% quartz, slightly porous; sandstone, calcareous, medium-gray (N5) with reddish tint due to red, micaceous, argillaceous interstitial material, medium-

grained granules, subrounded to rounded,
poorly sorted, abundant argillaceous nodules,
75% quartz, grains frosted.

Depth (feet)	Thickness (feet)	
4496-4501	5	Sandstone: light-gray (N7), very fine to fine-grained, subangular, moderately well sorted, slightly silty, slightly calcareous, 90% quartz, moderately porous.
4501-4504	3	Like 4496-4501.
4504-4509	5	Siltstone: medium-gray (N5), sandy, micaceous.
4509-4514	5	Like 4504-4509.
4514-4519	5	Like 4504-4509.
4519-4524	5	Like 4504-4509.
4524-4530	6	Siltstone and shale: siltstone, medium light-gray (N6), sandy; shale, medium dark-gray (N4), silty, micaceous.
4530-4534	4	Sandstone: silty, medium light-gray (N6), very fine grained, angular to subangular, very poorly sorted, slightly calcareous, scattered pyrite crystals, 50% quartz, slightly porous.
4534-4540	6	Like 4530-4534.
4540-4545	5	Like 4530-4534.
4545-4550	5	Siltstone and shale: siltstone, medium-gray (N5), sandy; shale, medium dark-gray (N4).
4550-4555	5	Siltstone and shale: siltstone, medium-gray (N5), sandy, slightly calcareous, with abundant pyrite; shale, medium dark-gray (N4), silty, micaceous.

Depth
(feet)

Thickness
(feet)

4555-4560	5	Shale: medium dark-gray (N4), fissile, silty, slightly micaceous.
4560-4565	5	Like 4555-4560.
4565-4570	5	Like 4555-4560.
4570-4575	5	Sandstone: medium light-gray (N6), very fine grained, angular to subangular, moderately well sorted, slightly silty, 90% quartz, very slightly porous.
4575-4585	10	Shale: medium-gray (N5) to medium dark-gray (N4), silty, scattered clusters of pyrite crystals.
4585-4590	5	Siltstone and shale: siltstone, medium light-gray (N6), sandy, scattered pyrite crystals; shale, medium dark-gray (N4), silty, micaceous.
4590-4595	5	Shale: medium dark-gray (N4), like 4585-4590.
4595-4600	5	Shale: like 4585-4590.
4600-4605	5	Sandstone: calcareous, light-gray (N7), very fine to fine-grained, subangular, poorly sorted, silty, abundant pyrite, 75% quartz, very slightly porous.
4605-4610	5	Sandstone, siltstone, and shale: sandstone, like 4600-4605; siltstone, medium-gray (N5), pyritic; shale, medium dark-gray (N4), slightly silty, moderately fissile.

Depth (feet)	Thickness (feet)	
4610-4615	5	Like 4605-4610.
4615-4620	5	Like 4605-4610.
4620-4625	5	Like 4605-4610.
<u>Big Stone Gap shale</u> — 323 feet thick		
4625-4635	10	Shale: medium dark-gray (N4), with abundant clusters of pyrite crystals.
4635-4645	10	Like 4625-4635.
4645-4655	10	Like 4625-4635; siltstone, medium dark-gray (N4), sandy.
4655-4665	10	Like 4645-4655.
4665-4673	8	Like 4645-4655.
4673-4675	2	No samples.
4675-4685	10	Shale: medium dark-gray (N4), silty.
4685-4690	5	Shale: medium dark-gray (N4), fissile; sample contains a few clusters of pyrite crystals.
4690-4700	10	Like 4685-4690.
4700-4709	9	Like 4685-4690.
4709-4719	10	Like 4685-4690.
4719-4725	6	Like 4685-4690.
4725-4733	8	Like 4685-4690.
4733-4750	17	Like 4685-4690.
4750-4757	7	Shale: medium dark-gray (N4), with a slight brownish tint, lumpy.
4757-4764	7	Shale: like 4750-4757.
4764-4771	7	Like 4750-4757.

Depth (feet)	Thickness (feet)	
4771-4779	8	Like 4750-4757; sample contains abundant pyrite.
4779-4788	9	Like 4750-4757; sample contains scattered marcasite crystals.
4788-4797	9	Shale and siltstone: shale, medium dark-gray (N4), moderately fissile, moderately micaceous; siltstone, medium-gray (N5).
4797-4805	8	Shale: medium dark-gray (N4), moderately fissile; shale, medium dark-gray (N4) with brownish tint, silty.
4805-4815	10	Shale: medium dark-gray (N4), fissile, slightly micaceous.
4815-4826	11	Like 4805-4815.
4826-4843	17	Like 4805-4815.
4843-4850	7	Siltstone: medium-gray (N5), sandy, micaceous.
4850-4860	10	Shale: medium dark-gray (N4), silty.
4860-4870	10	Shale: medium dark-gray (N4), fissile.
4870-4880	10	Shale: medium dark-gray (N4), silty, slightly micaceous.
4880-4890	10	Like 4870-4880.
4890-4900	10	Like 4870-4880.
4900-4911	11	Like 4870-4880.
4911-4922	11	Like 4870-4880.
4922-4932	10	Shale and siltstone: shale, medium dark-gray (N4), slightly silty; siltstone, medium-gray (N5) to medium dark-gray (N4), sandy, scattered marcasite (?) crystals.

Depth (feet)	Thickness (feet)	
4932-4938	6	Like 4922-4932.
4938-4948	10	Like 4922-4932.
		<u>Chemung formation ?</u>
4948-4959	11	Siltstone: medium dark-gray (N4), sandy to argillaceous, moderately micaceous, abundant pyrite crystals.
4959-4969	10	Siltstone and sandstone: siltstone, like 4948-4959; sandstone, silty, medium light-gray (N6) to medium-gray (N5), very fine grained, angular to subangular, poorly sorted, slightly calcareous, micaceous, scattered pyrite crystals, 50% quartz, very slightly porous.
4969-4976	7	Sandstone and shale: sandstone, like 4959-4969; shale, medium dark-gray (N4), fissile; shale, dark-gray (N3), carbonaceous, thin calcareous beds, fossiliferous.
4976-4981	5	Siltstone and limestone: siltstone, medium-gray (N5), micaceous; limestone, medium dark-gray (N4), silty, dense.
4981-4991	10	Shale and limestone: shale, medium dark-gray (N4), fissile; limestone, light brownish-gray (5YR 6/1), dense.
4991-5000	9	Shale: medium dark-gray (N4), fissile.
5000-5010	10	Like 4991-5000.

Depth (feet)	Thickness (feet)	
5010-5032	22	Siltstone: medium light-gray (N6), sandy; siltstone, medium-gray (N5), micaceous, argillaceous.
5032-5040	8	Like 5010-5032; with fine to medium crystalline dolomite.
5040-5050	10	Siltstone and dolomite: siltstone, medium-gray (N5), slightly sandy, micaceous; siltstone, medium dark-gray (N4), argillaceous; dolomite, like 5032-5040.
5050-5055	5	Siltstone and shale: siltstone, medium dark-gray (N4), argillaceous, micaceous; shale, medium dark-gray (N4), fissile.
5055-5060	5	Like 5050-5055.
5060-5065	5	Siltstone: medium-gray (N5), sandy, micaceous.
5065-5075	10	Like 5060-5065.
5075-5085	10	Shale: medium dark-gray (N4), silty, slightly micaceous.
5085-5100	15	Like 5075-5085.

✓
Summary of Yukon-Pocahontas No. 2-1466 Well 43

	Depth (feet)	Thickness (feet)
Norton formation	79-581	502
Lee formation	581-1950	1369
Bluestone formation	1950-2432	482
Princeton sandstone	2432-2580	148
Hinton formation		
Avis limestone member of Reger	2580-2645	65
Hinton formation undivided	2645-3030	385
Stony Gap sandstone member	3030-3215	185
Bluefield shale	3215-3720	505
Greenbrier limestone	3720-4323	603
Maccrady shale ?	4323-4340	17 (error)
Price sandstone	4340-4625	285 (error)
Big Stone Gap shale	4625-4948	323
Chemung formation	4948-5100	152 +

11-312 A

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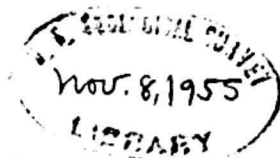
W. E. Wrather, Director

(Detailed logs of 28 wildcat wells... in Virginia)

Sample Record of the F. H. Curtis No. 1-A well and the
R. A. Looney No. 1-1659 well,
Buchanan County, Virginia

by

A. D. Williamson, Eloise T. Jacobsen and P. T. Stafford



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Prepared in Cooperation with the Division of Geology of
the Virginia Department of Conservation and Development

**This report is preliminary and has not
been edited or reviewed for conformity
with U. S. Geological Survey standards
and nomenclature.**

Sample Record of the F. H. Curtis No. 1-A well and the

R. A. Looney No. 1-1659 well, Buchanan County,

Virginia

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The subject wells of this circular were drilled about 6 miles northeast of Grundy, Buchanan County, Virginia. Both wells started in the Pennsylvanian Norton formation but the Curtis No. 1-A well stopped in the Bluefield shale, while the Looney No. 1 was drilled into the Mississippian Maccrady shale.

The presence of fresh water ostracods in the Bluefield shale cuttings from the Curtis 1-A well is noteworthy because this formation is usually regarded entirely as marine. Evidently part of the formation is non-marine. The courtesy of the United Producing Company and the Pipeline Construction and Drilling Company in making the samples available for study and publication is acknowledged with thanks. We also wish to thank Helen Duncan and Jean Berdan for the identification of the fossils from the Bluefield shale. The method of sample examination used and the explanation of the correlation is given in ^{U.S.} ~~Virginia~~ Geological Survey Bulletin No. 1027, "oil and gas wells drilled in southwest Virginia before 1950. (In preparation)

F. H. CURTIS NO. 1-A WELL

Buchanan County, Virginia.

Pipe Line Construction and Drilling Company.

Located 1.86 miles W. of 82° 00' and 5.57 miles S. of 37° 25', Hurley
Quadrangle, Mill Creek off Slate Creek.

Elevation, 1987.44 ft

Total depth, 3461 ft

Drilling commenced October 3, 1948; completed June 1, 1949.

Production: 6005.3 MCF I. P.

Gas shows at 1485, 2750, 2760, 3386 ft

Oil shows at 1022, 2250 ft

Gas pay at 3397-3431 ft

Coal at 456-460, 2127-2132, 2132-2137, 2137-2142, 2146, 2150, 3029-3033 ft

Samples examined by Allen D. Williamson, 251-615 ft and 2886-3461 ft,

April 1950; by P. T. Stafford, 615-2359 ft, March and April 1949,

ostracod identified by J. M. Berdan; by Eloise T. Jacobsen 2359-

2886 ft, June 1949.

Sample Library Reference: Virginia Geological Survey and Kentucky
Geological Survey.

Depth (feet)	Thickness (feet)
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Norton formation

351-361	10	Sandstone: very light gray (N8), very silty, moderately micaceous, fine- to medium-grained, subangular to subrounded, poorly sorted, scattered black and green mineral, slightly porous, 75% quartz.
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Depth (feet)	Thickness (feet)	
361-370	9	Sandstone: white (N9), slightly silty, fine- to medium-grained, with some coarse grains, sub-angular to subrounded, moderately well sorted, scattered black and green mineral, moderately porous, 90% quartz.
370-377	7	Sandstone: silty, calcareous, micaceous, light-gray (N7), very fine to medium-grained, sub-angular to subrounded, very poorly sorted, abundant black mineral, few sideritic nodules, scattered green mineral, very slightly porous, 75% quartz.
377-388	11	Sandstone: very light gray (N8), very silty, very fine to medium-grained, subangular, poorly sorted, scattered black mineral and green mineral, slightly porous, 75% quartz.
388-400	12	Like 377-388; with some sideritic nodules; and a small amount of shale, sideritic, brownish-gray (5YR 4/1).
400-417	17	Sandstone: conglomeratic, silty, micaceous, calcareous, fine- to coarse-grained, subangular to subrounded, poorly sorted, abundant black mineral, small amount of green mineral, slightly porous, 90% quartz.

Depth (feet)	Thickness (feet)	
417-422	5	Siltstone: sandy, micaceous, medium dark-gray (N4); grades into shale, carbonaceous, dark-gray (N3), fissile; sample also contains a little white chert.
422-428	6	Like 417-422.
428-440	12	Siltstone: micaceous, medium dark-gray (N4).
440-452	12	Sandstone: micaceous, light-gray (N7), very silty, very fine grained, subangular, poorly sorted, very slightly porous, 75% quartz.
452-467	15	Sandstone: calcareous, micaceous, light-gray (N7), slightly silty, very fine to fine-grained, subangular, fairly well sorted, scattered black mineral, very slightly porous, 90% quartz; sample contains a small amount of coal; and shale, carbonaceous, dark-gray (N3).
467-475	8	Sandstone: micaceous, sideritic, very light gray (N8), slightly silty, slightly calcareous, very fine to fine-grained, angular to subrounded, moderately well sorted, scattered black and green mineral, slightly porous, 90% quartz.
475-482	7	Like 467-475.
482-489	7	Like 467-475.
489-494	5	Siltstone: micaceous, medium-gray (N5) to medium dark-gray (N4), sandy to argillaceous.

Depth (feet)	Thickness (feet)	
494-505	11	Siltstone: calcareous, very light gray (N8), very sandy, scattered mica, and black mineral.
505-512	7	Siltstone: sandy, micaceous, medium dark-gray (N4).
512-520	8	Siltstone: sandy, micaceous, medium dark-gray (N4).
520-539	19	Like 512-520.
539-547	8	Like 512-520.
547-552	5	<u>Like</u> 512-520.
552-558	6	Sandstone: sideritic, medium-gray (N5), very silty, very fine-grained, angular to subangular, very poorly sorted, very slightly porous, 50% quartz.
558-566	8	Siltstone: medium dark-gray (N4), fairly micaceous, with a few aggregates of pyrite crystals.
566-580	12	Like 558-566.
580-591	11	Siltstone: micaceous. calcareous, medium dark-gray (N4).
591-600	9	Shale: carbonaceous, dark-gray (N3), fissile; and shale, sideritic, brownish-gray (5YR 4/1).
600-606	6	No sample.
606-615	9	Sandstone: silty, calcareous, light-gray (N7), very fine- to fine-grained, subangular to subrounded, poorly sorted, scattered green mineral, very slightly porous, 75% quartz.

Depth (feet)	Thickness (feet)	
615-623	8	Shale: silty, medium-gray (N5), slightly micaceous, very slightly calcareous to calcareous.
623-628	5	Shale 99%, sandstone 1%: shale, silty, medium-gray (N5), slightly micaceous, very slightly calcareous to calcareous; sandstone, calcareous, medium light-gray (N7), very fine grained, subangular to angular; sample contains a trace of coal.
628-632	4	Shale: like 615-623.
632-646	14	Shale: like 615-623.
646-654	8	Shale 55%, sandstone 44%, siltstone 1%: shale, like 615-623; sandstone, calcareous, argillaceous, light-gray (N7), slightly micaceous, very fine grained, subangular to angular, part limonitic-stained; siltstone, light brownish-gray (5YR 6/1); sample also contains a trace of coal.
654-662	8	Shale 55%, sandstone 45%: shale, medium-gray (N5), slightly micaceous, very slightly calcareous; sandstone, calcareous, argillaceous, light-gray (N7), slightly micaceous, very fine grained, subangular to angular.
662-670	8	Shale 80%, sandstone 20%: like 654-662.
670-678	8	Shale: like 654-662.
673-686	8	Shale: like 654-662, very slightly calcareous to calcareous.

Depth (feet)	Thickness (feet)	
686-692	6	Shale: like 654-662; sample contains a few pieces sandstone, calcareous, light-gray (N7), very fine grained, subangular to angular.
692-698	6	Like 654-662.
698-705	7	Like 654-662, very slightly calcareous.
705-714	9	Like 654-662.
714-718	4	Like 654-662.
718-725	7	Like 654-662.
725-731	6	Like 654-662.
731-734	3	Shale 85%, siltstone 15%: shale, silty, micaceous, medium-gray (N5), very slightly calcareous to calcareous; siltstone, light-gray (N7), slightly calcareous, some limonitic stain.
734-740	6	Sandstone 85%, shale 15%: sandstone, very light gray (N8), very slightly micaceous, fine- to medium-grained, subangular to subrounded, some limonitic stain; shale, like 654-662; sample contains a trace of coal and pyrite.
740-750	10	Sandstone 95%, shale 5%: sandstone, very light gray (N8), like 734-740, with some black and green minerals; shale, medium-gray (N5), like 654-662.
750-758	8	Sandstone 95%, shale 5%: like 740-750; sample contains a trace of pyrite and coal.

Depth (feet)	Thickness (feet)	
758-764	6	Sandstone 97%, shale 3%: like 740-750; sample contains no pyrite or coal, but does contain a trace of shale, grayish-red (10R 4/2), finely micaceous.
764-767	3	Like 758-764.
767-774	7	Like 758-764; but does not contain grayish-red shale.
774-782	8	Like 758-764; sample contains some sandstone, very slightly calcareous.
782-792	10	Like 758-764.
792-804	12	Shale 80%, sandstone 20%: shale, silty, medium dark-gray (N4), some very slightly calcareous, slightly micaceous; sandstone, very light gray (N8), fine- to medium-grained, subangular to subrounded, very slightly micaceous,
804-812	8	Sandstone 85%, shale 15%: sandstone, light-gray (N7), very slightly calcareous, slightly micaceous, very fine grained, subangular to angular, some limonitic stain; shale, micaceous, silty, medium-gray (N5), very slightly calcareous.
812-818	6	Shale 95%, sandstone 5%: shale, micaceous, silty, medium-gray (N5), very slightly calcareous; sandstone, micaceous, light-gray (N7), very fine grained, very slightly calcareous.

Depth (feet)	Thickness (feet)	
818-825	7	Shale 95%, sandstone 5%: like 812-818.
825-830	5	Shale 98%, limestone 2%: shale, like 812-818; limestone, light-gray (N7), finely crystalline, very slightly argillaceous.
830-840	10	Shale: medium dark-gray (N4) to brownish-gray (5YR 4/1), slightly micaceous, some very slightly calcareous.
840-850	10	Like 830-840.
850-860	10	Shale: medium-gray (N5), slightly micaceous, slightly silty.
860-866	6	Like 850-860.
866-871	5	Like 850-860, some very slightly calcareous.
871-877	6	Shale: like 850-860.
877-880	3	Shale 60%, sandstone 40%: shale, medium-gray (N5), slightly micaceous; sandstone, light- gray (N7), very fine to fine-grained, sub- rounded to subangular, slightly micaceous, very slightly calcareous to calcareous.
880-884	4	Sandstone 70%, shale 30%: like 877-880.
884-892	8	Sandstone: calcareous, light-gray (N7), very fine to medium-grained, subrounded, very slightly micaceous; shale, medium-gray (N5), slightly mica- ceous.
892-900	8	No sample.

Depth (feet)	Thickness (feet)	
900-903	3	Shale: medium-gray (N5); sample contains few pieces of coal.
903-912	9	Shale: like 900-903; sample contains a trace of coal.
912-917	5	Shale: medium-gray (N5), very slightly micaceous, some very slightly silty.
917-925	8	Shale 55%, sandstone 45%: shale, medium-gray (N5), slightly micaceous, very slightly silty; shale, pale yellowish-brown (10YR 6/2) to grayish-orange (10 YR 7/4), silty, very slightly micaceous; sandstone, light-gray (N7), very slightly micaceous, very fine to fine-grained, sub-rounded to subangular, sample contains some black and green minerals.
925-929	4	Shale 50%, sandstone 50%: like 917-925; shale, yellowish-brown (10YR 6/2).
929-934	5	Shale 90%, sandstone 10%: like 917-925; sample contains no yellowish-brown shale.
934-944	10	Shale 70%, sandstone 30%: like 917-925.
944-952	8	No sample.
952-960	8	Shale: medium-gray (N5) and medium dark-gray (N4), some slightly micaceous, some slightly silty.

Depth (feet)	Thickness (feet)	
960-965	5	Shale 90%, sandstone 10%: shale, medium dark-gray (N4), very slightly micaceous; sandstone, light-gray (N7), very slightly micaceous, very slightly calcareous, very fine to fine-grained, subrounded, contains some black and green minerals.
965-970	5	Shale 90%, sandstone 10%: like 960-965.
970-975	5	Shale: like 960-965.
975-979	4	Shale: like 960-965.
979-984	5	Like 960-965.
984-1000	16	Like 960-965.
1000-1010	10	No sample.
<u>Lee formation</u> - 1219 feet thick		
1010-1015	5	Sandstone 90%, shale 10%: sandstone, light-gray (N7), very fine to fine-grained, subrounded to subangular; shale, medium dark-gray (N4), very slightly micaceous; sample contains a trace of coal.
1015-1017	2	Sandstone 90%, shale 10%: like 1010-1015; sample contains no coal.
1017-1022	5	Sandstone 95%, shale 5%: like 1010-1015; Company reports "show of oil"; much of sandstone appears dark to brownish-black (5YR 2/1) and probably contains oil.
1022-1025	3	Sandstone 97%, shale 3%: like 1010-1015; some of the sandstone appears to contain oil, like 1017-1022.

Depth (feet)	Thickness (feet)	
1025-1034	9	Shale 92%, sandstone 8%: shale, micaceous, medium dark-gray (N4); sandstone, light-gray (N7), very fine to fine-grained, subrounded to subangular, very slightly micaceous.
1034-1040	6	Shale 75%, sandstone 25%: shale, medium-gray (N5), very silty, slightly micaceous; sandstone, very light gray (N8), subangular to angular, medium-grained, some black and green minerals; sandstone, light-gray (N7), very fine grained, subrounded to subangular, very slightly micaceous.
1040-1050	10	Sandstone 98%, shale 2%: sandstone, very light gray (N8), subangular to angular, fine- to medium-grained, some black and green minerals; sandstone, light-gray, very fine grained, subrounded to subangular, very slightly micaceous; and shale, medium-gray (N5), very silty, slightly micaceous.
1050-1054	4	Sandstone: very light gray (N8), like 1040-1050.
1054-1059	5	Sandstone: like 1040-1050.
1059-1064	5	Sandstone 50%, shale 50%: sandstone, like 1040-1050; shale, silty, micaceous, medium-gray (N5).
1064-1075	11	Sandstone 99%, shale 1%: sandstone, like 1040-1050; shale medium dark-gray (N4), very slightly micaceous.

Depth (feet)	Thickness (feet)	
1075-1084	9	Sandstone 99%, shale 1%: like 1064-1075.
1084-1090	6	Sandstone 99%, shale 1%: like 1064-1075.
1090-1100	10	Sandstone: like 1064-1075.
1100-1108	8	No sample.
1108-1116	8	Sandstone: like 1064-1075.
1116-1122	6	Sandstone: like 1064-1075; sample contains
11		abundant black minerals, including biotite (?).
1122-1125	3	Sandstone: like 1064-1075.
1125-1133	8	Sandstone: like 1064-1075.
1133-1141	8	Sandstone: like 1064-1075; sample contains a
		trace of shale, medium dark-gray (N4), very
		slightly micaceous.
1141-1145	4	Sandstone 80%, shale 20%: sandstone, like 1064-
		1075; sandstone, micaceous, medium dark-gray
		(N4), fine- to medium-grained, subrounded to
		subangular; shale, medium dark-gray (N4),
		very slightly micaceous, slightly silty.
1145-1152	7	Shale 95%, sandstone 5%: shale, medium dark-
		gray (N4), very silty, slightly micaceous;
		sandstone, micaceous, medium-gray (N5),
		fine- to medium-grained, subrounded to sub-
		angular.
1152-1157	5	Shale: like 1145-1152.
1157-1161	4	Shale: like 1145-1152.
1161-1170	9	Shale: like 1145-1152; some slightly silty to
		silty.

Depth (feet)	Thickness (feet)	
1170-1180	10	Shale: like 1161-1170; with one piece shale, pale red-brown (10R 5/4), very finely silty.
1180-1185	5	Shale: like 1145-1152.
1185-1192	7	Shale 60%, siltstone 40%: shale, like 1145-1152; siltstone, argillaceous, micaceous, medium light-gray (N6).
1192-1197	5	Shale 50%, siltstone 50%: like 1185-1192.
1197-1200	3	No sample.
1200-1215	15	Sandstone 70%, shale 30%: sandstone, light-gray (N7), slightly micaceous, very fine to fine-grained, subangular to angular, many black and dark minerals; shale, medium dark-gray (N4), slightly micaceous; shale, grayish-orange (10YR 7/4) to light-brown (5YR 6/4), very silty, very slightly micaceous; sample contains a few pieces shale, grayish-red (10R 4/2) to pale reddish-brown (10R 5/4), very silty.
1215-1221	6	Shale 80%, sandstone 20%: shale, medium dark-gray (N4), slightly micaceous, very silty; shale, grayish-orange (10YR 7/4) to light-brown (5YR 6/4), very silty, slightly micaceous; sample contains a few pieces shale, grayish-red (10R 4/2), very silty; sandstone, light-gray (N7), slightly micaceous, very fine to fine-grained, angular to subrounded, many black and dark minerals; trace

Depth (feet)	Thickness (feet)	
1221-1228	7	No sample.
1228-1230	2	Shale 60%, sandstone 40%: shale, silty, medium dark-gray (N4), very micaceous; sandstone, light-gray (N7), very fine to fine-grained, subrounded to angular, very slightly micaceous, some black and dark minerals.
1230-1242	12	Sandstone 98%, shale 2%: like 1228-1230.
1242-1245	3	No sample.
1245-1250	5	Sandstone 50%, shale 40%, siltstone 10%: sandstone, like 1228-1230, fine- to medium-grained; shale, medium dark-gray (N5), very micaceous, some silty; siltstone, medium-gray (N5), slightly micaceous, many dark and black minerals.
1250-1255	5	Sandstone 99%, shale 1%: like 1245-1250.
1255-1260	5	Sandstone 99%, shale 1%: like 1245-1250.
1260-1268	8	Like 1245-1250.
1268-1274	6	Like 1245-1250.
1274-1280	6	Like 1245-1250.
1280-1285	5	Like 1245-1250.
1285-1290	5	Sandstone and siltstone: sandstone, like 1245-1250; siltstone, light-gray (N7), with few black and dark minerals.
1290-1293	3	Siltstone 59%, sandstone 40%, shale 1%: siltstone, like 1285-1290; sandstone and shale, like 1245-1250.
1293-1307	14	Siltstone 95%, shale 5%: very light gray (N8),

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very few black minerals; siltstone, medium-gray (N7), few black minerals; shale, grayish-red (10R 4/2), very silty; shale, medium dark-gray (N5), slightly micaceous, some slightly silty.

31-2

1521-1522

133-

12

1

16

Depth (feet)	Thickness (feet)	
1307-1309	2	No sample.
1309-1314	5	Sandstone 90%, siltstone 10%: sandstone, very light gray (N8), very fine grained, rounded to subrounded, some limonitic stain; siltstone, very light gray (N8), very few black minerals.
1314-1318	4	Sandstone 99%, shale 1%: sandstone, like 1309-1314; shale, medium dark-gray (N5), slightly micaceous, some slightly silty.
1318-1326	8	Sandstone 99%, shale 1%: like 1314-1318.
1326-1331	5	Sandstone 96%, shale 4%: sandstone, silty, very light gray (N8), very fine to fine-grained, rounded to subangular, some black and green minerals; shale, medium dark-gray (N5), slightly micaceous, some slightly silty; shale, grayish-red (10R 4/2), very silty.
1331-1336	5	Sandstone 99%, shale 1%: sandstone, like 1326-1331; shale, medium dark-gray (N5) and grayish-red (10R 4/2), like 1326-1331.
1336-1341	5	Sandstone 90%, shale 4%: sandstone and shale, like 1326-1331; shale, light-brown (5YR 6/4).
1341-1350	9	Like 1336-1341.
1350-1360	10	Shale 95%, sandstone 5%: shale, silty, micaceous, medium dark-gray (N4); sandstone, silty, medium light-gray (N6), very fine to fine-grained, rounded to subrounded, slightly micaceous.

Depth (feet)	Thickness (feet)	
1360-1362	2	No sample.
1362-1367	5	Shale: like 1350-1360.
1367-1372	5	Shale 90%, sandstone 10%: like 1350-1360.
1372-1375	3	Shale 60%, sandstone 40%: like 1350-1360.
1375-1379	4	Sandstone 75%, shale 25%: sandstone, silty, light-gray (N7), very slightly micaceous, very fine to fine-grained, rounded to subrounded, well sorted; shale, like 1350-1360.
1379-1405	26	Sandstone 95%, shale 5%: like 1375-1379.
1405-1414	9	Sandstone and shale: like 1375-1379.
1414-1418	4	Like 1375-1379.
1418-1422	4	Sandstone 90%, shale 10%: sandstone, silty, light-gray (N7), very slightly micaceous, very fine to fine-grained, rounded to subangular, well sorted, few pieces magnetite (?), limonitic stain; sandstone, light brownish-gray (5YR 6/1), very slightly silty, very slightly micaceous, very fine to fine-grained, rounded to subrounded; shale, medium dark-gray (N4), some slightly silty, micaceous.
1422-1426	4	Sandstone 95%, shale 5%: sandstone, light-gray (N7), like 1418-1422;.
1426-1433	7	Sandstone 95%, shale 5%: sandstone, light-gray (N7), like 1418-1422; shale, like 1418-1422; sample contains a trace of siltstone, white (N9), calcareous cement; and trace hematite (?).

Depth (feet)	Thickness (feet)	
1433-1439	6	Sandstone 95%, shale 5%: sandstone, very light gray (N8), like 1418-1422; sandstone, light brownish-gray (5YR 6/1), very slightly silty, very slightly micaceous, very fine to fine-grained, rounded to subrounded, many black and few green minerals; shale, micaceous, medium dark-gray (N4), some slightly silty.
1439-1448	9	Sandstone 95%, shale 15%: sandstone, very light gray (N8), like 1418-1422; sandstone, light brownish-gray (5YR 6/1), like 1433-1439; shale, brownish-gray (5YR 4/1), very hard.
1448-1452	4	Sandstone 80%, shale 20%: sandstone, silty, light-gray (N7), very slightly micaceous, very fine to fine-grained, rounded to subangular, well sorted, few black minerals, some slight limonitic staining; sandstone, medium light-gray (N6), slightly silty, very slightly micaceous, very fine to fine-grained, rounded to subangular, well sorted, many dark and black minerals; shale, medium dark-gray (N4), very micaceous, some very silty; and shale, silty, brownish-gray (5YR 4/1), very hard.

Depth (feet)	Thickness (feet)	
1452-1459	7	Sandstone 99%, shale 1%: sandstone, white (N9), very slightly micaceous, very fine to fine-grained, subrounded to subangular, well sorted, slight limonitic iron-staining, some black minerals; shale, medium dark-gray (N4), very micaceous, some silty.
1459-1465	6	Sandstone 99%, shale 1%: like 1452-1459.
1465-1476	11	Siltstone 95%, sandstone and shale 5%: siltstone, shaly, medium-gray (N5), very micaceous, numerous black minerals; shale and sandstone, like 1452-1459.
1476-1485	9	Sandstone 90%, siltstone 5%, shale 5%: sandstone, silty, medium light-gray (N6), very fine to fine-grained, poorly sorted, many dark and black minerals; siltstone and shale, like 1465-1476; sample contains a trace of coal.
1485-1493	8	Sandstone 90%, siltstone 5%, shale 5%: sandstone, very light gray (N8), very fine to fine-grained to some medium-grained, subrounded to angular, many green (glauconite?), brown, and dark minerals; siltstone, shaly, medium-gray (N5), very micaceous, numerous black minerals; shale, medium dark-gray (N4), very micaceous.

Depth (feet)	Thickness (feet)	
1493-1505	<u>12</u>	Sandstone 95%, shale 5%: like 1485-1493.
1505-1515	10	Shale 60%, siltstone 30%, sandstone 10%: like 1485-1493.
1515-1524	9	Siltstone 50%, shale 40%, sandstone 10%: like 1485- 1493.
1524-1535	11	Siltstone 60%, shale 40%: siltstone, micaceous, shaly, medium-gray (N5); shale, silty, medium dark-gray (N4), slightly micaceous.
1535-1546	11	Sandstone 50%, shale 45%, siltstone 5%: sandstone, silty, light-gray (N7), slightly micaceous, very fine grained, subrounded to subangular; some with numerous dark and black minerals; shale and siltstone, like 1524-1535.
1546-1556	10	Sandstone: like 1535-1546, except very fine to fine-grained, limonitic stain and magnetite (?) present; sample contains a trace of shale <u>like 1524-1535.</u>
1556-1564	8	Shale: medium-gray (N5), very slightly micaceous, slightly fissile.
1564-1571	7	Shale: like 1556-1564.
1571-1576	5	Shale: like 1556-1564.
1576-1582	6	Shale: like 1556-1564.
1582-1588	6	Shale: like 1556-1564.
1588-1596	8	Shale: like 1556-1564.

Depth (feet)	Thickness (feet)	
1596-1603	7	Shale: like 1556-1564; sample contains a trace of coal.
1603-1608	5	Siltstone to sandstone 60%, shale 40%: siltstone, medium-gray (N5), some very micaceous, partly argillaceous, many dark and black minerals, grading into sandstone, silty, light-gray (N7), very slightly micaceous, very fine to fine-grained, poorly sorted, with many to few dark and black minerals; shale, like 1556-1564; sample also contains numerous pieces of coal.
1608-1616	8	Sandstone 99%, shale 1%: sandstone, micaceous, light-gray (N7) to very light gray (N8), very fine to fine-grained, poorly sorted, some chlorite (?), green and black minerals; sample contains a few pieces shale, pale-brown (5YR 5/2), and grayish-red (10YR 5/2), some very finely silty, some slightly micaceous; few pieces shale, like 1603-1608.
1616-1624	8	Sandstone 95%, shale 5%: sandstone, like 1608-1616; shale, medium-gray (N5) to pale-brown to grayish-red.
1624-1630	6	Sandstone 98%, shale 2%: shale, medium-gray (N5); with a trace of shale, pale-brown (5YR 5/2), like 1608-1616.

Depth (feet)	Thickness (feet)	
1630-1634	4	Sandstone 99%, shale 1%: like 1624-1630.
1634-1641	7	Sandstone 99%, shale 1%: like 1624-1630.
1641-1649	8	Sandstone 99%, shale 1%: sandstone, medium-gray (N5) to very light gray (N8), some very micaceous, some silty, very fine to medium-grained, subrounded to angular, poorly sorted, some with many dark and black minerals; shale, medium-gray (N5), some silty, some micaceous; sample contains numerous pieces coal.
1649-1668	19	No sample.
1668-1671	3	Sandstone 98%, shale 2%: sandstone, silty, light-gray (N7), slightly micaceous, very fine to medium-grained, subrounded to angular, some with many dark and black minerals, limonitic stain; shale, medium dark-gray (N4), very micaceous.
1671-1676	5	No sample.
1676-1686	10	Sandstone 99%, shale (cavings) 1%: like 1668-1671.
1686-1692	6	Like 1676-1686.
1692-1698	6	Sandstone: like 1668-1671.
1698-1702	4	Shale 60%, sandstone 40%: sandstone, like 1668-1671; shale, medium dark-gray (N4), very slightly micaceous; shale, medium dark-gray (N4) to brownish-gray (5YR 4/1), very hard.

Depth (feet)	Thickness (feet)	
1702-1709	7	Sandstone 95%, shale 5%: like 1668-1671.
1709-1716	7	Sandstone 99%, shale (cavings?) 1%: like 1668-1671.
1716-1725	9	Like 1709-1716.
1725-1730	5	Sandstone 90%, shale 10%: sandstone, silty, light-gray (N7), slightly micaceous, very fine to medium-grained, many black and green minerals, limonitic stain; shale, medium dark-gray (N4), very slightly micaceous; and shale, between medium dark-gray (N4) and brownish-gray (5YR 4/1), very hard.
1730-1736	6	Sandstone 95%, shale 5%: like 1725-1730.
1736-1740	4	Like 1725-1730; sample contains a trace of coal.
1740-1747	7	No sample.
1747-1752	5	Shale 99%, sandstone 1%: shale, medium-gray (N5), slightly micaceous, slightly silty to silty; sandstone, like 1725-1730 (cavings?); sample contains a quartz fragment..
1752-1758	6	Shale 60%, siltstone 40%: shale, medium-gray (N5) and medium dark-gray (N4), slightly micaceous, some slightly silty to silty; siltstone, light-gray (N7) and medium light-gray (N6), slightly argillaceous, some with many dark and black minerals; sample contains quartz fragments; and a trace of coal.

Depth (feet)	Thickness (feet)	
1758-1769	11	Shale 95%, siltstone 5%: shale, medium dark-gray (N4), slightly micaceous, slightly silty; siltstone, like 1752-1758.
1769-1775	6	Shale 98%, siltstone 2%: like 1758-1769.
1775-1783	5	Shale 60%, siltstone 40%: like 1758-1769; sample contains a few pieces coal.
1783-1792	9	Siltstone: like 1752-1758; sample contains abundant coal fragments and a few pieces of shale, like 1758-1769 (cavings?).
1792-1796	4	Sandstone 60%, siltstone 20%, shale 20%: sandstone, very light gray (N8), slightly silty, very fine grained, round to subangular, moderately well sorted; siltstone, like 1752-1758; shale, medium dark-gray (N4), slightly micaceous, slightly fissile; sample contains a few pieces coal.
1796-1802	6	Sandstone 80%, shale 20%: like 1792-1796; sample contains abundant coal and few pieces of pyritized shale (?).
1802-1810	8	Shale 99%, sandstone 1%: like 1792-1796; no coal or pyritized shale.
1810-1815	5	Shale: like 1792-1796, grading into siltstone, medium-gray (N5), shaly structure with many dark and black minerals.

Depth (feet)	Thickness (feet)	
1815-1820	5	Sandstone 75%, shale and siltstone 25%: sandstone, very light gray (N8), fine-grained, subrounded to subangular, well sorted, limonitic stain; shale and siltstone, like 1810-1815.
1820-1826	6	Like 1815-1820.
1826-1830	4	Sandstone 85%, shale 15%: sandstone, very light gray (N8) to medium-gray (N5), slightly micaceous, fine-grained to silty, some with many dark minerals, limonitic stain; shale, medium dark-gray (N4), slightly micaceous, some slightly silty.
1830-1833	3	Shale: like 1826-1830, very few pieces silty.
1833-1841	8	Like 1826-1830.
1841-1845	4	Siltstone 95%, shale 5%: siltstone, light-gray (N7), part slightly shaly, part with many dark and black minerals; shale, like 1826-1830.
1845-1852	7	Like 1841-1845.
1852-1861	9	No sample.
1861-1868	7	Siltstone: micaceous, medium dark-gray (N4) to medium light-gray (N6), many dark and black minerals, part argillaceous; grading into sandstone, silty, light-gray (N7), slightly micaceous, very fine grained, poorly sorted, rounded to subangular, few dark and black minerals and trace of noncalcareous white mineral.

Depth (feet)	Thickness (feet)	
1868-1872	4	Shale 60%, sandstone 40%: sandstone, like 1861-1868; shale, micaceous, dark-gray (N3).
1872-1874	2	Sandstone 95%, shale 5%: sandstone, light-gray (N7), very fine to fine-grained, rounded to subangular, very few dark and black minerals, limonitic stain; shale, micaceous, dark-gray (N3), (cavings?).
1874-1879	5	Sandstone 99%, shale 1%: like 1872-1874; with a few pieces shale, moderate brown (5YR 4/4), slightly micaceous.
1879-1884	5	Sandstone and shale: sandstone, like 1872-1874, very fine to medium-grained; shale, dark-gray (N3), like 1872-1874 (cavings?); shale, moderate-brown (5YR 4/4); and hematite; sample contains a trace of white, noncalcareous mineral.
1884-1888	4	Sandstone: very light gray (N8), fine- to medium-grained, subrounded to angular, limonitic stain; sample contains a trace of shale, like 1872-1874.
1888-1893	5	Like 1884-1888: sample contains a trace of shale, grayish-red (10R 4/2), slightly micaceous.
1893-1900	7	Sandstone: like 1884-1888, very fine to medium-grained, sample contains a trace of shale, like 1884-1888.
1900-1902	2	Like 1884-1888: no grayish-red shale.

Depth (feet)	Thickness (feet)	
1902-1911	9	Like 1884-1888.
1911-1913	2	Like 1884-1888.
1913-1917	4	Like 1884-1888; numerous pieces of shale, grayish-red (5M 4/2) and moderate yellowish-brown (10YR 5/4), very slightly micaceous.
1917-1919	2	Like 1888-1893; sandstone, white (N9).
1919-1923	4	Like 1888-1893; sandstone, very fine to some coarse-grained.
1923-1926	3	Like 1888-1893; sample extremely limonitic stained, no grayish-red (10R 4/2) shale.
1926-1930	4	Like 1923-1926; more coarse grains in sandstone.
1930-1934	4	Like 1923-1926.
1934-1941	7	Like 1923-1926.
1941-1949	8	Like 1923-1926.
1949-1956	7	Like 1923-1926; grain size decreasing to very fine to fine-grained, with few medium grains, very little limonitic stain; trace of shale, like 1923-1926; few pieces of shale, near grayish-orange (10YR 7/4), finely micaceous; and shale, grayish-red (5R 4/2).
1956-1961	5	Like 1949-1956.
1961-1975	14	Like 1949-1956.
1975-1981	6	Like 1949-1956; sandstone, fine- to coarse-grained.
1981-1984	3	Like 1975-1981.

Depth (feet)	Thickness (feet)	
1984-1994	10	Like 1975-1981.
1994-1999	5	Like 1975-1981; largely medium- to very coarse grained; sample contains a trace of hematite (?) and glauconite (?) in finer- grained sandstone.
1999-2000	1	Like 1994-1999.
2000-2010	10	Like 1994-1999; more pieces of shale, dark-gray (N4), slightly micaceous.
2010-2020	10	Like 2000-2010; very fine to medium-grained; no shale.
2020-2030	10	Like 2000-2010.
2030-2036	6	Like 2000-2010; few coarse-grained pieces; shale, dark-gray (N4), slightly micaceous; shale, grayish-red (5R 4/2).
2036-2039	3	Like 2030-2036; shale, grayish-red (5R 4/2) and light-brown (5YR 6/4); sample contains a trace of coal and shale, dark-gray (N4).
2039-2043	4	Like 2036-2039; shale, grayish-red (5R 4/2).
2043-2048	5	Like 2036-2039; much limonitic stain.
2048-2052	4	Like 2036-2039; shale, grayish-red (5R 4/2) and light-brown (5YR 6/4); shale, dark-gray (N3), fissile.
2052-2055	3	Like 2048-2052; sandstone, very fine to fine- grained, few medium grains.

Depth (feet)	Thickness (feet)	
2055-2059	4	Like 2048-2052; shale, grayish-red (5R 4/2); no shale, dark-gray (N3).
2059-2065	6	Like 2055-2059.
2065-2068	3	Like 2055-2059; very fine to fine-grained.
2068-2071	3	Like 2055-2059; sample contains a trace of shale, grayish-red (5R 4/2).
2071-2073	2	Like 2055-2059.
2073-2077	4	Like 2055-2059.
2077-2079	2	Sandstone 90%, shale 10%: sandstone, very light gray (N8) and white (N9), fine- to medium- grained, some coarse-grained, subrounded to angular, trace white, noncalcareous, and green minerals; shale, from grayish-red (5R 4/2) to light-brown (5YR 6/4).
2079-2083	<u>4</u>	Like 2077-2079; sample contains a trace of shale, dark-gray (N3), fissile.
2083-2090	7	Shale 90%, coal 6%, shale and sandstone 4%: shale, medium dark-gray (N4); shale and sandstone, like 2077-2079.
2090-2099	9	Shale 50%, siltstone 40%, coal, sandstone, and shale 10%: shale, medium dark-gray (N4); siltstone, argillaceous, medium-gray (N5), slightly micaceous; coal, sandstone, and shale, grayish-red (5R 4/2); sample contains a trace of pyrite.

Depth (feet)	Thickness (feet)	
2099-2109	10	Siltstone 90%, shale 10%: siltstone, medium-gray (N5) to light-gray (N7), darker pieces argillaceous and slightly micaceous; shale, medium dark-gray (N4).
2109-2116	7	Shale to siltstone: micaceous, medium dark-gray (N4), slightly fissile.
2116-2127	11	Shale 97%, siltstone 3%: shale, micaceous, dark-gray (N3), slightly fissile, some silty; siltstone, medium light-gray (N6), like 2099-2109; sample contains a trace of coal.
2127-2132	5	Shale 40%, siltstone 40%, coal 20%: shale, like 2116-2127; siltstone, light-gray (N7), slightly sandy, slightly micaceous, few dark and black minerals; sample contains a trace of pyrite.
2132-2137	5	Coal 90%, siltstone 5%, shale 5%: siltstone and shale, like 2127-2132.
2137-2142	5	Coal 40%, sandstone 30%, shale 30%: sandstone, silty, light-gray (N7), very fine grained, sub-angular to angular; shale, dark-gray (N3), fissile; shale, pale-brown (5YR 5/2), grayish-red (5R 4/2), and grayish-orange (10YR 7/4).
2142-2146	4	Sandstone 40%, shale 37%, coal 23%: sandstone, silty, light-gray (N7), very fine grained, angular, well sorted, few black minerals; shale, dark-gray (N3), fissile; shale, pale-brown (5YR 5/2) and grayish-red (5R 4/2).

Depth (feet)	Thickness (feet)	
2146-2150	4	Coal 95%, shale and sandstone 5%: shale and sandstone, like 2142-2146.
2150-2153	3	Sandstone 80%, shale 10%, coal 10%: sandstone, very light gray (N8), very fine to fine-grained, angular, well sorted, much limonitic stain; shale, dark-gray (N3) and medium dark-gray (N4); siltstone, medium light-gray (N6).
2153-2156	3	Sandstone 90%, shale 5%, coal and siltstone 5%: like 2150-2153.
2156-2159	3	No sample.
2159-2161	2	Sandstone 95%, shale and siltstone 5%: sandstone, like 2150-2153, much limonitic staining; shale and siltstone, like 2150-2153.
2161-2167	6	Sandstone 95%, shale 5%: sandstone and shale, like 2150-2153; shale, grayish-red (10R 4/2) and light-brown (5YR 6/4).
2167-2171	4	Sandstone 97%, shale and siltstone 3%: sandstone, white (N9), very fine to fine-grained, angular, well sorted, few black minerals, heavy limonitic stain; shale, medium dark-gray (N4), grayish-red (10R 4/2) and light-brown (5YR 6/4), slightly micaceous; siltstone, like 2150-2153.
2171-2173	2	Like 2167-2171.

Depth (feet)	Thickness (feet)	
2173-2175	2	Like 2167-2171.
2175-2178	3	Sandstone 80%, shale 20%: like 2167-2171; shale, medium dark-gray (N4); trace of shale, grayish- red (10R 4/2), pale reddish-brown (10R 5/4), pale-brown (5YR 4/2), and light-brown (5YR 6/4); sample contains a trace of pyrite.
2178-2185	7	Sandstone 95%, shale 5%: sandstone, like 2167- 2171, fine- to medium-grained, slight limonitic stain; shale, like 2175-2178.
2185-2188	3	Like 2178-2185.
2188-2190	2	Like 2178-2185.
2190-2195	5	No sample.
2195-2200	5	Like 2178-2185.
2200-2202	2	Like 2178-2185.
2202-2206	4	Like 2178-2185.
2206-2211	5	Sandstone 97%, shale 3%: like 2178-2185; sand- stone, few well rounded, coarse grains.
2211-2216	5	Like 2178-2185.
2216-2222	6	Sandstone 99%, shale 1%: like 2178-2185.
2222-2227	5	Like 2178-2185; sample contains one well rounded quartz conglomeratic fragment.
2227-2229	2	Like 2178-2185; sample contains no conglomeratic fragment.

Depth (feet)	Thickness (feet)	
		<u>Bluestone formation</u> 371 feet thick
2229-2232	3	Sandstone 99%, shale 1%: sandstone, white (N9), fine- to medium-grained, angular, well sorted, slight limonitic stain; shale, medium dark-gray (N3), finely micaceous; shale, grayish-red (10R 4/2), finely micaceous.
2232-2234	2	Sandstone 99%, shale 1%: sandstone, like 2229-2232; few pieces shale, medium light-gray (N6) to light brownish-gray (5YR 6/1).
2234-2240	6	Like 2232-2234.
2240-2242	2	Sandstone: like 2232-2234, very slightly calcareous, limonitic stain; sample contains few coarse, angular, quartz (pebble ?) fragments.
2242-2244	2	Like 2232-2234; sandstone, slightly calcareous, no coarse quartz fragments.
2244-2249	5	Sandstone: calcareous, white (N9), very fine to fine-grained, few medium grains, moderately well sorted, subrounded to rounded, limonitic stain, very few dark and green minerals.
2249-2255	6	Shale 95%, sandstone 5%: shale, silty, medium-gray (N5); sandstone, like 2244-2249.
2255-2260	5	Sandstone 95%, shale 5%: sandstone, silty, very fine grained, few dark minerals, slightly micaceous; sandstone, like 2244-2249; and shale, like 2249-2255.

Depth (feet)	Thickness (feet)	
2260-2263	3	Sandstone 75%, shale 25%: sandstone, like 2255-2260; shale, like 2249-2255.
2263-2268	5	Sandstone 60%, shale 40%: like 2260-2263.
2268-2271	3	Sandstone 85%, shale 15%: like 2260-2263; sandstone, very fine to fine-grained.
2271-2279	8	Shale: olive-gray (5.3 Y 3/2), trace of finely micaceous material; shale, grayish-red (5R 4/2) to blackish-red (5R 2/2); sample contains a trace of finely micaceous material.
2279-2284	5	Shale 90%, siltstone 10%: shale, olive-gray (5Y 3/2) and dark greenish-gray (5GY 4/1), trace of finely micaceous material; shale, grayish-red (5R 4/2) and blackish-red (5R 2/2), trace of finely micaceous material; siltstone, dark greenish-gray minerals, few red and black minerals.
2284-2289	5	Shale 95%, siltstone 5%: like 2279-2284; with shale, light brownish-gray, very slightly micaceous.
2289-2300	11	Like 2284-2289.
2300-2305	5	Like 2284-2289.
2305-2310	5	Shale 50%, siltstone 50%: like 2284-2289; with siltstone, greenish-gray (5 G 6 /1), slightly micaceous, noncalcareous, shaly structure, many greenish-gray minerals.

Depth (feet)	Thickness (feet)	
2310-2313	3	Siltstone 50%, shale 30%, sandstone 20%: siltstone, like 2284-2289; with shale, olive and greenish-gray, slightly silty, becoming more micaceous; sandstone, calcareous, medium light-gray (N6), very fine grained, subrounded to subangular, poorly sorted, many green and black minerals.
2313-2319	6	Shale 95%, sandstone and siltstone 5%: like 2310-2313.
2319-2324	5	Shale 95%, sandstone and siltstone, 5%: like 2310-2313; with shale, medium-gray (N5), slightly calcareous.
2324-2327	3	No sample.
2327-2333	6	Shale 95%, sandstone and siltstone 5%: like 2310-2313; with shale, medium-gray (N5), slightly calcareous.
2333-2339	6	Shale 99%, sandstone and siltstone 1%: like 2310-2313; with shale, calcareous, medium dark-gray (N4), slightly fissile.
2339-2344	5	Shale: calcareous, medium dark-gray (N4), slightly fissile; shale, grayish-brown (5YR 3/2), slightly calcareous; few pieces sandstone, like 2310-2313.

Depth (feet)	Thickness (feet)	
2344-2349	5	Shale 95%, limestone 5%: like 2310-2313, limestone, medium-gray (N5), finely crystalline, highly fossiliferous, fresh water ostracods, Whipplella sp., very argillaceous, slightly silty.
2349-2353	4	Shale 90%, limestone 10%: like 2344-2349; shale, medium-gray (N5), calcareous to very calcareous.
2353-2359	6	Shale 95%, limestone and siltstone 5%: shale, grayish-red (5R 4/2); shale, medium-gray (N5), calcareous to very calcareous; shale, grayish-brown (5YR 3/2); limestone, like 2344-2349; siltstone, calcareous, medium light-gray (N6), well rounded.
2359-2363	4	Shale 70%, limestone 30%: shale, grayish-red-purple (5RP 4/2), very slightly calcareous; shale, medium light-gray (N6); limestone, argillaceous, light brownish-gray (5YR 6/1), finely crystalline.
2363-2368	5	Shale: silty, greenish-gray (5G 6/1); shale, medium-gray (N5), slightly calcareous; shale, grayish red-purple, like 2359-2363; sample contains a trace of brown shale.

Depth (feet)	Thickness (feet)	
2368-2377	9	Shale 75%, siltstone 15%, shale 10%: shale, calcareous, medium light-gray (N6.5); siltstone, argillaceous, very light-gray (N8), coarse-grained, rather poorly sorted, calcareous cement; shale, grayish red-purple, like 2359-2363.
2377-2384	7	Like 2368-2377.
2384-2388	4	Shale 50%, sandstone 30%, siltstone 20%: sandstone, argillaceous, very light-gray (N8), very fine grained, subrounded, moderately well sorted; shale, medium-gray (N5); shale, silty, medium light-gray (N6), finely micaceous; siltstone, like 2368-2377.
2388-2392	4	Like 2384-2388; sample contains a trace of brown shale.
2392-2399	7	Sandstone 70%, shale 30%; like 2384-2388; sandstone, part with calcareous cement, slightly peppered with dark minerals.
2399-2405	6	Siltstone 75%, shale 25%: siltstone, argillaceous, light-gray (N7), fine-grained, moderately well sorted, slightly peppered with dark minerals; shale, medium-gray (N5); shale, purple, like 2384-2388.

Depth (feet)	Thickness (feet)	
2405-2415	10	Siltstone: like 2399-2405, argillaceous, coarse-grained, rather poorly sorted, slightly micaceous, with numerous yellowish-gray (5Y 8/1), angular, chert fragments; sample contains considerable limonitic stain.
2415-2422	7	Shale 75%, shale 25%: shale, medium-gray (N5), part silty and part micaceous; siltstone, like 2399-2405.
2422-2428	6	Shale 50%, siltstone 50%: shale, like 2415-2422, noncarbonaceous; siltstone, like 2399-2405, very coarse grained to very fine grained sandstone.
2428-2438	10	Shale 70%, sandstone 30%: shale, like 2415-2422; sandstone, very fine grained.
2438-2445	7	Shale 70%, sandstone 25%, siltstone 5%: shale, medium-gray (N5), part silty, slightly micaceous; sandstone, like 2428-2438, slightly calcareous cement; siltstone, light-gray (N7), calcareous cement.
2445-2470	25	No sample.
2470-2485	15	Shale: medium dark-gray (N4), slightly fissile.
2485-2515	30	Like 2470-2485.

Depth (feet)	Thickness (feet)	
2515-2525	10	Sandstone 50%, shale 50%: sandstone, very light gray (N8), very fine grained, subrounded, moderately well sorted, friable; shale, like 2470-2485.
2525-2529	4	Sandstone 70%, shale 30%: like 2515-2525, few dark mineral grains in sandstone.
2529-2534	5	Like 2515-2525.
2534-2540	6	Sandstone 85%, shale 15%: sandstone, like 2515-2525; shale, dark-gray (N3).
2540-2550	10	Sandstone 80%, shale 20%: sandstone, light-gray (N7) with part medium-gray (N5), very fine grained, subrounded, poorly sorted, calcareous cement, better cemented, some dark mineral grains, slightly micaceous; shale, like 2470-2485; shale, medium dark-gray (N4), very micaceous, shows contact with sandstone.
2550-2555	5	Sandstone: like 2540-2550; shale, dark-gray and medium dark-gray, like 2540-2550.
2555-2560	5	No sample.
2560-2570	10	Shale 90%, sandstone 10%: shale, medium dark-gray (N4), part very slightly silty; sandstone, light brownish-gray (5YR 6/1), very fine grained, subangular, rather poorly sorted, calcareous cement; sample contains a trace of sandstone, like 2540-2550.

Depth (feet)	Thickness (feet)	
2570-2585	15	Shale 95%, sandstone 5%: shale, dark-gray (N3), slightly carbonaceous; sandstone, white (N9), very fine grained, subrounded to subangular, moderately poorly sorted, finely micaceous; sample contains a trace of coal.
2585-2600	15	Like 2570-2585 <u>Princeton sandstone</u> — 200 feet thick
2600-2610	10	Sandstone: very light gray (N8), very slightly peppered with dark mineral; shale, medium dark-gray (N4), slightly silty, slightly micaceous.
2610-2620	10	Sandstone 90%, shale 10%: like 2570-2585; sandstone, better cemented, very slightly calcareous.
2620-2630	10	Sandstone 80%, shale 20%: like 2570-2585; sandstone, stronger peppered with dark minerals.
2630-2642	12	Sandstone 98%, shale 2%: sandstone, very light gray, friable, calcareous cement; shale, like 2570-2585.
2642-2648	6	Sandstone: argillaceous, light-gray (N7), slightly micaceous, very fine grained, subrounded, moderately poorly sorted, peppered with dark mineral, part calcareous cement, moderately well cemented.
2648-2655	7	Sandstone 90%, shale 10%: sandstone, like 2642-2648; shale, micaceous, medium-gray (N5).

Depth (feet)	Thickness (feet)	
2655-2665	10	Sandstone 95%, shale 5%: like 2642-2648; sandstone, little with calcareous cement, friable.
2665-2675	10	Sandstone 90%, shale 10%: sandstone, part medium-gray (N5); shale, like 2642-2648 and dark-gray (N3); sample contains a trace of pyrite.
2675-2685	10	Sandstone 90%, shale 10%: sandstone, argillaceous, very light gray (N8.3), very fine grained, subangular to subrounded, moderately poorly sorted, slightly calcareous cement, friable; shale, dark-gray (N3).
2685-2695	10	Like 2675-2685.
2695-2705	10	Sandstone 85%, shale 15%: like 2675-2685; sandstone, better cemented.
2705-2715	10	Sandstone 80%, shale 20%: sandstone, very light gray (N8), fine grained, subangular to subrounded, very poorly sorted with very fine grained to medium-grained quartz fragments, some angular and broken, some rounded; shale, dark-gray (N3), some very carbonaceous, with trace of coal; sample contains a trace of pyrite.
2715-2725	10	Like 2705-2715; sandstone contains coarse-grained, angular, quartz fragments (conglomerate?).
2725-2735	10	Sandstone 90%, shale 10%: sandstone, like 2705-2715; conglomeratic with considerable coarse-grained, angular, quartz fragments and shale

Depth
(feet).

Thickness
(feet)

nodules; shale, medium-gray (N5), very finely
micaceous; sample contains a trace of pyrite.

Depth (feet)	Thickness (feet)	
2735-2742	7	Sandstone 95%, shale 5%: like 2705-2715; sandstone contains fewer coarse-grained angular fragments.
2742-2750	8	Sandstone 95%, shale 5%: like 2705-2715; sandstone contains a trace coarse-grained, angular fragments, better sorting.
2750-2755	5	Shale 95%, sandstone 3%, pyrite 2%: shale, medium-dark-gray (N4); sandstone, like 2705-2715.
2755-2760	5	Sandstone 95%, shale 5%: sandstone, white (N9), very fine grained, subangular, very poorly sorted, friable.
2760-2766	6	Sandstone: like 2755-2760, conglomeratic (?), some coarse-grained, angular, smoky quartz fragments.
2766-2771	5	Sandstone 95%, shale 5%: sandstone, white (N9), very fine grained, subangular to subrounded, well sorted, friable; shale, dark-gray (N3).
2771-2781	10	Sandstone 97%, shale 3%: sandstone, white (N9), fine-grained, subangular, poorly sorted, friable.
2781-2791	10	Sandstone 98%, shale 2%: sandstone, white (N9), very fine grained, subangular, poorly sorted, friable.
2791-2800	9	Sandstone 85%, shale 15%: sandstone, micaceous, greenish-gray (5GY 6/1), very fine grained, subrounded to subangular, moderately well sorted, 60% quartz, considerable green and some

dark minerals, few coarse-grained, white, quartz fragments, rather well cemented, trace calcareous cement; shale, medium dark-gray (N4); shale, silty, medium-gray (N5).

Depth (feet)	Thickness (feet)	
<u>Hinton formation, Avis limestone member of Reger</u> —50 feet thick		
2800-2810	10	Shale 55%, sandstone 45%: like 2791-2800; shale, medium-gray (N5), finely micaceous.
2810-2820	10	Shale 60%, sandstone 40%: shale, medium-gray (N5) to medium light-gray (N6), part slightly silty to silty; sandstone, like 2791-2800, slightly calcareous cement, friable, no quartz fragments.
2820-2830	10	Sandstone 70%, shale 30%: sandstone, white (N9), fine-grained, subangular, very poorly sorted, few dark mineral inclusions, part with calcareous cement, friable; shale, medium dark-gray (N3.5); shale, micaceous, medium-gray (N5); sample contains considerable pyrite.
2830-2840	10	Sandstone 80%, shale 20%: sandstone, like 2820-2830; sandstone, greenish-gray (5GY 6/1), slightly micaceous, fine-grained, subangular, moderately poorly sorted, considerable green and few dark mineral inclusions, about 60% quartz; shale, medium dark-gray (N4).
2840-2850	10	Sandstone 75%, limestone 15%, shale 10%: sandstone, white (N9), like 2820-2830; sandstone, greenish-gray, like 2830-2840; limestone, brownish-gray to light brownish-gray (5YR 4/1), fine to medium crystalline; shale, like 2820-2830.

Depth
(feet)

Thickness
(feet)

Hinton formation (undivided) - ~~367~~ ~~611~~ feet ~~thick~~

- | | | |
|-----------|----|--|
| 2850-2855 | 5 | Sandstone 45%, shale 55%: sandstone, silty, white (N9), very fine grained, subangular to some subrounded, moderately poorly sorted, friable; shale, grayish-red (10 R 4/2), part very finely micaceous; limestone and shale, like 2840-2850. |
| 2855-2860 | 5 | Shale 95%, sandstone 5%: shale, calcareous, grayish-red (10R 4/2), like 2850-2855, some silty; shale, medium dark-gray (N4) to dark-gray (N3); sandstone, like 2850-2855. |
| 2860-2870 | 10 | Shale: grayish-red (10R 4/2), slightly calcareous. |
| 2870-2875 | 5 | Shale 80%, limestone 20%: shale, medium-gray (N5), very slightly calcareous, finely micaceous; shale, grayish-red, like 2860-2870; shale, pale-red (5R 6/2), very finely micaceous; limestone, pale yellowish-brown (10YR 6/2), very finely crystalline. |
| 2875-2880 | 5 | Like 2870-2875. |
| 2880-2886 | 6 | Shale and limestone: shale, calcareous, grayish-red (10R 4/2), finely micaceous; shale, silty, pale-red (10R 6/2), calcareous to slightly calcareous; shale and limestone, like 2870-2875. |

Depth (feet)	Thickness (feet)	
2886-2890	4	Siltstone: sandy, pale-red (10R 6/2), slightly calcareous; shale, dark-gray (N3), fissile.
2890-2895	5	Like 2886-2890.
2895-2900	5	Siltstone: sandy, micaceous, pale reddish-brown (10R 5/4), noncalcareous.
2900-2905	5	Siltstone: like 2895-2900, but calcareous.
2905-2915	10	Sandstone: silty, calcareous, greenish-gray (5GY 6/1), slightly micaceous, very fine grained, subangular, scattered black mineral, poorly sorted, very slightly porous, 75% quartz.
2915-2925	10	Like 2905-2915.
2925-2930	5	Shale: medium dark-gray (N4) to dark-gray (N3), fissile.
2930-2935	5	Shale and sandstone: shale, like 2925-2930; sandstone, like 2905-2915.
2935-2945	10	Like 2930-2935.
2945-2955	10	Shale: dark-gray (N3), fissile.
2955-2960	5	Shale: micaceous, medium dark-gray (N4), fissile.
2960-2965	5	Shale: calcareous, medium dark-gray (N4) to dark-gray (N3).
2965-2975	10	Siltstone: sandy, greenish-gray (5GY 6/1), slightly calcareous.
2975-2980	5	Shale: medium dark-gray (N4), fissile.
2980-2988	8	Siltstone: sandy, greenish-gray (5GY 6/1), slightly calcareous.

Depth (feet)	Thickness (feet)	
2988-2995	7	Shale: medium dark-gray (N4), containing dark-gray (N3), carbonaceous, nodular inclusions.
2995-3005	10	Sandstone: white (N9), slightly silty, slightly calcareous, very fine grained, subangular to subrounded, fairly well sorted, slightly porous, 90% quartz.
3005-3015	10	Like 2995-3005.
3015-3025	10	Shale: dark-gray (N3), fissile.
3025-3029	4	Like 3015-3025.
3029-3033	4	Shale: silty, medium dark-gray (N4) to shale, dark-gray (N3); with abundant coal.
3033-3036	3	Sandstone: white (N9), very fine grained, angular to subangular, well sorted, slightly porous, 95% quartz.
3036-3040	4	Like 3033-3036.
3040-3045	5	Sandstone and shale: sandstone, like 3033-3036; shale, dark-gray (N3), fissile.
3045-3049	4	Sandstone: like 3033-3036.
3049-3054	5	Shale: dark-gray (N3), fissile.
3054-3061	7	Sandstone: very light gray (N8), slightly calcareous, very fine grained to fine-grained, subangular, scattered black mineral, well sorted, porous, 90% quartz.
3061-3070	9	Siltstone: grayish-red (5R 4/2), locally calcareous; to siltstone, argillaceous, medium dark-gray (N4), with greenish tint, slightly calcareous.

Depth (feet)	Thickness (feet)	
3070-3076	6	Shale: silty, calcareous, grayish-red (10R 3/2); and shale, carbonaceous, dark-gray (N3), lumpy.
3076-3084	8	Shale: grayish-red, like 3070-3076.
3084-3094	10	Shale: medium dark-gray (N4), very slightly calcareous.
3094-3100	6	Like 3084-3094.
3100-3110	10	Siltstone: calcareous, medium-gray (N5).
3110-3116	6	Shale: silty, medium dark-gray (N4), slightly calcareous; and shale, grayish-red (5R 4/2), slightly silty, lumpy.
3116-3132	16	Shale: silty, calcareous, medium dark-gray (N4); and siltstone, sandy, calcareous, medium-gray (N5), with greenish tint; sample also contains a little limestone, very light gray (N8), non- crystalline.
3132-3143	11	Siltstone and shale: grayish-red (5YR 4/2), slightly calcareous; shale, medium dark-gray (N4), noncalcareous.
3143-3155	12	Like 3132-3143.
3155-3160	5	Like 3132-3143.
3160-3165	5	Like 3132-3143.
3165-3170	5	Siltstone: medium dark-gray (N4) with greenish tint; shale, carbonaceous, dark-gray (N3), fissile; sample contains a small amount of coal.

Depth (feet)	Thickness (feet)	
3170-3182	12	Shale: silty, micaceous, medium dark-gray (N4); shale, carbonaceous, dark-gray (N3); sample also contains abundant pyrite.
3182-3187	5	Siltstone: micaceous, medium dark-gray (N4), slightly sandy, slightly calcareous.
3187-3196	9	Shale and siltstone: shale, grayish-red (5R 4/3), moderately fissile; siltstone, micaceous, pale-red (5R 5/2).
3196-3204	8	Shale, siltstone, and limestone: shale and siltstone, like 3187-3197; limestone, silty, light olive-gray (5Y 6/1) to greenish-gray (5GY 6/1).
3204-3212	8	Like 3196-3204.
3212-3217	5	Shale: medium dark-gray (N4) to dark-gray (N3), fissile.
3217-3225	8	<u>Hinton formation, (Stony gap sandstone member)</u> Sandstone: white (N9), slightly silty, slightly calcareous, very fine grained, subangular, well sorted, slightly porous, 90% quartz.
3225-3237	12	Shale: medium dark-gray (N4), finely micaceous; shale, carbonaceous, dark-gray (N3).
3237-3251	14	Like 3225-3237.
3251-3262	11	Like 3225-3237.
3262-3267	5	Sandstone: silty, calcareous, micaceous, very light gray (N8) to medium dark-gray (N6), very

fine grained to fine-grained, subangular, poorly sorted, very slightly porous, 75% quartz with partings of dark-gray (N3) shale.

Depth (feet)	Thickness (feet)	
3267-3275	8	Like 3262-3267.
		<u>Bluefield shale</u>
3275-3290	15	Shale: sandy, micaceous, medium-gray (N5); shale, medium dark-gray (N4), lumpy; and shale, calca- reous, dark-gray (N3), fissile.
3290-3301	11	Siltstone: sandy, light-gray (N7), slightly calcareous.
3301-3312	11	Shale: medium dark-gray (N4), fissile.
3312-3325	13	Like 3301-3312; sample contains some shale, grayish-red (5R 4/2), lumpy.
3325-3347	22	Limestone: silty, medium-gray (N5) to dark-gray (N3), dense.
3347-3358	11	No sample.
3358-3368	10	Shale: silty, medium dark-gray (N4), slightly calcareous, fossiliferous (brachiopod fragments) with small amount of pyrite.
3368-3380	12	Like 3358-3368.
3380-3388	8	Sandstone: calcareous, white (N9), fine-grained, subangular, well sorted, slightly porous, 95% quartz.
3388-3397	9	Shale: medium dark-gray (N4), fissile, finely micaceous with scattered pyrite crystals.
3397-3404	7	Like 3388-3397.
3404-3415	11	No sample.
3415-3418	3	Like 3397-3404; sample contains abundant pyrite crystals.

Depth (feet)	Thickness (feet)	
3418-3422	4	Sandstone: white (N9), fine-grained, subangular, well sorted, porous, 95% quartz.
3422-3424	2	Like 3418-3422.
3424-3431	7	Like 3418-3422.
3431-3437	6	Shale: medium dark-gray (N4), slightly silty.
3437-3443	6	Limestone: silty, medium dark-gray (N4), finely crystalline to medium crystalline.
3443-3461	18	Like 3437-3443; and shale, calcareous, dark- gray (N3).

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Summary of F. H. Curtis No. 1-A Well 37

	Depth (feet)	Thickness (feet)
Norton formation	351-1010	659
Lee formation	1010-2229	1219
Bluestone formation	2229-2600	371
Princeton sandstone	2600-2800	200
Hinton formation		
Avis limestone member of Regan	2800-2850	50
Hinton formation undivided	2850-3217	367
Stony Gap sandstone member	3217-3275	58
Bluefield shale	3275-3461	186

U.S. Geological Survey Reports - Open file series
Detailed logs of 28 oilcut wells
in Virginia

312a

R. A. LOONEY NO. 1-1659 WELL, by A. D. Williamson,
Eloise T. Jacobsen & P. T. Stafford

Buchanan County, Virginia.

United Producing Company.

Located 30,100 ft S. of 37°25'; 11,600 ft W. of 82°00'.

Elevation, 2076 ft Gr.

Total depth, 4175 ft

Drilling commenced September 8, 1949; completed January 19, 1950.

Production: none.

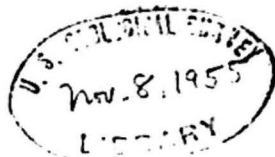
Gas shows at 1555 and 2247 ft

Oil show at 1205 ft

Coal at 28-30, 57-60, 115-117 ft according to drillers' log; 362-367,
391-399, 407-413, 413-419, 464-473, 1552-1559, 1601-1612, 1976-1980,
2162-2170, 2178-2183, 2195-2198, 2198-2206, 2206-2212, 2215-2218 ft

Samples examined by Allen D. Williamson, 336-3230 ft, June 1950;
3732-4175 ft, April 1950.

Sample Library Reference: Virginia Geological Survey.



Depth (feet)	Thickness (feet)	
		<u>Norton formation</u> 789 feet thick
336-343	7	Siltstone and shale: siltstone, medium-gray (N5), micaceous; shale, medium dark-gray (N4).
343-353	10	Siltstone: medium-gray (N5), micaceous, sandy; sample contains some quartz grains, very fine to medium-grained, subangular.

Depth (feet)	Thickness (feet)	
353-362	9	Shale: medium dark-gray (N4), silty.
362-367	5	Siltstone, shale and coal: siltstone, micaceous, medium-gray (N5), sandy with fine-grained, subangular, quartz grains; shale, grayish-black (N2), carbonaceous; sample contains about 10% coal.
367-373	6	Like 362-367.
373-377	4	Sandstone: light-gray (N7), very fine to fine-grained, angular to subangular, slightly calcareous, silty, micaceous (muscovite) with abundant black mineral and some green mineral.
377-383	6	Shale: medium dark-gray (N4), slightly silty, finely micaceous.
383-391	8	Sandstone and siltstone: sandstone, silty, medium dark-gray (N4) to medium light-gray (N6), very fine to medium-grained, subangular, micaceous, calcareous, abundant black mineral; probably interbedded with siltstone, medium dark-gray (N4), micaceous.
391-399	8	Sandstone, coal and shale: sandstone, very light gray (N8), very fine to fine-grained, angular to subangular, moderately porous, some muscovite and green mineral; about 5% coal; shale, dark-gray (N3).

Depth
(feet)

Thickness
(feet)

- | | | |
|---------|---|--|
| 399-407 | 8 | Sandstone: very light gray (N8), very fine to medium-grained, subangular to subrounded, moderately porous, friable, some muscovite and green mineral, like 391-399. |
| 407-413 | 6 | Sandstone 50%, shale 30%, coal 20%: sandstone, very light gray (N8), fine- to coarse-grained, subangular to subrounded, abundant black, brown, and green minerals, some muscovite; shale, dark-gray (N3), carbonaceous; shale, brownish-gray (5YR 4/1), very fine with subconchoidal fracture and a little pyrite. |
| 413-419 | 6 | Sandstone, coal, and shale: sandstone, very light gray (N8), fine- to medium-grained, angular to subrounded, moderately well sorted, slightly porous, some muscovite, black mineral, green mineral, and mica (phlogopite ?); sample contains some coal and shale, dark-gray (N3), like 407-413. |
| 419-424 | 5 | Sandstone: very light gray (N8), like 413-419. |
| 424-429 | 5 | Sandstone: very light gray (N8), fine- to medium-grained, angular to subangular, moderately well sorted, slightly porous, silty, abundant black, green, and brown minerals. |
| 429-435 | 6 | Sandstone: like 424-429. |

Depth (feet)	Thickness (feet)	
435-441	6	Sandstone and siltstone: sandstone, silty, very light gray (N8), very fine to medium- grained, angular to subangular, poorly sorted, with abundant black mineral and muscovite; siltstone, medium light-gray (N6), sandy, black and brown minerals and mica (muscovite ?).
441-447	6	Sandstone: silty, light-gray (N7), very fine to fine-grained, angular to subangular, abundant black mineral, mica (muscovite), some green mineral (chlorite ?), and some brown mineral; sample also contains some carbonaceous material.
447-452	5	Sandstone: light-gray (N7), like 441-447.
452-464	12	Like 441-447.
464-470	6	Like 441-447.
470-476	6	Like 441-447.
476-483	7	Sandstone: light-gray (N7), very fine to medium-grained, with a few coarse crystals, subangular to subrounded, silty, poorly sorted, little black and green minerals, some mica (muscovite), slightly porous.
483-487	4	Like 476-483.
487-499	12	Shale: dark-gray (N3), silty, micaceous.
499-508	9	Sandstone: medium light-gray (N6), very fine to fine-grained, angular to subangular, poorly sorted, silty, micaceous, abundant black material.

Depth (feet)	Thickness (feet)	
508-518	10	Shale: medium dark-gray (N4), micaceous, slightly fissile.
518-526	8	Siltstone: medium dark-gray (N4), micaceous, few plant fossils.
528-537	9	Siltstone 90%, coal 10%: siltstone, like 518- 526.
537-543	6	Shale: micaceous, dark-gray (N3), fissile; shale, grayish-black (N2), fine, carbonaceous.
543-549	6	Like 537-543.
549-556	7	Siltstone: medium-gray (N5), sandy.
556-572	16	Sandstone: light-gray (N7), very fine to medium- grained, subangular to subrounded, poorly sorted, porous, silty, abundant black mineral and some green mineral, 75% quartz.
562-576	14	Like 556-562.
576-580	4	Sandstone: very light gray (N8), very fine to fine-grained, subangular to subrounded, well sorted, moderate porous, with some black and green mineral, 90% quartz.
580-590	10	Sandstone: silty, medium light-gray (N6), very fine to medium-grained, angular to subangular, micaceous (muscovite), thin partings of coal and carbonaceous shale.

Depth (feet)	Thickness (feet)	
590-593	3	Siltstone: medium dark-gray (N4), micaceous, carbonaceous.
593-599	6	Sandstone: light-gray (N7), very fine to fine-grained, subangular to subrounded, moderately well sorted, silty, calcareous, micaceous (muscovite and biotite ?), green mineral (chlorite ?), 75% quartz.
599-605	6	Siltstone: micaceous, medium-gray (N5).
605-611	6	Like 599-605.
611-616	5	Shale: medium dark-gray (N4), slightly micaceous, moderately fissile, compact.
616-626	10	Shale: medium dark-gray (N4), silty, micaceous.
626-636	10	Siltstone: medium dark-gray (N4), micaceous.
636-647	11	Siltstone: like 626-636.
647-657	10	Sandstone and siltstone: sandstone, medium light-gray (N6), very fine to fine-grained, subangular to subrounded, calcareous, slightly porous, moderately well sorted; grading into siltstone, medium dark-gray (N4), sandy.
657-667	10	Siltstone: like 647-657.
667-677	10	Like 647-657.
677-687	10	Shale: dark-gray (N3) to brownish-gray (5YR 4/1), sideritic, silty.
687-697	10	Shale: dark-gray (N3), silty, slightly sideritic, micaceous.

Depth (feet)	Thickness (feet)	
697-707	10	Sandstone: light-gray (N7), very fine to fine-grained, subangular to subrounded, moderately porous, silty, slightly calcareous, some black mineral and some mica, also some black shale (carbonaceous ?).
707-715	8	Siltstone: medium dark-gray (N4), micaceous, with a few fossils (brachiopods).
715-725	10	No sample.
725-735	10	Like 707-715
735-747	12	Sandstone: very light gray (N8), very fine to fine-grained, subangular to subrounded, silty, calcareous, slightly micaceous (muscovite), little black mineral, 80% quartz, slightly porous.
747-757	10	Shale: medium dark-gray (N4), micaceous, fissile.
757-767	10	Siltstone: medium dark-gray (N4), micaceous, slightly calcareous.
767-777	10	Like 757-767.
777-787	10	Like 757-767.
787-797	10	Siltstone: medium dark-gray (N4), micaceous, with some sideritic zones.
797-806	9	Siltstone: like 757-767.
806-815	9	Like 757-767.
815-824	9	Like 757-767.

Depth (feet)	Thickness (feet)	
824-834	10	Siltstone: medium dark-gray (N4), argillaceous, micaceous.
834-844	10	Like 824-834.
844-854	10	Sandstone: light-gray (N7), fine- to medium- grained, subangular to subrounded, poorly sorted, slightly porous, silty, abundant black mineral, little green mineral, 90% quartz.
854-864	10	Like 844-854.
864-871	7	Like 844-854.
871-881	10	Like 844-854.
881-887	6	Like 844-854.
887-892	5	Like 844-854.
892-897	5	Like 844-854.
897-902	5	Shale: medium dark-gray (N4), silty, micaceous, lumpy.
902-910	8	Like 897-902.
910-927	17	Siltstone: medium light-gray (N6), sandy, mica- ceous, calcareous.
927-937	10	Shale: medium dark-gray (N4), like 897-902.
937-947	10	Like 897-902.
947-957	10	Like 897-902.
957-967	10	Like 897-902.
967-976	9	Siltstone: medium-gray (N5), sandy, micaceous.
976-983	7	Like 897-902.

Depth (feet)	Thickness (feet)	
983-990	7	Shale: medium dark-gray (N4), fissile, finely micaceous.
990-1000	10	Like 983-990.
1000-1010	10	Like 983-990.
1010-1016	6	Shale: grayish-black (N2), carbonaceous.
1016-1024	8	Siltstone: medium-gray (N5), sandy, micaceous.
1024-1032	8	Like 1016-1024.
1032-1041	9	Siltstone: medium light-gray (N6), sandy, slightly calcareous.
1041-1048	7	Shale: medium dark-gray (N4), fissile.
1048-1056	8	Sandstone: silty, medium light-gray (N6), very fine grained, subangular, poorly sorted, slightly calcareous, abundant black mineral, 75% quartz, very slightly porous.
1056-1064	8	No samples.
1064-1067	3	Siltstone: medium dark-gray (N4), sandy, micaceous.
1067-1080	13	Shale: dark-gray (N3), carbonaceous, silty.
1080-1087	7	Like 1067-1080.
1087-1095	8	Like 1067-1080.
1095-1105	10	Shale: medium dark-gray (N4), sandy, calcareous.
1105-1115	10	Siltstone: medium-gray (N5), sandy.
1115-1125	10	Like 1105-1115.

Depth (feet)	Thickness (feet)	
1125-1133	8	<p><u>Lee formation</u> -1210 feet thick</p> <p>Sandstone: light-gray (N7), conglomeratic, medium- to coarse-grained, subangular to subrounded, poorly sorted, silty, micaceous, abundant black mineral, little green mineral, 90% quartz, slightly porous.</p>
1133-1142	9	Like 1125-1133.
1142-1150	8	Like 1125-1133.
1150-1162	12	Siltstone: medium dark-gray (N4), sandy, micaceous.
1162-1170	8	<p>Sandstone: silty, medium-gray (N5), very fine to fine-grained, subangular, poorly sorted, micaceous, abundant brown mineral, scattered black mineral, 75% quartz, very slightly porous.</p>
1170-1172	2	Like 1162-1170.
1172-1178	6	Like 1162-1170; calcareous.
1178-1186	8	Like 1162-1170.
1186-1195	9	Like 1162-1170.
1195-1205	10	<p>Siltstone: micaceous, medium light-gray (N6), sandy, abundant brown mineral, some green mineral.</p>
1205-1211	6	Sandstone: like 1162-1170.
1211-1221	10	Like 1162-1170.
1221-1233	12	Like 1162-1170.

Depth (feet)	Thickness (feet)	
1233-1241	8	Siltstone: medium dark-gray (N4), micaceous.
1241-1247	6	Like 1233-1241.
1247-1252	5	Siltstone: medium-gray (N5), sandy, micaceous; with partings of carbonaceous shale.
1252-1259	7	Like 1247-1252.
1259-1280	21	Like 1247-1252.
1280-1289	9	Siltstone: medium dark-gray (N4), argillaceous.
1289-1296	7	Shale: dark-gray (N3), silty, micaceous.
1296-1304	8	Like 1289-1296.
1304-1310	6	Sandstone: light-gray (N7), very fine grained, subangular, moderately well sorted, slightly silty, micaceous, scattered black mineral, 90% quartz, slightly porous.
1310-1316	6	Sandstone: silty, light-gray (N7), very fine grained, like 1304-1310, 75% quartz.
1316-1326	10	Siltstone: medium-gray (N5) to medium dark- gray (N4), micaceous.
1326-1332	6	Sandstone: very light gray (N8), fine-grained, subangular, poorly sorted, silty, scattered black mineral, some green mineral, 90% quartz, very slightly porous.
1332-1340	8	Sandstone: medium light-gray (N6), very fine grained, subangular, poorly sorted, silty, micaceous, sideritic, scattered black mineral and green mineral, 75% quartz, slightly porous.

Depth (feet)	Thickness (feet)	
1340-1348	8	Like 1332-1340.
1348-1356	8	Like 1332-1340.
1356-1363	7	Like 1332-1340.
1363-1370	7	Like 1132-1340.
1370-1375	5	Sandstone: light-gray (N7), very fine grained, subangular, moderately well sorted, slightly silty, micaceous, calcareous, scattered black mineral, 90% quartz.
1375-1379	4	Sandstone: light-gray (N7), very fine to fine- grained, subangular, poorly sorted, slightly calcareous, silty, scattered black mineral, 90% quartz, very slightly porous.
1379-1386	7	Like 1375-1379.
1386-1393	7	Like 1375-1379.
1393-1400	7	Like 1375-1379.
1400-1407	7	Like 1375-1379.
1407-1414	7	Like 1375-1379.
1414-1420	6	Sandstone: very light gray (N8), very fine grained, subangular to subrounded, well sorted, scattered black mineral, 90% quartz, moderately porous.
1420-1426	6	Like 1414-1420.
1426-1440	14	Siltstone: medium-gray (N5), micaceous.
1440-1446	6	No samples.
1446-1449	3	Siltstone: medium light-gray (N6) to medium- gray (N5), sandy, micaceous, sideritic.

Depth (feet)	Thickness (feet)	
1449-1457	8	Siltstone: medium light-gray (N6), finely micaceous.
1457-1464	7	Siltstone: medium dark-gray (N4), micaceous.
1464-1473	9	Shale and coal: shale, dark-gray (N3), carbonaceous, lumpy; sample contains some impure coal.
1473-1476	3	Sandstone: very light gray (N8) to light-gray (N7), very fine grained, subangular, moderately well sorted, slightly porous, scattered black mineral, 90% quartz.
1476-1478	2	No samples.
1478-1484	6	Like 1473-1476.
1484-1490	6	Sandstone: very light gray (N8), very fine grained, subangular, poorly sorted, silty, slightly calcareous, micaceous, 90% quartz.
1490-1497	7	Like 1484-1490.
1497-1503	6	Sandstone: medium light-gray (N6), very fine grained, subangular, poorly sorted, very slightly porous, silty, micaceous, sideritic, scattered black mineral, 75% quartz.
1503-1509	6	Like 1497-1503.
1509-1513	4	No samples.
1513-1518	5	Sandstone: very light gray (N8), very fine grained, angular to subangular, moderately well sorted, slightly porous, silty, scattered black mineral, 90% quartz.

Depth (feet)	Thickness (feet)	
1518-1524	6	Siltstone and shale: siltstone, medium dark-gray (N4), sandy, micaceous; shale, carbonaceous, grayish-black (N2), some showing woody structure.
1524-1529	5	Sandstone: very light gray (N8), fine-grained, subangular, well-sorted, slightly micaceous, 90% quartz, slightly porous.
1529-1538	9	Sandstone: very light gray (N8), fine- to medium-grained, subangular, well sorted, moderately porous, 90% quartz.
1538-1547	9	Sandstone: very light gray (N8), very fine grained, angular to subangular, moderately silty, scattered black mineral, 90% quartz.
1547-1552	5	Like 1538-1547; partings of shale, dark-gray (N3), carbonaceous, micaceous.
1552-1559	7	Coal: pure, bright.
1559-1566	7	Sandstone: very light gray (N8), fine- to medium-grained, subangular to subrounded, well sorted, sideritic, some black mineral, 30% quartz, very porous. ? 80%
1566-1576	10	Like 1559-1566.
1576-1586	10	Sandstone: very light gray (N8), fine-grained, subangular, moderately well sorted, scattered black mineral, slightly micaceous, 90% quartz, moderately porous.

Depth (feet)	Thickness (feet)	
1586-1594	8	Sandstone: very light gray (N8), like 1559-1566.
1594-1601	7	Sandstone: medium light-gray (N6) to medium-gray (N5), fine- to medium-grained, sub-angular, poorly sorted, silty, micaceous, sideritic, abundant black mineral, small amount of green mineral, 75% quartz, slightly porous; partings of shale, grayish-black (N2), carbonaceous, micaceous.
1601-1612	11	Shale and coal: shale, grayish-black (N2), carbonaceous.
1612-1621	9	Siltstone: medium dark-gray (N4), slightly sandy, micaceous.
1621-1631	10	Sandstone: light-gray (N7), very fine grained, angular to subangular, poorly sorted, silty, micaceous, abundant siderite nodules, scattered black mineral, 75% quartz, very slightly porous.
1631-1643	12	No sample.
1643-1653	10	Siltstone: medium dark-gray (N4), sandy, slightly micaceous.
1653-1664	11	Shale: medium dark-gray (N4), fissile.
1664-1674	10	Like 1653-1664.
1674-1683	9	Like 1653-1664.
1683-1691	8	Siltstone: sandy, medium-gray (N5), micaceous.

Depth (feet)	Thickness (feet)	
1691-1696	5	Sandstone: silty, light-gray (N7), very fine to medium-grained, subangular to subrounded, very poorly sorted, slightly calcareous, sideritic, scattered black mineral, 75% quartz, very slightly porous.
1696-1703	7	Like 1691-1696.
1703-1712	9	No samples.
1712-1721	9	Sandstone: very light gray (N8), medium-grained, subangular, poorly sorted, silty, slightly calcareous, scattered black mineral, 90% quartz, slightly porous.
1721-1729	8	Sandstone: light-gray (N7), very fine to fine-grained, subangular to subrounded, poorly sorted, silty, scattered black mineral, sideritic, some green mineral, 75% quartz, slightly porous.
1729-1737	8	Sandstone: very light gray (N8), fine- to medium-grained, subangular, poorly sorted, slightly porous, silty, scattered black mineral, 90% quartz.
1737-1746	9	Sandstone: very light gray (N8), medium-grained, subangular to subrounded, moderately well sorted, calcareous, sideritic, scattered black mineral, 90% quartz, slightly porous.
1746-1754	8	Sandstone: light-gray (N7), fine- to medium-grained, subangular, poorly sorted, silty,

micaceous, sideritic, scattered black mineral,
some green mineral, 75% quartz, slightly porous.

Depth (feet)	Thickness (feet)	
1754-1762	8	Like 1746-1754.
1762-1771	9	Like 1746-1754.
1771-1780	9	Like 1746-1754.
1780-1790	10	Sandstone: silty, light-gray (N7) to medium-gray (N5), fine- to medium-grained, angular to subrounded, very poorly sorted, very slightly porous, calcareous, scattered black mineral, 75% quartz.
1790-1798	8	Like 1780-1790; with partings of shale, medium dark-gray (N4), fissile.
1798-1806	8	Shale and sandstone: shale, brownish-gray (5YR 4/1), sideritic; sandstone, like 1780-1790.
1806-1814	8	Sandstone: very light gray (N8), fine- to medium-grained, subangular to subrounded, moderately well sorted, calcareous, scattered black mineral, some green mineral, 90% quartz, moderately porous.
1814-1824	10	Sandstone: silty, brownish-gray (5YR 4/1), fine- to medium-grained, subangular to subrounded, very poorly sorted, calcareous, sideritic, micaceous, 75% quartz.
1824-1834	10	Shale: dark-gray (N3), silty, carbonaceous.
1834-1846	12	Like 1824-1834.

Depth (feet)	Thickness (feet)	
1846-1860	14	Siltstone: medium light-gray (N6) to medium dark-gray (N4), sandy, micaceous.
1860-1867	7	Like 1846-1860.
1867-1870	3	No samples.
1870-1878	8	Shale: medium dark-gray (N4), silty; sample contains a little pyrite.
1878-1886	8	Like 1870-1878.
1886-1895	9	Sandstone: light-gray (N7), very fine grained, angular to subangular, poorly sorted, calcareous, silty, micaceous, 90% quartz, very slightly porous.
1895-1902	7	Like 1886-1895; partings of shale, dark-gray (N3), fissile, micaceous.
1902-1909	7	Like 1895-1902.
1909-1914	5	Siltstone: medium-gray (N5) to medium dark-gray (N4), argillaceous.
1914-1920	6	Shale: medium dark-gray (N4), silty.
1920-1926	6	Sandstone: light-gray (N7), very fine grained, subangular, poorly sorted, silty, 90% quartz, slightly porous.
1926-1930	4	Like 1920-1926.
1930-1934	4	Siltstone and shale: siltstone, medium dark-gray (N4), micaceous; shale, grayish-black (N2), fissile, carbonaceous.

Depth (feet)	Thickness (feet)	
1934-1939	5	Sandstone: very light gray (N8), very fine to fine-grained, subangular, moderately well sorted, slightly silty, 90% quartz, slightly porous.
1939-1943	4	Like 1934-1939.
1943-1946	3	Like 1934-1939.
1946-1950	4	Sandstone: very light gray (N8), fine-grained, subangular, well sorted, 90% quartz, porous.
1950-1953	3	Like 1946-1950.
1953-1955	2	Like 1946-1950.
1955-1960	5	Like 1946-1950; with some medium grains.
1960-1965	5	Like 1946-1950.
1965-1968	3	Like 1946-1950.
1968-1971	3	Like 1946-1950.
1971-1973	2	No samples.
1973-1976	3	Like 1946-1950.
1976-1980	4	Shale and coal: shale, dark-gray (N3), carbonaceous; sample contains some impure coal.
1980-1987	7	Sandstone: very light gray (N8), fine- to medium-grained, subangular to subrounded, well sorted, 95% quartz, moderately porous.
1987-1990	3	Like 1980-1987.
1990-1993	3	Sandstone: very light gray (N8), conglomeratic, medium- to coarse-grained, with some pebble chips, subangular to subrounded, well sorted, 95% quartz, very porous.

Depth (feet)	Thickness (feet)	
1993-1997	4	Like 1990-1993.
1997-2001	4	Like 1990-1993.
2001-2004	3	Sandstone: very light gray (N8), conglomeratic, very fine to coarse-grained, angular to sub- rounded, poorly sorted, 90% quartz, slightly porous.
2004-2006	2	Like 2001-2004.
2006-2015	9	Like 2001-2004.
2015-2022	7	Sandstone: like 2001-2004, very fine to fine- grained.
2022-2029	7	Sandstone: very light gray (N8), very fine grained to granule-sized, angular to rounded, poorly sorted, 95% quartz, slightly porous.
2029-2033	4	Like 2022-2029.
2033-2036	3	No samples.
2036-2043	7	Like 2022-2029.
2043-2049	6	Like 2022-2029.
2049-2057	8	Siltstone: dark-gray (N3), carbonaceous, mica- ceous.
2057-2062	5	Sandstone: like 2022-2029.
2062-2066	4	Like 2022-2029.
2066-2076	10	Sandstone: very light gray (N8), very fine to fine-grained, angular to subangular, well sorted, 95% quartz, slightly porous.

Depth (feet)	Thickness (feet)	
2076-2083	7	Sandstone: like 2022-2029.
2083-2088	5	Like 2022-2029.
2088-2092	4	Sandstone: very light gray (N8), conglomeratic, medium-grained to granule-sized, subangular to subrounded, well sorted, 95% quartz, moderately porous.
2092-2095	3	Like 2088-2092.
2095-2101	6	Sandstone: very light gray (N8), very fine to fine-grained, angular to subangular, mod- erately well sorted, 95% quartz, slightly porous.
2101-2107	6	Like 2095-2101.
2107-2110	3	Sandstone: very light gray (N8), fine- to medium- grained, subangular to subrounded, well sorted, moderately porous, 95% quartz.
2110-2121	11	Sandstone: very light gray (N8), fine-grained, angular to subangular, well sorted, 95% quartz, slightly porous.
2121-2124	3	Like 2110-2121.
2124-2127	3	Like 2110-2121.
2127-2129	2	Sandstone: very light gray (N8), like 2107-2110.
2129-2135	6	Like 2107-2110.
2135-2140	5	Like 2107-2110.
2140-2143	3	Like 2107-2110.
2143-2146	3	Sandstone: like 2107-2110.

Depth (feet)	Thickness (feet)	
2146-2150	4	Shale: dark-gray (N3), silty, micaceous.
2150-2155	5	Sandstone: medium light-gray (N6), very fine to fine-grained, subangular to subrounded, poorly sorted, silty, calcareous, abundant black argillaceous material, micaceous, sideritic, 75% quartz, very slightly porous.
2155-2162	7	Like 2150-2155.
2162-2170	8	Shale and coal: shale, medium dark-gray (N4), slightly silty; shale, grayish-black (N2), carbonaceous; sample contains some impure coal.
2170-2178	8	Sandstone: light-gray (N7) to medium light-gray (N6), very fine grained, angular to subangular, poorly sorted, silty sideritic, micaceous, 75% quartz, very slightly porous.
2178-2183	5	Shale and coal: shale, dark-gray (N3), carbonaceous.
2183-2189	6	Shale: medium dark-gray (N4), silty, moderately fissile, micaceous.
2189-2195	6	Siltstone: medium dark-gray (N4), sandy, micaceous.
2195-2198	3	Coal and shale: coal; with a small amount of shale, dark-gray (N3), carbonaceous, lumpy.
2198-2196	8	Coal and shale: coal, impure; shale, carbonaceous, dark-gray (N3).

Depth (feet)	Thickness (feet)	
2106-2206	100	No sample.
2206-2212	6	Coal, shale, and sandstone: coal; shale, dark-gray (N3), carbonaceous; sandstone, very light gray (N8), very fine grained, angular to subangular, well sorted, 95% quartz, slightly porous.
2212-2215	3	Like 2206-2212.
2215-2218	3	Shale, coal, and sandstone: shale, dark-gray (N3), carbonaceous, fissile, with thin coal partings; shale, light brownish-gray (5YR 6/1), sideritic; sandstone, like 2206-2212; some coal.
2218-2224	6	Like 2215-2218.
2224-2229	5	Like 2215-2218; sample contains more sandstone.
2229-2234	5	Sandstone: very light gray (N8), very fine to fine-grained, angular to subangular, well sorted, 95% quartz, slightly porous.
2234-2240	6	Like 2229-2240.
2240-2246	6	Like 2229-2240.
2246-2252	6	Like 2229-2240.
2252-2256	4	Like 2229-2240.
2256-2263	7	Sandstone: very light gray (N8), very fine to fine-grained, angular to subangular, moderately well sorted, silty, 90% quartz, very slightly porous.

Depth (feet)	Thickness (feet)	
2263-2268	5	Like 2256-2263.
2268-2273	5	Sandstone: very light gray (N8), very fine to medium-grained, angular to subangular, moderately well sorted, silty, 90% quartz, slightly porous.
2273-2278	5	Like 2268-2273.
2278-2283	5	Like 2268-2273.
2283-2288	5	Like 2268-2273.
2288-2293	5	Sandstone: very light gray (N8), very fine to medium-grained, subangular to subrounded, well sorted, very slightly silty, 95% quartz, moderately porous.
2293-2298	5	Like 2288-2293.
2298-2303	5	Like 2288-2293.
2303-2307	4	Sandstone: very light gray (N8), very fine to fine-grained, angular to subangular, well sorted, very slightly silty, 95% quartz, slightly porous.
2307-2310	3	Like 2303-2307.
2310-2315	5	Like 2303-2307.
2315-2320	5	Sandstone and shale: sandstone, light-gray (N7), fine- to medium-grained, subangular to subrounded, moderately well sorted, abundant inclusions of dark-gray (N3), argillaceous

material, 90% quartz, slightly porous; shale,
dark-gray (N3), carbonaceous, micaceous, sandy;
sample contains a small amount of pyrite.

Depth (feet)	Thickness (feet)	
2320-2324	4	Sandstone: very light gray (N8), very fine to fine-grained, subangular to subrounded, well sorted, scattered black mineral 95% quartz, slightly porous.
2324-2330	6	Like 2320-2324.
2330-2335	5	Sandstone: very light gray (N8), fine-grained, subangular to subrounded, well sorted, slightly silty, slightly calcareous, 90% quartz, slightly porous.
<u>Bluestone formation</u> 465 feet thick		
2335-2343	8	Siltstone and shale: siltstone, medium-gray (N5); shale, light brownish-gray (5YR 6/1), sideritic, lumpy.
2343-2351	8	Shale: medium-gray (N5) to medium dark-gray (N4), calcareous; shale, grayish-red (10R 4/2), slightly calcareous.
2351-2357	6	Shale: medium dark-gray (N4), slightly calcareous, with reddish streaks; shale, grayish-red, like 2343-2351.
2357-2365	8	Shale: grayish-red (10R 4/2), silty, micaceous, noncalcareous; shale, medium-gray (N5), silty with greenish tint.
2365-2371	6	Shale and siltstone: shale, grayish-red, like 2357-2365; siltstone, calcareous, greenish-gray (5G 6/1), sandy.

Depth (feet)	Thickness (feet)	
2371-2376	5	Like 2365-2371.
2376-2412	36	No sample.
2412-2417	5	Siltstone: sandy, very light gray (N8) to light-gray (N7); siltstone, grayish-red (5R 4/2), sandy to argillaceous.
2417-2422	5	Siltstone: medium-gray (N5) to medium dark-gray (N4), sandy, calcareous.
2422-2426	4	Siltstone and shale: siltstone, medium dark-gray (N4), slightly calcareous; shale, grayish-red (5R 4/2), silty; sample contains a small amount of coal (cavings ?).
2426-2433	7	Shale: medium dark-gray (N4), silty, lumpy, with a calcareous lens; shale, dark-gray (N3), carbonaceous, fissile.
2433-2440	7	Like 2426-2433.
2440-2444	4	No samples.
2444-2447	3	Siltstone: medium dark-gray (N4), calcareous.
2447-2452	5	Shale and limestone: shale, medium dark-gray (N4) to dark-gray (N3), calcareous; limestone, dark-gray (N3), dense, silty.
2452-2453	1	Limestone and sandstone: limestone, light-gray (N7), silty; sandstone, light-gray (N7), fine- to medium-grained, subangular, calcareous, 90% quartz.

Depth (feet)	Thickness (feet)	
2453-2460	7	Sandstone and siltstone: sandstone, light-gray (N7) to medium light-gray (N6), very fine grained, subangular, poorly sorted, silty, noncalcareous, 90% quartz, slightly porous; interbedded with siltstone, calcareous, light brownish-gray (5YR 6/1).
2460-2468	8	Like 2453-2460; shale, medium dark-gray (N4), silty; shale, grayish-red (5R 3/2).
2468-2475	7	Like 2453-2460; with shale, like 2460-2468.
2475-2481	6	Sandstone: light-gray (N7), very fine grained, subangular, moderately well sorted, silty, 95% quartz, slightly porous.
2481-2490	9	Like 2475-2481.
2490-2501	11	Like 2481-2490.
2501-2509	8	Like 2481-2490; with lenses of siltstone, medium dark-gray (N4), carbonaceous, micaceous.
2509-2517	8	Sandstone, siltstone, and shale: sandstone, very light gray (N8), very fine grained, subangular, moderately well sorted, slightly silty, calcareous 90% quartz, slightly porous; interbedded with siltstone, medium gray (N5) to medium dark-gray (N4), sandy; shale, medium dark-gray (N4), micaceous.

Depth (feet)	Thickness (feet)	
2517-2522	5	Shale: medium dark-gray (N4) to dark-gray (N3), silty, carbonaceous, micaceous; sample contains abundant pyrite.
2522-2527	5	Sandstone: light-gray (N7), very fine to fine-grained, subangular, poorly sorted, silty, scattered carbonaceous material, few medium to coarse, subangular to subrounded grains, 90% quartz, slightly porous.
2527-2533	6	Like 2522-2527; shale, dark-gray (N3), carbonaceous, micaceous.
2533-2540	7	Shale: medium dark-gray (N4), fissile, micaceous.
2540-2552	12	Like 2533-2540.
2552-2564	12	Like 2533-2540.
2564-2576	12	Like 2533-2540.
2576-2588	12	Like 2533-2540.
2588-2600	12	Shale and limestone: shale, medium dark-gray (N4), silty, with abundant pyrite; limestone, dark-gray (N3), dense, slightly silty, thin-bedded.
2600-2612	12	Shale: medium dark-gray (N4), fissile, micaceous.
2612-2620	8	Like 2600-2612; sandstone, very light gray (N8), fine-grained, subangular, well sorted, calcareous, 95% quartz, slightly porous.
2620-2624	4	Sandstone: like 2612-2620.

Depth (feet)	Thickness (feet)	
2624-2626	2	Sandstone: like 2612-2620.
2626-2629	3	Sandstone: like 2612-2620.
2629-2632	3	Sandstone: white (N9), very fine to fine-grained, subangular, well sorted, calcareous, scattered carbonaceous material, slightly porous, abundant clusters of pyrite crystals.
2632-2638	6	Like 2629-2632.
2638-2641	3	Like 2629-2632.
2641-2646	5	Like 2629-2632.
2646-2656	10	Siltstone and shale: siltstone, medium dark- gray (N4), sandy, micaceous; shale, medium dark-gray (N4), fissile.
2656-2666	10	Shale: medium dark-gray (N4), slightly calcareous.
2666-2673	7	Like 2656-2666; sandstone, light-gray (N7) to medium-gray (N5), fine- to medium-grained, very poorly sorted, calcareous, argillaceous, scattered pyrite crystals, 75% quartz, slightly porous.
2672-2678	6	Sandstone and shale: sandstone, very light gray (N8), fine- to medium-grained, subangular, poorly sorted, silty, calcareous, abundant argillaceous material, 90% quartz, slightly porous; interbedded with shale, dark-gray (N3), fissile, carbonaceous.
2678-2682	4	Like 2672-2678.
2682-2686	4	Like 2672-2678.

Depth (feet)	Thickness (feet)	
2686-2690	4	Like 2672-2678.
2690-2696	6	Shale: medium dark-gray (N4).
2696-2702	6	Like 2690-2696; sandstone, white (N9) to medium light-gray (N6), very fine to medium-grained, poorly sorted, silty, calcareous, abundant carbonaceous material, 90% quartz, slightly porous.
2702-2713	11	Like 2696-2702.
2713-2715	2	Like 2696-2702.
2715-2718	3	Like 2696-2702.
2718-2721	3	Like 2696-2702.
2721-2724	3	Like 2696-2702.
2724-2727	3	Like 2696-2702.
2727-2731	4	Like 2696-2702.
2731-2733	2	Like 2696-2702.
2733-2737	4	Sandstone and shale: sandstone, white (N9), very fine to fine-grained, subangular, well sorted, slightly silty, noncalcareous, slightly porous; lenses of shale, dark-gray (N3), carbonaceous, fissile.
2737-2740	3	Like 2733-2737.
2740-2752	12	Sandstone: white (N9), fine- to medium-grained, subangular to subrounded, moderately well sorted, slightly silty, slightly calcareous,

Depth
(feet)

Thickness
(feet)

scattered carbonaceous material, pyrite crystals, slightly porous, 90% quartz.

Depth (feet)	Thickness (feet)	
2752-2755	<u>3</u>	Like 2740-2752.
2755-2759	4	Sandstone and shale: sandstone, like 2752-2755; shale, medium dark-gray (N4), moderately fissile.
2759-2764	5	Shale: dark-gray (N3), carbonaceous, fissile, abundant pyrite, fossiliferous, abundant ostracods.
2764-2769	5	Sandstone: white (N9), fine-grained, subangular, well sorted, slightly silty, abundant carbo- naceous material, 95% quartz, moderately porous.
2769-2776	7	Like 2764-2769.
2776-2784	8	Sandstone, siltstone, and shale: sandstone, light-gray (N7), very fine to medium-grained, subangular to rounded, poorly sorted, slightly porous, silty, abundant pyrite, 90% quartz; with lenses of siltstone, medium dark-gray (N4), sandy; shale, dark-gray (N3), carbonaceous.
2784-2792	8	Siltstone and shale: siltstone, medium-gray (N5), sandy, micaceous; shale, dark-gray (N3), fissile.
2792-2800	<u>2</u>	Shale and sandstone: shale, medium dark-gray (N4), silty; shale, dark-gray (N3), carbo- naceous, a few ostracods; sandstone, very light gray (N8), very fine to fine-grained,

Depth
(feet)

Thickness
(feet)

subangular to subrounded, moderately well
sorted, slightly porous, slightly silty,
calcareous, scattered clusters of pyrite
crystals with partings of carbonaceous shale,
90% quartz.

Depth
(feet)

Thickness
(feet)

Princeton sandstone ~~124 feet thick~~

2800-2803	3	Sandstone: white (N9), fine- to medium-grained, subangular to subrounded, very well sorted, calcareous, scattered pyrite crystals, 95% quartz, moderately porous.
2803-2808	5	Like 2800-2803.
2808-2814	6	Like 2800-2803.
2814-2817	3	Sandstone: white (N9), fine- to medium-grained, few coarse grains, subangular to subrounded, well sorted, moderately porous, slightly silty, 95% quartz.
2817-2822	5	Sandstone and shale: sandstone, like 2814-2817; shale, dark-gray (N3), fissile.
2822-2831	9	No sample.
2831-2837	6	Like 2817-2822.
2837-2839	2	Shale and limestone: shale, medium dark-gray (N4), fissile, scattered pyrite crystals; thin lens of limestone, brownish-gray (5YR 4/1), dense to medium crystalline.
2839-2843	4	Sandstone: white (N9), fine- to medium-grained, subangular, well sorted, calcareous, 95% quartz, slightly porous.
2843-2847	4	Sandstone and shale: sandstone, like 2839-2843; shale, medium dark-gray (N4), fissile, partly calcareous.

Depth (feet)	Thickness (feet)	
2847-2853	6	Sandstone and shale: sandstone, like 2839-2843, with some coarse grains; shale, medium-gray (N5), calcareous.
2853-2858	5	Like 2847-2853.
2858-2862	4	Like 2847-2853; sample contains a small amount of chert.
2862-2866	4	Sandstone and shale: sandstone, like 2839- 2843; shale, medium dark-gray (N4), calcareous; sample also contains a small amount of chert (?), like 2858-2862.
2866-2870	4	Sandstone: like 2839-2843.
2870-2874	4	Sandstone: conglomeratic, white (N9), medium- to very coarse-grained, subangular to rounded, well sorted, calcareous, 95% quartz, porous.
2874-2879	5	Like 2870-2874; more conglomeratic.
2879-2881	2	Shale: medium dark-gray (N4), calcareous; shale, dark-gray (N3), fissile, noncalcareous, inter- bedded.
2881-2882	1	Like 2879-2881.
2882-2884	2	Shale: medium dark-gray (N4), calcareous.
2884-2888	4	Sandstone: white (N9), fine- to medium-grained, subangular to subrounded, slightly calcareous, 95% quartz, slightly porous.
2888-2894	6	Like 2884-2888.

Depth (feet)	Thickness (feet)	
2894-2900	6	Like 2884-2888; with scattered pyrite crystals, slight iron oxide staining on grains.
2900-2905	5	Like 2894-2900.
2905-2910	5	Like 2894-2900.
2910-2915	5	Like 2894-2900.
2915-2919	4	Like 2894-2900.
2919-2924	5	Like 2894-2900.

Hinton formation.

Avis limestone member of Reger -- ~~54 feet thick~~

2924-2929	5	Limestone and shale: limestone, medium-gray (N5), dense, slightly argillaceous; shale, grayish-red (5R 4/2).
2929-2937	8	Shale: grayish-red (5R 4/2), slightly silty, scattered mica, calcareous.
2937-2946	9	Like 2929-2937.
2946-2955	9	Like 2929-2937; siltstone, pale-red (5R 6/2), sandy, calcareous, micaceous.
2955-2963	8	Shale: grayish-red (5R 4/2), silty, lumpy; shale, medium dark-gray (N4), calcareous, moderately fissile.
2963-2971	8	Shale: medium dark-gray (N4), slightly calca- reous, lumpy.
2971-2978	7	Like 2963-2971; with a thin bed of limestone, medium light-gray (N6), dense, fossiliferous (?).

Depth
(feet)

Thickness
(feet)

~~252+~~
Hinton formation (undivided) - 754 feet thick

2978-2985	7	Sandstone: light-gray (N7) to medium-gray (N5), very fine grained, subangular, very poorly sorted, silty, calcareous, micaceous, abundant argillaceous material, abundant green mineral, 75% quartz, slightly porous.
2985-2990	5	Like 2978-2985.
2990-2995	5	Like 2978-2985; very silty, 50% quartz.
2995-2997	2	Like 2978-2985.
2997-3000	3	Sandstone: greenish-gray (5GY 6/1), very fine grained, angular to subangular, poorly sorted, slightly porous, silty, calcareous, micaceous, abundant green mineral, 75% quartz.
3000-3007	7	Siltstone: sandy, medium light-gray (N6) to medium-gray (N5), micaceous, slightly calcareous.
3007-3013	6	Like 3000-3007.
3013-3018	5	Like 3000-3007.
3018-3024	6	Sandstone: very light gray (N8), very fine grained, subangular, poorly sorted, silty, calcareous, micaceous, scattered carbonaceous material, 90% quartz, very slightly porous.
3024-3031	7	Siltstone: medium-gray (N5) to medium dark-gray (N4), sandy, micaceous, slightly calcareous.

Depth (feet)	Thickness (feet)	
3031-3040	9	Shale: medium dark-gray (N4), finely micaceous; shale, greenish-gray (5G 6/1), calcareous.
3040-3049	9	Shale: dark-gray (N3).
3049-3054	5	Shale: greenish-gray (5G 6/1) to dark greenish-gray (5G 4/1) to dusky-red (5R 3/4), mottled, calcareous.
3054-3059	5	Sandstone: very light gray (N8), very fine grained, subangular, moderately well sorted, calcareous, 90% quartz, very slightly porous.
3059-3071	12	Siltstone: medium dark-gray (N4), slightly sandy.
3071-3077	6	Sandstone: white (N9), very fine grained, subangular, moderately well sorted, slightly porous, slightly silty, calcareous, scattered argillaceous material, 90% quartz.
3077-3083	6	Like 3071-3077; grading into siltstone, medium-gray (N5), sandy, calcareous, micaceous.
3083-3090	7	Sandstone: white (N9), very fine grained, subangular, moderately well sorted, slightly silty, scattered carbonaceous material, 90% quartz, slightly porous.
3090-3094	4	Shale: dark-gray (N3), calcareous.
3094-3104	10	Shale and siltstone: shale, dark-gray (N3), carbonaceous; siltstone, medium-gray (N4), sandy; sample contains abundant pyrite.

Depth (feet)	Thickness (feet)	
3104-3108	4	Like 3094-3104; ^{and} sandstone, very light gray (N8), very fine grained, subangular, poorly sorted, silty, abundant carbonaceous material, 75% quartz, very slightly porous, interbedded.
3108-3112	4	Like 3104-3108.
3112-3115	3	Like 3104-3108.
3115-3119	4	Sandstone and shale: sandstone, like 3104-3108; shale, dark-gray (N3), carbonaceous, fissile, with abundant pyrite.
3119-3122	3	Like 3115-3119.
3122-3126	4	Like 3115-3119.
3126-3130	4	Like 3115-3119.
3130-3135	5	Like 3115-3119.
3135-3138	3	Sandstone and shale: sandstone, white (N9), very fine grained, subangular, well sorted, slightly porous, slightly calcareous, 95% quartz; shale, like 3115-3119, interbedded.
3138-3142	4	Sandstone: like 3135-3138.
3142-3146	4	Like 3135-3138.
3146-3154	8	Like 3135-3138.
3154-3158	4	Like 3135-3138.
3158-3168	10	Siltstone and shale: siltstone, medium-gray (N5), sandy, calcareous; shale, greenish-gray (5G 6/1) and grayish-red (10R 4/2), mottled.

Depth (feet)	Thickness (feet)	
3168-3174	6	Shale and sandstone: dark-gray (N3), slightly silty; sandstone, light-gray (N7), very fine to fine-grained, subangular to subrounded, poorly sorted, silty, calcareous, abundant pyrite, scattered carbonaceous material, 75% quartz, slightly porous.
3174-3181	7	Siltstone: medium dark-gray (N4).
3181-3188	7	Like 3174-3181; shale, greenish-gray (5G 5/1), calcareous; shale, grayish-red (5R 4/2), interbedded.
3188-3195	7	Shale: greenish-gray and grayish-red, like 3181-3188.
3195-3201	6	Like 3188-3195.
3201-3210	9	Shale: medium dark-gray (N4), silty.
3210-3217	7	Like 3201-3210; siltstone, medium-gray (N5), sandy, calcareous.
3217-3223	6	Shale: grayish-red (10R 4/2); shale, medium dark-gray (N4) with greenish tint, calcareous.
3223-3230	7	Like 3217-3223.
3230-3732	502	No sample.
		<u>Bluefield shale</u>
3732-3737	5	Limestone: light brownish-gray (5YR 6/1) to medium dark-gray (N4), dense, pure, silty nodules, crinoidal.

Depth (feet)	Thickness (feet)	
3737-3744	7	Limestone: very light gray (N8) to brownish-gray (5YR 4/1), dense.
3744-3752	8	Limestone: medium dark-gray (N4), dense; limestone, medium crystalline, thin-bedded, silty.
3752-3759	7	Siltstone: medium dark-gray (N4), calcareous, thin calcite partings.
3759-3768	9	Like 3752-3759.
3768-3777	9	<u>Greenbrier limestone</u> Like 3752-3759; limestone, very light gray (N8), noncrystalline; sample contains some pyrite.
3777-3784	7	Limestone: medium dark-gray (N4), dense, slightly silty, slightly oolitic.
3784-3791	7	Limestone: medium dark-gray (N4) with brownish tint, dense, partly oolitic; limestone, very light gray (N8), like 3768-3777.
3791-3796	5	Limestone: white (N9); limestone, brownish-gray (5YR 4/1), mottled, dense to medium-crystalline, few scattered pyrite crystals.
3796-3801	5	Limestone: white (N9) and light brownish-gray (5YR 6/1), mottled, dense.
3801-3808	7	Limestone: white (N9) and light brownish-gray (5YR 6/1), dense, very oolitic.
3808-3818	10	Limestone: very light gray (N8), finely crystalline; limestone, light brownish-gray (5YR 6/1), dense, oolitic.

Depth (feet)	Thickness (feet)	
3818-3821	3	Like 3808-3818.
3821-3827	6	Like 3808-3818.
3827-3835	8	Limestone: brownish-gray (5YR 4/1), dense to oolitic.
3835-3842	7	Limestone: medium dark-gray (N4) with brownish tint, silty; limestone, very light gray (N8), dense, with a few crinoid stems.
3842-3847	5	Like 3835-3842.
3847-3854	7	Like 3835-3842.
3854-3861	7	Limestone: very light gray (N8), finely crystalline, oolitic; limestone, medium dark-gray (N4), dense to medium crystalline, oolitic.
3861-3871	10	Like 3854-3861.
3871-3877	6	Limestone: silty, medium dark gray (N4), with abundant crinoid stems.
3877-3881	4	Like 3871-3877; with limestone, very light gray (N8), dense; limestone, brownish-gray (5YR 4/1), dense.
3881-3891	10	Limestone: brownish-gray (5YR 4/1), dense; limestone, very light gray (N8), noncrystalline, like 3877-3881.
3891-3898	7	Limestone: medium-gray (N5) to medium dark-gray (N4), dense, very oolitic.
3898-3904	6	Limestone: white (N9) to medium dark-gray (N4), dense, medium crystalline, oolitic.

Depth (feet)	Thickness (feet)	
3904-3910	6	Like 3898-3904.
3910-3916	6	Limestone: very light gray (N8) to light brownish-gray (5YR 6/1), dense, medium crystalline; sample contains scattered pyrite crystals.
3916-3921	5	Limestone: medium dark-gray (N4), with brownish tint, finely crystalline, very oolitic.
3921-3926	5	Like 3916-3921.
3926-3932	6	Limestone: white (N9) and brownish-gray (5YR 4/1), mottled, dense to medium crystalline, oolitic.
3932-3941	9	Like 3926-3932.
3941-3948	7	Limestone: white (N9) to light-gray (N7), dense, oolitic.
3948-3959	11	Limestone: brownish-gray (5YR 4/1), partly oolitic.
3959-3968	9	Limestone: brownish-gray (5YR 4/1) to very light gray (N8), dense, some oolites, and a few crinoid buttons.
3968-3975	7	Like 3959-3968.
3975-3985	10	Limestone: brownish-gray (5YR 5/1), dense; limestone, white (N9), noncrystalline; sample contains some white (N9), coarsely crystalline calcite.
3985-3996	11	Limestone: brownish-gray (5YR 5/1), dense; sample contains a small amount of pyrite.
3996-4008	12	Like 3985-3996; sample contains pyrite.
4003-4010	7	Like 3985-3996; limestone, grayish-red (5YR 4/2), finely crystalline.

Depth (feet)	Thickness (feet)	
4010-4016	6	Limestone: medium-gray (N5), dense to finely crystalline.
4016-4020	4	Like 4010-4016; sample contains abundant white (N9), coarsely crystalline calcite; and a few pieces of limestone, dark-gray (N3), dense, with pyrite crystals.
4020-4025	5	Like 4016-4020; scattered pyrite crystals throughout sample.
4025-4032	7	Limestone: white (N9) to medium-gray (N5) with brownish tint, dense, oolitic.
4032-4037	5	Like 4025-4032; fewer ooliths.
4037-4043	6	Limestone: medium light-gray (N6), dense, fossiliferous (brachiopods and crinoid buttons); shale, dark-gray (N3), carbonaceous, fossiliferous (ostracods ?).
4043-4054	11	Limestone: medium-gray (N5), dense.
4054-4058	4	Limestone: medium dark-gray (N4) with brownish tint, dense.
4058-4066	8	Limestone: medium-gray (N5), dense, very oolitic.
4066-4071	5	Limestone: medium dark-gray (N4), dense; white (N9), noncrystalline.
4071-4076	5	Limestone: medium dark-gray (N4), like 4066-4071.
4076-4085	9	Limestone: silty, medium dark-gray (N4),; sample contains some quartz grains.

Depth (feet)	Thickness (feet)	
4085-4107	22	Like 4076-4085.
4107-4115	8	<u>Maccrady shale</u> Limestone and siltstone: limestone, dark-gray (N3), dense, silty; siltstone, medium-gray (N5), with greenish tint, slightly calcareous; sample contains scattered pyrite crystals.
4115-4119	4	Siltstone: medium-gray (N5), like 4107-4115; siltstone, grayish-red (5R 4/2), mottled, slightly calcareous.
4119-4125	6	Like 4115-4119.
4125-4130	5	Siltstone: medium-gray (N5), micaceous, with abundant nodules of bright green mineral.
4130-4135	5	Siltstone: grayish-red (10R 4/2) with scattered mica.
4135-4139	4	Like 4130-4135.
4139-4140	1	Siltstone: grayish-red (10R 4/2), slightly sandy, micaceous; sample contains abundant red mineral (gypsum?).
4140-4142	2	Like 4139-4140.
4142-4151	9	Siltstone: medium-gray (N5) with a greenish tint, micaceous, fine to sandy.
4151-4157	6	Siltstone: dusky-red (5R 3/4) to very dusky- red (10R 2/2), scattered mica.
4157-4161	4	Like 4151-4157.
4161-4165	4	Like 4151-4157.

th
(ft)

Thickness
(feet)

165-4173

8

Siltstone: grayish-red (10R 4/2), micaceous;
siltstone, greenish-gray (5G 7/1), interbedded,
micaceous.

173-4175

2

Shale: grayish-red (5R 4/2) to greenish-gray
(5GY 6/1), fissile, mottled, micaceous.

Summary of Looney No. 1-1659 Well 33

	Depth (feet)	Thickness (feet)
orton formation	336-1125	789
ee formation	1125-2335	1210
limestone formation	2335-2800	465
inceton sandstone	2800-2924	124
inton formation		
Avis limestone member of Reger	2924-2978	54
Hinton formation undivided	2978-3230	252 +
o/sample	3230-3732	502
bluefield shale	3732-3768?	36 +
Greenbrier limestone	3768?-4107	339 ?
Maccrady shale	4107-4175	68 +

399
DEPARTMENT OF THE INTERIOR

✓ UNITED STATES GEOLOGICAL SURVEY *Reports - Open file series*

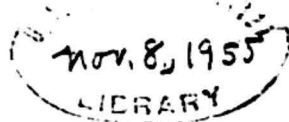
W. E. Wrather, Director

Detailed logs of 28 wildcat wells in Virginia

Sample Record of the A. L. Powers No. 1 well, Buchanan County,
Virginia

by

Mary Beth McFarlan and A. D. Williamson



OPEN FILE

Prepared in Cooperation with the Division of Geology of
the Virginia Department of Conservation and Development

This report is preliminary and has not
been edited or reviewed for conformity
with U. S. Geological Survey standards
and nomenclature.

Sample Record of the A. L. Powers No. 1 well, Buchanan County,
Virginia

by

Mary Beth McFarlan and A. D. Williamson

The A. L. Powers No. 1 well, drilled about $2\frac{1}{2}$ miles east of Grundy, encountered commercial quantities of the gas in the Greenbrier limestone. The well was drilled by the Pipeline Construction and Drilling Company and we are indebted to this company for making the samples available for study and publication. The well started in the Pennsylvanian Norton formation and stopped in the Mississippian Price sandstone. The method of sample examination used, definitions of terms and the reasons for correlations here given are explained in ^{U.S.} ~~Virginia~~ Geological Survey Bulletin No. 1027, (*in preparation*).

A. L. POWERS NO. 1 WELL

Buchanan County, Virginia.

Pipe Line Construction and Drilling Company.

Located 3.1 miles W. of 82°00' and 3.86 miles S. of 37°20'; on left fork of Booth Branch.

Elevation, 1509.25 ft

Total depth, 3725 ft; cable tools.

Drilling commenced September 5, 1948; completed April 10, 1949.

Production: 3452 MCF

Gas shows at 315, 843, 2609-2619 ft

Gas pays at 3332-3334, 3472-3474, 3500-3508 ft

Coal at 485-489, 1375-1380 ft

Samples examined by Allen D. Williamson, 121-548 ft, April 1950; and 3380-3725 ft, April 1950; by Mary Beth McFarlan, 548-3380 ft, March to May 1950.

Sample Library Reference: Virginia Sample Library.

Depth (feet)	Thickness (feet)	
		<u>Norton formation</u> — 528 feet —
121-128	7	Siltstone: micaceous, medium dark-gray (N4), sandy with carbonaceous partings.
128-134	6	Like 121-128.
134-140	6	Shale: silty, micaceous, medium dark-gray (N4).
140-147	7	Like 134-140.

Depth (feet)	Thickness (feet)	
147-152	5	Like 134-140.
152-158	6	Siltstone: argillaceous, micaceous, medium dark-gray (N4).
158-165	7	Sandstone: micaceous, light-gray (N7), very fine- grained, subangular, very silty, abundant black mineral, poorly sorted, 1/2 quartz.
165-171	5	Sandstone: silty, light-gray (N7), fine-grained to medium-grained, subangular to subrounded, slightly micaceous, abundant black mineral, little green mineral present, probably chlorite?, poorly sorted, slightly porous, 3/4 quartz.
171-178	7	Like 165-171.
178-183	5	Like 165-171.
183-189	6	Like 165-171.
189-194	5	Like 165-171.
194-200	6	Siltstone: micaceous, medium dark-gray (N4).
200-206	6	Shale: micaceous, dark-gray (N3), fissile.
206-215	9	Like 200-206.
215-221	6	Like 200-206.
221-227	5	Like 200-206.
227-232	5	Like 200-206.
232-240	8	No sample.
240-250	10	Like 200-206.
250-260	10	Siltstone: sandy, micaceous.

Depth (feet)	Thickness (feet)	
260-270	10	Like 250-260.
270-280	10	Sandstone: micaceous, very light-gray (N8), fine- to medium-grained, subangular to subrounded, well sorted, porous, sideritic nodules, 90% quartz.
280-290	10	Sandstone: conglomeratic, very light-gray (N8), medium- to coarse-grained, subangular to sub- rounded, little green mineral (probably chlorite), and a few sideritic nodules, moderately well sorted, 90% quartz.
290-300	10	No sample.
300-304	4	Sandstone: very light-gray (N8), very fine to fine-grained, subangular to subrounded, little green mineral (probably chlorite), well sorted, slightly porous.
304-312	8	Shale: micaceous, dark-gray (N3), fissile.
312-319	7	Sandstone: calcareous, light brownish-gray (5YR 6/1), fine- to medium-grained, subangular, little green mineral (probably chlorite), moderately well sorted, slightly porous, 75% quartz.
319-327	8	Like 312-319.
327-334	7	Shale: micaceous, silty, dark-gray (N3), fissile.
334-344	10	Siltstone: sandy, micaceous, medium-gray (N5), carbonaceous partings.

Depth (feet)	Thickness (feet)	
344-356	12	Siltstone and shale: siltstone, like 334-344; shale, silty, carbonaceous, dark-gray (N3).
356-366	10	Shale: dark-gray (N3), like 344-356.
366-373	7	Sandstone: micaceous, light-gray (N7), very fine to fine-grained, subangular, very slightly porous, very silty, slightly calcareous, abundant black mineral, poorly sorted, abundant limonitic stain.
373-380	7	Siltstone: sandy, medium dark-gray (N4), sandy.
380-388	8	Like 373-380.
388-395	7	No sample.
395-404	9	Shale: micaceous, dark-gray (N3), fissile.
404-410	6	Like 395-404, with little brownish-gray (5YR 4/1), sideritic shale.
410-424	14	Shale: silty, medium dark-gray (N4), very micaceous.
424-432	8	Shale: silty, medium dark-gray (N4), fissile, slightly micaceous.
432-447	15	Like 424-432.
447-454	7	Shale: micaceous, medium dark-gray (N4).
454-460	6	Sandstone: silty, micaceous, medium-gray (N5), very fine grained, subangular, abundant black mineral, poorly sorted, slightly porous, 75% quartz.
460-463	3	No sample.
463-471	8	Like 454-460.

Depth (feet)	Thickness (feet)	
471-479	8	Like 454-460.
479-485	6	Sandstone: silty, micaceous, light-gray (N7), fine- to medium-grained, subangular to subrounded, poorly sorted, slightly porous, abundant black mineral, 75% quartz.
485-492	7	Shale: carbonaceous, dark-gray (N3); and coal.
492-496	4	Siltstone: sandy, micaceous, medium-gray (N5).
496-502	6	Siltstone: sandy, micaceous, medium light-gray (N6) to medium dark-gray (N4).
502-513	11	Sandstone: light-gray (N7), very fine to fine- grained, subangular, little black mineral, moderately well sorted, silica cement, very slightly porous, little limonitic stain, 90% quartz.
513-519	6	Like 502-513.
519-528	9	Siltstone: medium dark-gray (N4), very micaceous, slightly sandy.
<u>Lee formation</u> —1010 feet—		
528-535	7	Sandstone: calcareous, very light-gray (N8), very fine to medium-grained, subangular, slightly silty, little black mineral, poorly sorted, slightly porous, 90% quartz.
535-542	7	Like 528-535.
542-548	6	Like 528-535.

Depth (feet)	Thickness (feet)	
546-559	11	No sample.
559-562	3	Sandstone 99%, shale 1%: sandstone, white to yellowish, fine-grained, angular to subangular, scattered black and few light-green minerals, limonitic stain, some pieces with calcareous cement; shale, dark-gray (N3).
554-562	8	Sandstone 98%, shale 2%: sandstone, white (N9), fine-grained, angular to subangular, clustered, some scattered black and green (glauconite?) minerals, noncalcareous to slightly calcareous cementing material, limonitic stain; shale, dark-gray (N3), very finely micaceous; sample contains one or two pieces white, amorphous, noncalcareous mineral.
562-570	8	Sandstone 99%, shale 1%: sandstone, white (N9), fine- to medium-grained, angular to subangular, occasional pieces of glauconite (?), very little magnetite (?), limonitic stain; shale, grayish-black (N2), occasional piece mica (muscovite?); sample contains a trace of coal and pyrite.
570-575	5	Sandstone 99%, shale 1%: sandstone, white (N9), very fine to fine-grained, few larger fragments, scattered black and green (glauconite?) minerals, trace magnetite (?), limonitic stain; shale, grayish-black (N2) to dark-gray (N3); sample contains trace of coal, and occasional piece of mica (muscovite?).

Depth (feet)	Thickness (feet)	
575-580	5	Like 570-575.
580-585	5	Like 570-575; sample contains more very fine grained sandstone grading into siltstone.
585-592	7	Sandstone: white to yellowish, fine- to medium-grained, occasional larger fragment of quartz, angular to subangular, free, occasional clusters; sample contains several pieces of coal and a trace of shale, grayish-black (N2).
592-598	6	Sandstone: conglomeratic, white (N9), medium- to very coarse grained, angular, little glauconite (?) present, limonitic stain; sample contains several pieces of coal and an occasional piece of shale, dark-gray (N3).
598-603	5	Sandstone 95%, shale 5%: sandstone, medium- to coarse-grained, large fragments of quartz conglomerate, little silty material, limonitic stain, scattered black minerals, very slightly micaceous, poorly sorted; shale, dark-gray (N3) to grayish-black (N2); sample contains a trace of coal.
603-608	5	Sandstone 75%, shale 25%: like 598-603.
608-615	7	Sandstone 99%, shale 1%: sandstone, argillaceous, white to gray (N8), very fine grained, clustered, scattered black minerals, slightly micaceous, little limonitic stain; shale, medium dark-gray (N4) to dark-gray (N3), some sandy.

Depth (feet)	Thickness (feet)	
615-625	10	Like 608-615.
625-635	10	Shale 99%, sandstone 1%: shale, silty, medium dark-gray (N4), slightly micaceous; sandstone, argillaceous, gray, very fine grained.
635-642	7	Sandstone 60%, shale 40%: sandstone, argillaceous, white to gray, very fine grained, one or two larger fragments (cavings?), slightly micaceous, scattered black mineral, little limonitic stain; shale, medium dark-gray (N4), silty to nonsilty, some pieces very micaceous.
642-647	5	Shale 75%, sandstone 25%: shale, silty, sandy, medium dark-gray (N4), occasional piece not silty, slightly micaceous, little limonitic stain; sandstone, argillaceous, gray, slightly micaceous, very fine grained.
647-657	10	Shale 95%, sandstone 5%: shale, medium dark-gray (N4) to dark-gray (N3), some pieces silty, slightly micaceous; sandstone, argillaceous, very fine grained, few scattered black minerals.
657-667	10	Like 647-657.
667-674	7	Sandstone 50%, shale 50%: sandstone, like 647-657; shale, more silty; sample contains a trace of coal.

	Thickness (feet)	
685	11	Sandstone: light-gray (N7) to some medium dark-gray (N4), very slightly micaceous, very fine grained, clustered, scattered black minerals, slightly calcareous cement; shale, medium dark-gray (N4), slightly micaceous and silty.
685-695	10	Like 674-685; sandstone, argillaceous, darker gray.
695-705	10	Like 674-685; sandstone, noncalcareous.
705-715	10	Like 674-685; sandstone is noncalcareous; shale, very micaceous.
715-724	9	Sandstone: white to few brownish-gray (5YR 4/1), fine- to very fine grained, angular to subangular, black and green (glauconite?) minerals, free and some clustered, few scattered, some pieces argillaceous and micaceous; sample contains an occasional piece medium dark-gray (N4) shale.
724-741	17	No sample.
741-750	9	Shale 60%, sandstone 40%: shale, medium dark-gray (N4) to dark-gray (N3), some silty and slightly micaceous; sandstone, white to gray, fine-grained, some argillaceous, scattered black and few green minerals, little limonitic stain.
750-756	6	Shale 50%, sandstone 50%: like 741-750, except the shale is silty.

Depth
(feet)

Thickness
(feet)

756-764

8

Sandstone 99%, shale 1%: sandstone, white (N9), fine-grained, angular to subangular, scattered black and green minerals, free and clustered, little limonitic stain, few pieces argillaceous; shale, medium dark-gray (N4); sample contains a trace of coal.

764-771

7

Sandstone and shale: sandstone, white (N9) to very light gray (N8), medium- to fine-grained, part very fine grained, free and clustered, some scattered black and green minerals, occasionally slightly calcareous, limonitic stain, occasional piece argillaceous; shale, dark-gray (N3).

771-778

7

Sandstone: white (N9) to very light gray (N8), medium- to fine-grained, little very fine grained, free and clustered, some scattered black and green minerals, slightly calcareous, little limonitic stain, argillaceous; shale, dark-gray (N3).

778-781

3

Like 771-778: sample contains some siltstone and a few more green minerals (glauconite ?).

781-791

10

Siltstone 70%, sandstone 30%: siltstone, very light gray (N8), some clusters, very little limonitic stain; sandstone, white (N9), fine- to

medium-grained, clustered and free, few black
and green minerals; sample contains several
fragments of coal, and an occasional piece of
mica (muscovite).

818

827

836

86-8

Depth (feet)	Thickness (feet)	
791-808	17	Shale: medium dark-gray (N4) to dark-gray (N3), some brownish-gray (5YR 4/1), slightly silty; sandstone, very light gray (N8) to gray, very fine grained, scattered black minerals, trace of limonitic stain; sample contains a coal fragment.
808-818	10	Like 791-808; except there is a very occasional piece of shale, brownish-gray (5YR 4/1); sample contains a trace of pyrite and coal.
818-827	9	Sandstone 85%, shale 15%: sandstone, light-gray (N7), very fine grained, few scattered black minerals, some pieces argillaceous, trace limonitic stain; shale, very slightly micaceous.
827-836	9	Sandstone 65%, shale 35%: sandstone, white to gray, very fine grained, few scattered black minerals, limonitic stain; shale, medium dark-gray (N4), slightly micaceous, some pieces silty; sample contains a trace of coal.
836-846	10	Sandstone 95%, shale 5%: sandstone, very light-gray (N8), fine- to very fine grained, scattered black and green (glauconite?) minerals, limonitic stain; shale, medium dark-gray (N4) to dark-gray (N3), some slightly silty, very slightly micaceous, sample contains a trace of coal.
846-853	7	Like 836-846; sample contains no coal; two or three pieces shale, brownish-gray (5YR 4/1).

Thickness (feet)		
8	853-861	Sandstone: white (N9), fine-grained, few black and green (glauconite?) minerals, mostly free, some clusters, very little limonitic stain.
8	861-869	Like 853-861; sample contains more clusters.
11	869-880	Shale 98%, sandstone 2%: shale, medium dark-gray (N4), finely micaceous, little limonitic stain; sandstone, gray, very fine grained.
10	880-890	Like 869-880; sample contains a trace of very fine grained sandstone.
20	890-920	Like 880-890; no limonitic stain.
10	920-930	Like 880-890.
10	930-940	Like 880-890; little silty material.
10	940-950	Like 930-940.
10	950-960	Like 930-940; piece coal.
9	960-969	Like 930-940; except no sandstone.
6	969-975	Sandstone 95%, shale 5%: sandstone, light-gray (N7), very fine to fine-grained, scattered black and few green (glauconite?) minerals, calcareous cement, some argillaceous; shale, medium dark-gray (N4) to dark-gray (N3); trace coal.
5	975-980	Shale 85%, sandstone 15%: shale, dark-gray (N3) to black (N1); sandstone, very light gray (N8), very fine-grained, free and clustered; trace pyrite, several pieces of coal.

Thickness (feet)		
5	No sample.	
9	Shale 80%, sandstone 20%: shale, medium dark-gray (N4) to dark-gray (N3), few pieces slightly micaceous; sandstone, light-gray (N7), very fine grained, very little limonitic stain; one piece magnetite.	
6	Sandstone 90%, shale 10%: sandstone, very light-gray (N8), very fine-grained, scattered black minerals, clustered, limonitic stain; shale, medium dark-gray (N4), some pieces micaceous.	
10	Like 994-1000; some sandstone free; shale, dark brownish-gray (5YR 3/1).	
10	Like 994-1000, sandstone, more free than clustered; shale, dark-gray (N3) to medium dark-gray (N4).	
10	Sandstone 75%, shale 25%: sandstone, white (N9), very fine grained, few pieces argillaceous, clustered, few black minerals, little limonitic stain; shale, medium dark-gray (N4), some pieces slightly micaceous; sample contains one piece white, amorphous, noncalcareous mineral.	
10	Like 1020-1030.	
10	Sandstone 95%, shale 5%: sandstone, white (N9), fine-grained, free and clustered, one larger quartz fragment, few scattered black mineral, limonitic stain; shale, dark-gray (N3); part of sample with brownish tint and trace of white, amorphous, noncalcareous mineral.	

Thickness (feet)		
1060-1060	10	No sample.
1060-1070	10	Sandstone 99%, shale 1%: sandstone, white to yellow, fine-grained, free, much limonitic stain; shale, dark-gray (N3) to black (N1); sample contains two or three pieces coal and one piece of brownish shale.
1070-1075	5	Sandstone 98%, shale 2%: sandstone, white to yellowish, fine- to medium-grained, much limonitic stain; shale, medium dark-gray (N4) to dark-gray (N3), one or two pieces noncalcareous, white, amorphous material.
1075-1082	7	Sandstone 70%, shale 30%: sandstone, white (N9), fine-grained, scattered black minerals, clustered, few free grains, limonitic stain; shale, dark-gray (N3), few pieces very micaceous.
1082-1090	8	Like 1075-1082; more free sandstone; sample contains occasional green mineral (glauconite?) and two or three larger fragments of quartz.
1090-1100	10	Sandstone 90%, shale 10%: sandstone, white (N9) to light-gray (N7), very fine to fine- to medium-grained, free, some clustered, angular to sub-angular, very occasional green mineral (glauconite?); shale, medium dark-gray (N4), few pieces slightly micaceous.
1100-1110	10	Like 1090-1100; little limonitic stain.

Depth (feet)	Thickness (feet)	
1110-1116	6	Shale 85%, sandstone 15%: shale, medium dark-gray (N4), occasionally slightly micaceous, one piece banded; sandstone, white (N9), fine-grained, free and clustered, one or two pieces shaly, little limonitic stain and one larger fragment of quartz.
1116-1123	7	Like 1110-1116; sample contains no larger fragments of quartz.
1123-1130	7	Sandstone 98%, shale 2%: sandstone, white (N9) to some gray, fine-grained, some scattered black mineral, clustered and free, limonitic stain; shale, dark-gray (N3); sample contains white, noncalcareous, amorphous mineral.
1130-1136	6	Sandstone 98%, shale 2%: sandstone, white (N9) to gray, very fine grained to fine-grained, slightly calcareous, few scattered black minerals, much limonitic stain; shale, medium dark-gray (N4), occasionally very slightly micaceous.
1136-1142	6	Like 1130-1136; sample contains more free sandstone, very slightly calcareous.
1142-1146	4	Like 1130-1136; only very slightly calcareous; sample contains very occasional green mineral (glauconite?).

Depth (feet)	Thickness (feet)	
1146-1151	5	Sandstone 70%, siltstone 30%: sandstone, very fine- to fine-grained, white (N9) to light tan, some limonitic stain, mostly free, few clusters; occasional piece argillaceous siltstone; sample contains a trace of shale, dark-gray (N3).
1157-1161	4	Like 1140-1151.
1160-1170	10	Sandstone 99%, shale 1%: sandstone, conglomeratic, white (N9) to yellowish, fine- to medium- to coarse-grained, free, angular to subangular, limonitic stain, few green minerals (glauconite?); shale, dark-gray (N3).
1170-1180	10	Like 1160-1170; more coarse-grained, more limonitic stain.
1180-1190	10	Like 1160-1170.
1190-1200	10	Like 1160-1170.
1200-1208	8	Like 1160-1170; sandstone, not as coarse-grained.
1208-1216	8	Sandstone: white to yellow, fine-grained, occasional green mineral (glauconite?); sample contains trace of a dark-gray (N3) shale.
1216-1225	9	Like 1208-1216.
1225-1235	10	Like 1208-1216; sample contains larger quartz fragments.
1235-1245	10	Like 1208-1216.
1245-1250	5	Like 1208-1216.
1250-1252	2	No sample.

1252-1260 1260	8	Sandstone; white to yellowish (limonitic stain?), very fine to coarse-grained, angular to sub-angular; sample contains trace of shale, dark-gray (N3).
1260-1266 1300	6	Like 1252-1260.
1266-1273	7	Like 1252-1260.
1273-1281	8	Like 1252-1260; few pieces medium-gray (N5) shale.
1281-1288	7	Siltstone to sandstone 80%, shale 20%: siltstone to sandstone, white to tan, medium-grained, some limonitic staining; shale, medium dark-gray (N4), (cavings?).
1288-1294	6	Like 1281-1288.
1294-1300 1300	6	Sandstone: white to tan, medium- to coarse-grained; sample contains some siltstone and very fine grained sandstone, subrounded to angular, some limonitic stain.
1300-1309	9	Sandstone: white to tan, medium- to coarse-grained with some fine-grained, angular to subangular, some limonitic stain; sample contains a trace of shale, dark-gray (N3), (cavings?).
1309-1319	10	Like 1300-1309.
1319-1326	7	Like 1300-1309.
1326-1334	8	Like 1300-1309.
1334-1340	6	Sandstone: white (N9), coarse-grained to fine- to medium-grained, angular to subangular, some limonitic stain; sample contains a trace of shale, dark-gray (N3), (cavings?).

Depth (feet)	Thickness (feet)	
1340-1347	7	Like 1334-1340.
1347-1353	6	Sandstone 99%, shale 1%: like 1334-1340.
1353-1360	7	Like 1347-1353.
1360-1367	7	Shale 50%, sandstone 50%: shale, medium dark-gray (N4), very slightly micaceous; sandstone, white (N9) to light-gray (N7), fine- to medium-grained, slightly argillaceous; sample contains a few larger pieces of quartz and several pieces of coal.
1367-1375	8	Like 1360-1367; sample contains scattered black minerals.
1375-1380	5	Coal 85%, sandstone 15%: sandstone, light- to medium-gray, very fine-grained.
1380-1388	8	Sandstone 95%, shale 5%: sandstone, light- to medium-gray, very fine grained, very slightly micaceous, scattered black minerals, few larger quartz fragments (cavings?); shale, medium dark-gray (N4); sample contains several pieces of coal.
1388-1396	8	Like 1380-1388.
1396-1405	9	Shale 95%, sandstone 10%: shale, silty, medium dark-gray (N4), finely micaceous; sandstone, light- to medium-gray (N5), very fine-grained, some argillaceous, scattered black minerals.

Depth (feet)	Thickness (feet)	
1405-1414	9	Shale 95%, sandstone to siltstone 5%: shale, medium dark-gray (N4), very slightly micaceous; sandstone to siltstone, light-gray (N7).
1414-1422	8	Like 1405-1414.
1422-1430	8	Shale: medium dark-gray (N4) to medium-gray (N5), very slightly micaceous.
1430-1438	8	Like 1422-1430; sample contains a trace of sandstone, like 1405-1414.
1438-1448	10	Shale 60%, siltstone 40%: shale, medium dark-gray (N4), very slightly micaceous, some silty; siltstone, light-gray (N7) with tannish tint.
1448-1457	9	Shale 50%, siltstone 50%: shale, like 1438-1448; siltstone, very slightly micaceous, few scattered black minerals.
1457-1465	8	Like 1438-1448; some siltstone, shaly.
1465-1472	7	Like 1438-1448; siltstone, light-gray (N7).
1472-1480	8	Sandstone 95%, shale 5%: sandstone, silty, white (N9) to tan, very fine-grained, scattered black minerals, some limonitic stain; shale, medium dark-gray (N4).
1480-1490	10	Sandstone 90%, shale 10%: sandstone, white, with a few pieces of medium light-gray (N6), very fine-grained, very slightly micaceous, scattered black minerals, some limonitic stain; shale, medium dark-gray (N4) to dark-gray (N3), slightly micaceous.

Depth (feet)	Thickness (feet)	
1490-1500	10	Like 1480-1490.
1500-1511	11	Sandstone: white (N9), fine-grained, angular to subangular, scattered black minerals, two or three larger quartz fragments, some limonitic stain; shale, dark-gray (N3), finely micaceous.
1511-1522	11	Like 1500-1511; shale, medium dark-gray (N4) to dark-gray (N3); sample contains none of the larger quartz fragments.
1522-1540	18	Sandstone 99%, shale 1%: sandstone, white (N9), very fine to medium-grained, angular to subangular, limonitic staining; shale, medium dark-gray (N4) to dark-gray (N3); sample contains a few pieces black magnetic mineral (magnetite?).
1522-1532	10	Like 1522-1540.
1540-1550	10	Sandstone 99%, shale 1%: sandstone, white to yellowish tan, very fine to medium-grained, angular to subangular to subrounded, limonitic stain; shale, dark-gray (N3); sample contains trace of black magnetic mineral (magnetite?).
1550-1560	10	Siltstone to sandstone 99%, shale 1%: sandstone, white to tan, fine-grained, limonitic stain; shale, dark-gray (N3); sample contains trace of a black magnetic mineral (magnetite?).
1560-1567	7	Like 1550-1560.

Depth (feet)	Thickness (feet)	
1567-1575	8	Sandstone 99%, shale 1%: sandstone, white to yellowish, fine- to medium-grained, angular to subangular, limonitic stain; shale, medium dark-gray (N4) to dark-gray (N3).
1575-1582	7	Like 1567-1575; sample contains a trace of coal.
1582-1590	8	Sandstone 99%, shale 1%: sandstone, white to tan, medium- to some fine-grained, angular to subangular, limonitic stain; little dark-gray (N3) shale.
<u>Bluestone formation</u> — 360 feet		
1590-1600	10	Shale 99%, sandstone 1%: shale, medium-gray (N5), noncalcareous to slightly calcareous; sandstone, white (N9), fine- to medium-grained.
1600-1610	10	Shale: medium dark-gray (N4) to pale reddish-gray, slightly calcareous; gray shale covered by pale reddish-gray shale, soft, earthy, slightly silty.
1610-1620	10	Like 1600-1610.
1620-1630	10	Like 1610-1620.
1630-1640	10	Shale 97%, sandstone 3%: shale, medium-gray (N5) to medium dark-gray (N4); shale is covered with a silty, calcareous material, white to light-gray (N7); little sandstone, calcareous, white (N9), very fine grained.

Depth (feet)	Thickness (feet)	
1640-1650	10	Like 1630-1640.
1650-1660	10	Shale 80%, sandstone 20%: shale, medium-gray (N5) to medium dark-gray (N4) to grayish-red (10R 4/2); sandstone, white to light-gray (N7) to pinkish; sample contains few grains green, very fine grained.
1660-1670	10	Shale: reddish-gray to medium-gray (N5), few pieces greenish; sandstone, greenish-gray (5G 6/1), very fine grained, few scattered black and dark-green minerals; sample contains a trace of brownish limestone.
1670-1680	10	Sandstone 50%, shale 50%: sandstone, white to greenish-gray (5G 6/1), very fine grained, slightly calcareous, scattered green (glauconite?) and black minerals; shale, reddish-gray to medium dark-gray (N4).
1680-1690	10	Shale 70%, sandstone 30%: shale, medium dark-gray (N4) to reddish-gray to greenish tint, very finely micaceous; sandstone, white to greenish-gray (5G 6/1), very fine-grained, slightly calcareous, scattered green (glauconite?) and black minerals; sample contains a trace of limestone, brownish.
1690-1700	10	Sandstone 80%, shale 20%: like 1670-1680; sandstone, very slightly calcareous; shale, reddish-gray.

Depth (feet)	Thickness (feet)	
1700-1710	10	Sandstone and shale: sandstone, silty, white to light-gray (N7), very fine grained, some with greenish tint, very slightly micaceous, very slightly calcareous; shale, silty, medium dark-gray (N4) to grayish-red (10R 4/2), some limonitic stain.
1710-1720	10	Sandstone to limestone 97%, shale 3%: sandstone, calcareous, white to gray, very fine to fine-grained, few scattered black minerals; limestone, sandy; shale, dark-gray (N3) to reddish-gray; sample contains a trace of pyrite.
1720-1730	10	Sandstone 99%, shale 1%: sandstone, white to light-gray (N6), very fine grained, scattered black minerals, little limonitic stain; shale, medium-gray (N5) to medium dark-gray (N4) to reddish-gray; sample contains a few pieces of limestone and a trace of pyrite.
1730-1740	10	Sandstone 70%, shale 30%: sandstone, white to gray, some argillaceous, slightly calcareous to very slightly micaceous, few scattered black minerals; shale, medium-gray (N5) to medium dark-gray (N4), slightly micaceous.
1740-1750	10	Sandstone 60%, shale 40%: like 1730-1740.

Depth
(feet)

Thickness
(feet)

1750-1760

10

Shale 75%, sandstone 25%: shale, medium dark-gray (N4), very slightly micaceous; sandstone, white to gray, very fine grained, sample contains a few scattered black minerals.

1760-1770

1780-1790

1800-1810

1820-1830

1840-1850

1860-1870

1880-1890

1900-1910

1920-1930

1940-1950

1960-1970

1980-1990

2000-2010

2020-2030

Thickness (feet)		
1760-1770	10	No sample.
1770-1780	10	Shale: medium dark-gray (N4), little silty material, very slightly micaceous.
1780-1810	30	Like 1770-1780; sample interval 10 feet.
1810-1820	10	Like 1770-1780; with very little silty material.
1820-1830	10	Like 1810-1820.
1830-1840	10	No sample.
1840-1850	10	Shale: medium dark-gray (N4), very slightly micaceous, very little silty material.
1850-1860	10	Like 1840-1850.
1860-1870	10	Like 1840-1850.
1870-1880	10	Like 1840-1850; with little silty material.
1880-1890	10	Like 1870-1880; sample contains a trace of coal.
1890-1900	10	Shale 60%, sandstone 40%: shale, medium dark-gray (N4) to dark-gray (N3), very finely micaceous, very slightly calcareous; sandstone, shaly, calcareous, gray, very fine grained, slightly calcareous.
1900-1910	10	Like 1890-1900.
1910-1920	10	Shale 70%, sandstone 30%: shale, medium-gray (N5), very finely micaceous; sandstone, calcareous, light- to medium-gray (N5), fine-grained, slightly micaceous, slightly argillaceous, little limonitic stain.
1920-1930	10	Shale: medium-gray (N5), very finely micaceous.

Depth (feet)	Thickness (feet)	
1930-1940	10	Like 1920-1930; sample containing little silty material.
1940-1950	10	Shale: medium dark-gray (N4), very finely micaceous, little silty material.
1950-1960	10	<u>Princeton sandstone</u> Sandstone 60%, shale 40%: sandstone, calcareous, white to gray, very fine grained, few scattered black minerals, little limonitic stain; shale, medium dark-gray (N4), little silty material.
1960-1970	10	Like 1950-1960; sample contains no silty material.
1970-1980	10	Shale: medium dark-gray (N4), very finely micaceous; sample contains a few pieces of sandstone, like 1950-1960 (cavings?), little silty material.
1980-1990	10	Like 1970-1980; shale, dark-gray (N3).
1990-2000	10	Shale: medium dark-gray (N4) to dark-gray (N3), very slightly micaceous, silty material; sample contains a trace of coal and few pieces of sandstone (cavings?).
2000-2010	10	Like 1990-2000; sample contains no coal.
2010-2020	10	Like 1990-2000; shale, medium dark-gray (N3).
2020-2030	10	Like 2010-2020.
2030-2040	10	Like 2010-2020; sample contains much silty material.
2040-2050	10	Like 2030-2040.
2050-2060	10	Like 2030-2040.

Depth (feet)	Thickness (feet)	
2060-2070	10	Sandstone: shaly, white to gray, very fine to fine-grained, slightly calcareous, few scattered black minerals, slightly micaceous; sample contains little pyrite.
2070-2080 [?]	10	Sandstone 50%, shale 25%, limestone 25%: sandstone, calcareous, very light to medium-gray (N5) to tan, very fine grained, very slightly micaceous; shale, medium dark-gray (N4), very slightly micaceous; limestone, medium brownish-gray (5YR 5/1) to white to gray, crystalline to dense; sample contains a trace of pyrite.
2076-2080	4	Sandstone 98%, shale 2%: sandstone, white to yellowish (limonitic stain), very fine grained, scattered black minerals, slightly calcareous; shale, medium dark-gray (N4); sample contains some pyrite, and black, magnetic mineral (magnetite?).
2080-2084	4	Like 2076-2080.
2084-2089	5	Sandstone: white, very fine grained to siltstone, slightly calcareous, limonitic staining, black magnetic mineral (magnetite?); sample contains a trace of shale, dark-gray (N3).
2089-2093	4	Sandstone: white to yellowish (limonitic staining), very fine to fine-grained, little black magnetic mineral (magnetite?); trace dark-gray (N3) shale; sample also contains a little pyrite.

Depth (feet)	Thickness (feet)	
2093-2096	3	Sandstone 99%, shale 1%: sandstone, white to yellowish (limonitic stain), very fine grained, black magnetic mineral (magnetite?); shale, dark-gray (N3) to grayish-black (N2); sample contains a trace of pyrite.
2096-2100	4	Sandstone: white to yellowish, very fine to fine-grained, much limonitic stain, black magnetic mineral (magnetite?); sample contains a trace of shale, dark-gray (N3) and a trace of pyrite.
2100-2104	4	Sandstone: white, very fine grained, limonitic stain, black magnetic mineral (magnetite?); sample also contains trace of shale, dark-gray (N3).
2104-2109	5	No sample.
2109-2113	4	Like 2100-2104; little siltstone.
2113-2118	5	Like 2100-2104.

Hinton Formation

Hinton formation, Avis limestone member of Reger - 67 feet.

2118-2128	10	Shale 84%, limestone 15%, sandstone 1%: shale, calcareous, medium dark-gray (N5), finely micaceous; limestone, medium dark-gray to tan to white, shaly structure; sandstone, white (N9), fine-grained (cavings?); sample contains a trace of pyrite.
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Depth (feet)	Thickness (feet)	
2128-2140	12	Like 2118-2128.
2140-2155	15	Like 2118-2128; sample contains no pyrite.
2155-2167	12	Like 2118-2128; sample contains no sandstone.
2167-2177	10	Shale: calcareous, medium dark-gray (N4) to medium light-gray (N6), very finely micaceous.
2177-2185	8	Like 2167-2177; sample contains several pieces shaly limestone.
221		
222		<u>Hinton formation 'undivided' — 227 feet</u>
2185-2195	10	Shale 67%, sandstone 30%, limestone 3%: shale, medium dark-gray to greenish tint; sandstone, gray to greenish tint, very fine grained, scattered black and few dark-green (glauconite?) minerals; limestone, gray to white, shaly structure; sample contains one piece gypsum.
22		
22		
2195-2202	7	Sandstone 69%, shale 30%, limestone 1%: sandstone, white to gray, very fine grained, two or three larger quartz fragments; shale, medium dark-gray (N4) to reddish brown-gray, very finely micaceous; little limestone, gray to brownish-gray (5YR 4/1) and few pieces black magnetic mineral (magnetite?).
2202-2207	5	Sandstone 90%, shale 10%: sandstone, white to brownish-gray (5YR 4/1), very fine grained, slightly shaly, few scattered black minerals, some limonitic stain; shale, medium dark-gray to brownish-gray to green tint; sample contains a trace of limestone, brownish-gray (5YR 4/1).

Depth (feet)	Thickness (feet)	
207-2212	5	Like 2202-2207; sample contain less shale and no limestone.
212-2218	6	Sandstone: white to very light gray (N7), very fine grained, few scattered black minerals, some limonitic stain; sample contains a trace of limestone, gray.
218-2228	10	Like 2212-2218; sample contains no limestone.
228-2235	7	Sandstone: white, fine-to medium-grained, sub-angular to angular, some pieces calcareous, few scattered black minerals, some limonitic stain; shale, medium-gray (N5) to medium dark-gray (N4), very finely micaceous.
2235-2245	10	Like 2228-2235; sample contains a trace of shale.
2245-2253	8	Like 2228-2235.
2253-2262	9	Like 2228-2235; sample contains a trace of shale.
2262-2274	12	Sandstone 65%, shale 35%: sandstone, like 2228-2235, calcareous, medium dark-gray (N4), some pieces noncalcareous.
2274-2285	11	Like 2262-2274.
2285-2295	10	Shale 85%, sandstone 15%: shale, grayish-red (10R 4/2) to medium-gray (N5) to medium dark-gray (N4), very finely micaceous, some shale slightly calcareous; sandstone to brownish, fine-grained, slightly calcareous; sample contains a few pieces of limestone.

Depth (feet)	Thickness (feet)	
2295-2305	10	Like 2285-2295:
2305-2314	9	Shale: medium dark-gray (N4), covered by much pale red silty material, very slightly micaceous, some pieces calcareous.
2314-2324	10	Shale: reddish-gray to medium dark-gray (N4), little pale red (5R 6/2) silty material, very slightly micaceous, few pieces very slightly calcareous; sample contains a trace of limestone.
2324-2334	10	Like 2314-2324; more silty material, slightly calcareous; shale, slightly calcareous; sample contains more limestone.
2334-2344	10	Shale 85%, sandstone 15%: shale: grayish-red (5R 4/2) to medium-gray (N5) to medium dark-gray (N4), some pieces slightly calcareous, very micaceous to nonmicaceous; sandstone, calcareous, micaceous, argillaceous, pale reddish-gray to gray, very fine grained; sample contains little limestone, sandy.
2344-2350	6	Shale 95%, limestone 5%: shale, medium dark-gray (N4) to grayish-red (5R 4/2), some slightly calcareous, silty material, tan, nonmicaceous to finely micaceous; limestone, gray to reddish-gray, some silty.

Depth (feet)	Thickness (feet)	
2350-2359	9	Shale 60%, sandstone 40%: shale, medium dark-gray (N4), few pieces reddish, some silty, finely micaceous; sandstone, white to gray, very fine grained to siltstone, slightly calcareous, few scattered black minerals; sample contains some tan, shaly, silty material.
2359-2370	11	Shale 80%, sandstone 20%: shale, medium dark-gray (N4) to dark-gray (N3) to reddish-gray, few pieces finely micaceous; sandstone, white to gray, very fine grained, some very shaly, calcareous to very slightly calcareous.
2370-2380	10	Shale: medium dark-gray-(N4), several pieces with reddish tint, very slightly calcareous; little tan silty material; sample contains a few pieces gritty limestone.
2380-2392	12	Shale 99%, limestone 1%: shale, medium dark-gray (N4) to grayish-red (5R 4/2); the red shale is calcareous and the gray shale is very slightly to noncalcareous, very finely micaceous; limestone, tan to gray, gritty.
2392-2402	10	Shale 99%, sandstone 1%: shale, medium dark-gray (N4) to grayish-red (5R 4/2) to medium-gray (N5), noncalcareous to some calcareous, very slightly micaceous; sandstone, white to gray, very fine grained, some very calcareous, some argillaceous; sample contains a trace of limestone, some limonitic stain, and a little tan silty material.

Depth (feet)	Thickness (feet)	
2402-2412	10	Shale 97%, sandstone 3%: shale, medium dark-gray (N4) to dark-gray (N3) to reddish-gray, few pieces with greenish tint, calcareous to noncalcareous; sandstone, white to gray, very fine grained to silty, very calcareous; sample contains a few pieces of limestone.
2412 Hinton formation (Stony Gap sandstone member) - 209 feet		
2412-2423	11	Sandstone 85%, shale 15%: sandstone, white to gray, very fine grained, angular, scattered black minerals, free, some pieces argillaceous; shale, medium dark-gray to reddish-gray, very slightly micaceous.
2423-2435	12	Like 2412-2423.
2435-2442	7	Sandstone 80%, shale 20%: sandstone, white to few light-gray, very fine grained, angular, free and in clusters, few scattered black minerals, some pieces calcareous, limonitic stain; shale, medium dark-gray (N4) to grayish-red (5R 4/2), some pieces slightly calcareous and some pieces finely micaceous.
2442-2450	8	Sandstone 97%, shale 3%: sandstone, white (N9), very fine grained, angular to subangular, free, few clusters, limonitic stain; shale, medium dark-gray (N4) to dark-gray (N3) to reddish-gray.

Depth (feet)	Thickness (feet)	
2450-2463	13	Shale 60%, sandstone 40%: shale, medium dark-gray (N4), few pieces grayish-red (5R 4/2), slightly calcareous to calcareous; sandstone, white, very fine-grained, free and clustered, slightly calcareous, few scattered black minerals, very little limonitic stain.
2463-2473	10	Shale 99%, sandstone 1%: shale, medium-gray (N5), some with reddish tint, some pieces sandy, very slightly micaceous; sandstone, white to gray, very fine grained.
2473-2480	7	Shale: medium-gray (N5); sample contains one piece of sandstone, greenish-gray (5GY 4/1), very fine-grained, one piece conglomeratic (?) with soft, calcareous cementing material.
2480-2490	10	Shale: medium-gray (N5) to reddish-gray; sample contains one piece white, very fine-grained sandstone with scattered black minerals and little tan, silty material.
2490-2500	10	Shale: medium-gray (N5), few pieces reddish-gray shale, little tan silty material.
2500-2512	12	Like 2490-2500.
2512-2520	8	Shale 97%, sandstone 3%: shale, medium dark-gray to reddish-gray; sandstone, white, very fine grained. very few scattered black minerals; sample contains a trace of coal and pyrite.

Depth (feet)	Thickness (feet)	
2520-2530	10	Shale 90%, sandstone 10%: like 2512-2520.
2530-2535	5	No sample.
2535-2537	2	Like 2512-2520; sample contains one piece of sandstone, conglomeratic(?) with soft calcareous cement.
2537-2540	3	Sandstone 60%, shale 40%: sandstone, white, very fine grained, angular to subangular, free, some limonitic stain; shale, medium dark-gray (N4) to grayish-red (5R 4/2); sample contains trace of pyrite.
2540-2545	5	Like 2537-2540.
2545-2548	3	Sandstone 85%, shale 15%: sandstone, white to tan to yellow, very fine grained to silty, very large amount of limonitic stain, free, few pieces slightly calcareous; shale, medium dark-gray (N4) to some grayish-red (5R 4/2); some sandstone and shale cemented together by light-gray, soft, calcareous material.
2548-2550	2	Sandstone 75%, shale 25%: sandstone, white, very fine grained to siltstone, much limonitic staining, free, occasional piece calcareous; shale, medium dark-gray (N4) to grayish-black (N2), few pieces reddish-gray, a few pieces slightly calcareous; sample contains a trace of limestone, coal, and magnetite (?) with a few pieces noncalcareous, white, amorphous mineral.

Depth (feet)	Thickness (feet)	
2550-2552	2	Like 2548-2550; shale, medium dark-gray (N4) to dark-gray (N3) and reddish-gray; sample contains no coal, no limestone, with a trace of pyrite.
2552-2558	6	Shale 95%, sandstone 5%: shale, medium dark-gray (N4), occasional piece reddish-gray; sandstone, white, very fine grained, few pieces very slightly calcareous, some limonitic stain; sample contains a trace of white chert and several pieces of pyrite, one or two of which are disseminated in the shale.
2558-2568	10	Sandstone 90%, shale 10%: sandstone, white, very fine grained, free, few clusters, some limonitic stain, occasional piece calcareous; shale, medium dark-gray (N4) to grayish-red (10R 4/2).
2568-2576	8	Sandstone 90%, shale 5%: like 2558-2568.
2576-2580	4	Sandstone 97%, shale 3%: sandstone, white to yellowish, very fine-grained, much limonitic stain, free, few clusters (some cemented with limonite); shale, medium dark-gray (N4) to reddish-gray; sample contains a trace of magnetite(?).
2580-2581	1	No sample.
2581-2585	4	Sandstone 97%, shale 3%: sandstone, white to yellowish, very fine grained, limonitic stain, free; shale, medium dark-gray (N4) to grayish-black (N2).

Depth (feet)	Thickness (feet)	
2585-2600	5	Like 2581-2585; sample contains a few pieces of limestone, gray, sandy; also a trace of chert.
2600-2608	8	Sandstone 99%, shale 10%: sandstone, white to yellowish, very fine grained, limonitic stain, free and clusters; shale, medium dark-gray (N4); sample contains one or two pieces of white amorphous mineral.
2608-2618	10	Like 2600-2608.
2618-2619	1	Sandstone 80%, shale 20%: sandstone, white to some yellowish, very fine to fine-grained, limonitic stain, occasional piece calcareous, mostly free; shale, medium dark-gray (N4) to dark-gray (N3), occasional red piece, calcareous to noncalcareous; sample contains one pink mineral and a trace of coal.
2619-2621	2	Like 2618-2619; sandstone is more calcareous; sample contains no pink mineral and no coal.
<u>Bluefield shale</u> — 519 feet		
2621-2630	9	Shale 85%, sandstone 15%: shale, medium dark-gray (N4) to dark-gray (N3), very calcareous to noncalcareous; sandstone, white (N9), very fine to fine-grained, noncalcareous to calcareous, little limonitic stain; sample contains a trace of pyrite.

Depth (feet)	Thickness (feet)	
2630-2635	5	Like 2621-2630; sandstone, grades from calcareous shale to shaly limestone, slightly dolomitic.
2635-2640	5	Shale: medium dark-gray (N4) to reddish-gray few pieces slightly calcareous, slightly micaceous, some pieces silty; sample contains two or three pieces tan chert.
2640-2650	10	Like 2635-2640; sample contains one to two pieces yellowish-brown rotten chert (?), silty.
2650-2658	8	Shale: grayish-red (5R 4/2) to medium-gray (N5) with a slightly greenish tint, little silty, some pieces slightly micaceous, few pieces slightly calcareous.
2658-2665	7	Like 2650-2658.
2665-2670	5	Shale 97%, limestone 3%: shale, medium-gray to grayish-red, noncalcareous to calcareous; lime- stone, dolomitic, gray to light-gray (N7), shaly structure.
2670-2680	10	Like 2665-2670; limestone, nondolomitic.
2680-2690	10	Shale: medium-gray (N4) to grayish-red (5R 4/2), noncalcareous to calcareous, slightly micaceous; sample contains a few pieces of dolomite, gray, shaly structure.
2690-2700	10	Shale: medium-gray (N5), one piece with little banding of lighter shale.

Depth (feet)	Thickness (feet)	
2700-2710	10	Shale: medium-gray (N5) to medium dark-gray (N4), some pieces slightly silty and very slightly micaceous.
2710-2720	10	Like 2700-2710; with few pieces reddish-gray shale (cavings?).
2720-2735	15	Sandstone 60%, shale 40%: sandstone, white to gray, very fine grained, few scattered black minerals, some pieces argillaceous, noncalcareous to calcareous; shale, medium dark-gray (N4), one or two pieces reddish-gray; one or two pieces limonite (?); sample contains a trace of pyrite.
2735-2750	15	Shale: dark-gray (N3) to medium dark-gray (N4), noncalcareous to calcareous, occasional piece reddish-gray; sandstone, white to gray, very fine grained, very slightly to slightly calcareous; sample contains a few pieces limestone, dark-gray (N3) to white (N9), shaly structure, very little limonitic stain.
2750-2765	15	Shale 99%, sandstone 1%: shale, dark-gray (N3) to medium dark-gray (N4), noncalcareous to calcareous to little shaly limestone, occasional piece reddish-gray; sandstone, calcareous, white to gray, very fine grained, little limonitic stain.

Depth (feet)	Thickness (feet)	
2765-2785	20	Like 2750-2765; sample contains a piece of limonite (?).
2785-2795	10	Like 2750-2765; sample contains no sandstone.
2795-2805	10	Shale 97%, sandstone to siltstone 2%, limestone 1%: shale, medium dark-gray (N4), noncalcareous to calcareous, some silty; sandstone to siltstone, argillaceous, calcareous, gray; limestone, gray, shaly structure.
2805-2817	12	Sandstone 60%, shale 40%: sandstone, argillaceous, white to gray, very fine grained, clustered and free, slightly calcareous; shale, dark-gray (N3) to some medium dark-gray (N4), noncalcareous to slightly calcareous; sample contains few pieces limestone and trace pyrite.
2817-2832	15	Like 2805-2817.
2832-2844	12	Siltstone to sandstone 75%, shale 25%: shale, medium dark-gray (N4); siltstone to sandstone, medium dark-gray (N4) to light-gray (N7), very argillaceous, some pieces very slightly calcareous.
2844-2855	11	Sandstone 70%, shale 30%: sandstone, white to gray, very fine grained, clustered, few scattered black minerals, few pieces very slightly calcareous, little limonitic stain; shale, medium dark-gray (N4) to dark-gray (N3), some slightly silty, some pieces finely micaceous; sample contains a trace of pyrite.

Depth (feet)	Thickness (feet)	
2855-2865	10	Like 2844-2855; sample contains more free sandstone, but no dark-gray (N3) shale.
2865-2875	10	Sandstone 85%, shale 15%: sandstone, white to gray, very fine grained to siltstone, noncalcareous, few scattered black minerals, some shaly; shale, medium dark-gray (N4) to dark-gray (N3), few pieces micaceous; little limonitic stain.
2875-2885	10	Shale 75%, sandstone 25%: shale, medium dark-gray (N4) to dark-gray (N3), occasional piece very finely micaceous; sandstone, white to gray, free and clustered, some argillaceous, occasional piece calcareous, little limonitic stain; sample contains a trace of pyrite.
2885-2900	5	Shale: medium dark-gray (N4); sample contains some soft, light-gray (N7), slightly calcareous silty material.
2900-2912	12	Shale 60%, limestone 40%: shale, medium dark-gray (N4) to little white (N9), shaly structure, one or two crinoid stems noted; sample contains a trace of pyrite.
2912-2925	13	Like 2900-2912; sample contains no pyrite.
2925-2927	2	Like 2900-2912.
2927-2939	12	Like 2900-2912.
2939-2950	11	Like 2900-2912.

Depth (feet)	Thickness (feet)	
2950-2958	8	Shale 70%, limestone 30%: like 2900-2912.
2958-2968	10	Like 2950-2958.
2968-2977	9	Like 2950-2958.
2977-2990	13	Shale 50%, limestone 50%: shale, dark-gray (N3), noncalcareous to slightly calcareous; limestone, argillaceous, white to gray to brownish-gray (5YR 4/1), very oolitic.
2990-3000	10	Like 2977-2990, limestone more argillaceous.
3000-3007	7	Limestone 60%, shale 40%: like 2977-2990.
3007-3014	7	Dolomite 65%, shale 30%, limestone 5%: dolomite, medium-gray (N5) to light-gray (N7), very finely crystalline, shaly structure; shale, medium dark- gray (N4), noncalcareous to calcareous; limestone, gray to white, shows shaly structure.
3014-3026	12	Shale 85%, limestone 15%: shale, medium dark- gray, noncalcareous to calcareous, several pieces brownish shale; limestone, gray to white, shows shaly structure.
3026-3040	14	Shale: medium dark-gray (N4), very calcareous.
3040-3050	10	Like 3026-3040; very calcareous; with part only slightly calcareous and trace fossil.
3050-3060	10	Like 3026-3040.
3060-3072	12	Limestone 80%, shale 20%: limestone, argillaceous, gray to white, crystalline, moderately oolitic; shale, dark-gray (N3) to medium dark-gray (N4), noncalcareous to slightly calcareous.

Depth (feet)	Thickness (feet)	
3072-3081	9	Like 3060-3072.
3081-3093	12	Limestone 90%, shale 10%: like 3060-3072.
3093-3104	11	Limestone 95%, shale 5%: Like 3060-3072; except no dark-gray shale.
3104-3114	10	Like 3060-3072.
3114-3125	11	Like 3060-3072.
3125-3140	15	Shale 98%, limestone 2%: shale, dark-gray (N4) to medium dark-gray (N3), very calcareous; <u>Greenbrier limestone</u> — 341 feet —
3140-3155	15	Limestone 80%, shale 20%: limestone, argillaceous, dark-gray (N3) to white (N9), crystalline, partly oolitic, sample contains few calcite crystals; shale, calcareous, dark-gray (N3), few pieces noncalcareous..
3155-3168	13	Like 3140-3155.
3168-3178	10	Like 3140-3155
3178-3185	7	Like 3140-3155.
3185-3190	5	Limestone 99%, shale 1%: limestone, medium-gray (N5) to white, finely crystalline to dense, slightly oolitic, shaly structure; shale, medium- gray (N5).
3190-3200	10	Like 3185-3190; few pieces dolomitic.
3200-3212	12	Limestone: medium-gray (N5) to white (N9), some with brownish tint, dense to some crystalline; several pieces white, earthy-looking, hard.

Depth (feet)	Thickness (feet)	
3212-3225	13	Limestone 99%, shale 1%: limestone, brownish-gray (5YR 4/1), to white (N9), dense, some very finely crystalline; sample contains few pieces shale, medium dark-gray (N4).
3225-3236	11	Like 3212-3225.
3236-3247	11	Like 3212-3225.
3247-3262	15	Limestone 99%, shale 1%: limestone, gray to white to little brownish-gray (5YR 4/1), crystalline, some sense, occasionally oolitic, little white, silty material over sample with one or two calcite crystals; shale, medium dark-gray (N4); sample contains trace of pyrite.
3262-3270	8	Like 3247-3262.
3270-3280	10	Limestone: medium dark-gray (N4) to some white (N9), very shaly, several calcite crystals; some shale, medium dark-gray (N4), very calcareous with one or two pieces reddish-gray shale.
3280-3290	10	Like 3270-3280; sample contains no red shale.
3290-3300	10	Like 3270-3280 with occasional piece of shale, very slightly calcareous.
3300-3312	12	Limestone: medium dark-gray (N4) to white (N9); gray is argillaceous with very oolitic zones and one or two calcite crystals.

Depth (feet)	Thickness (feet)	
3312-3322	10	Limestone: brownish-gray (5YR 4/1) to white to little gray, very finely crystalline to dense, occasional piece oolitic (cavings?); few pieces are shaly.
3322-3330	8	Like 3312-3322, nonoolitic; sample contains several calcite crystals.
3330-3338	8	Limestone 99%, shale 1%: limestone, brownish-gray (5YR 4/1) to white to gray, very finely crystalline to dense, slightly oolitic; few pieces shale, medium dark-gray (N4), slightly calcareous.
3338-3348	10	Like 3330-3338; sample contains several calcite crystals.
3348-3357	9	Limestone 99%, shale 1%: limestone, brownish-gray (5YR 4/1), very finely crystalline to dense, some pieces oolitic, one or two crinoid stems; shale, medium-gray (N5) to medium dark-gray (N4), very slightly calcareous; sample contains a trace of pyrite.
3357-3363	6	Limestone 99%, shale 1%: limestone, white to light brownish-gray (5YR 6/1), some dense to very finely crystalline, moderately oolitic; shale, medium dark-gray (N4).
3363-3371	8	Like 3357-3363.

Depth (feet)	Thickness (feet)	
3371-3380	9	Like 3357-3363; sample contains a trace of pyrite.
3380-3395	15	Limestone: white (N9) to light brownish-gray (5YR 6/1), few fine to medium crystals, medium crystalline.
3395-3410	15	Like 3380-3395.
3410-3425	15	Like 3380-3395, very oolitic.
3425-3440	15	Like 3380-3395.
3440-3455	15	Limestone: like 3380-3395 to light brownish- gray (5YR 6/1), coarsely crystalline, nodular.
3455-3467	12	Limestone: white to light brownish-gray (5YR 6/1), like 3380-3395; sample contains little pyrite.
3467-3472	5	Like 3380-3395.
3472-3481	9	Limestone: very light-gray (N8) to medium-gray (N5), finely crystalline to medium crystalline, oolitic.
<u>Maccrady shale</u> - 147 feet		
3481-3490	9	Limestone: dolomitic, light-gray (N7) to brownish-gray (5YR 4/1), medium crystalline.
3490-3500	10	No sample.
3500-3510	10	Limestone: light olive gray (5Y 6/1), very silty with little siltstone, grayish-red (10R 4/2), slightly calcareous.
<u>Maccrady shale</u>		
3510-3518	8	Siltstone: calcareous, medium-gray (N5), some with slightly reddish tint; and limestone, light- gray (N7), medium crystalline, nodular.

Depth (feet)	Thickness (feet)	
3518-3528	10	Like 3510-3518.
3528-3535	7	Siltstone: micaceous, medium dark-gray (N4), slightly calcareous; sample contains a little shale, dark-gray (N3), carbonaceous (?).
3535-3545	10	Siltstone: micaceous, grayish-red (10R 4/2).
3545-3554	9	Like 3535-3545; and siltstone, sandy, medium-gray (N5), with abundant green mineral, probably chlorite.
3554-3560	6	Siltstone: grayish-red, like 3535-3545.
3560-3567	7	Like 3535-3545.
3567-3574	7	Siltstone: like 3535-3545.
3574-3582	8	Siltstone: micaceous, like 3535-3545, and medium-gray (N5), slightly micaceous.
3582-3589	7	Siltstone, sandy, micaceous, greenish-gray (5GY 6/1); and siltstone, micaceous, sandy, grayish-red (5R 4/1), noncalcareous.
3589-3596	7	Like 3582-3589.
3596-3605	9	Siltstone 50%, shale 50%: like 3582-3589; and shale, silty, medium dark-gray (N4).
3605-3611	6	Siltstone to very fine sandstone: micaceous, greenish-gray (5GY 6/1), subangular grains, very slightly calcareous, little green mineral, probably chlorite and little black mineral.

Depth (feet)	Thickness (feet)	
3611-3618	7	Like 3605-3611.
3618-3628	10	Siltstone: micaceous, medium dark-gray (N4) to light-gray (N7); with some sandstone, pale yellowish-brown (10YR 6/2), very fine-grained to fine-grained, angular to subangular, very friable.
		<u>Price sandstone</u> reservoir formation
3628-3636	8	Sandstone and siltstone: like 3618-3628.
3636-3644	8	Sandstone: medium-gray (N5), very silty, very fine grained to medium-grained, angular to subangular, abundant black mineral; and siltstone, micaceous, shaly, medium dark-gray (N4).
3644-3654	10	Like 3630-3644; sandstone, pale yellowish-brown (10YR 6/2), like 3628-3630.
3654-3660	6	Siltstone: micaceous, medium dark-gray (N4); and siltstone, micaceous, medium light-gray (N6), thin-bedded.
3660-3670	10	Siltstone: medium dark-gray (N4), like 3654-3660.
3670-3680	10	Like 3654-3660.
3680-3685	5	Like 3654-3660.
3685-3690	5	Like 3654-3660.
3690-3700	10	Sandstone: silty, medium dark-gray (N4) to medium light-gray (N6), very fine grained to medium-grained, angular to subrounded, slightly calcareous; sample contains little pyrite and few rounded, frosted, medium quartz grains.

Depth
(feet)

Thickness
(feet)

3700-3710

10

Sandstone: like 3690-3700.

3710-3718

8

Sandstone: pale yellowish-brown (10YR 6/2),

very fine grained to fine-grained, angular,

slightly calcareous; sample contains pyrite

and few frosted quartz grains.

3718-3725

7

Like 3710-3718.

Anten

Anten

Anten

Anten

Anten

Anten

Anten

Anten

✓

Summary of A. L. Powers No. 1 Well 34

	Depth (feet)	Thickness (feet)
Norton formation	121 - 528	407 +
Lee formation	528-1590	1062 <i>3</i>
Bluestone formation	1590-1950	360
Princeton sandstone	1950-2118	168
Hinton formation		
Avis limestone member of Reger	2118-2185	67
Hinton formation undivided	2185-2412	227
Stony Gap sandstone member	2412-2621	209
Bluefield shale	2621-3140	519
Greenbrier limestone	3140- 3510	370
Maccrady shale	3510 -3628	118
Price sandstone	3628-3725	97 +

100-4492

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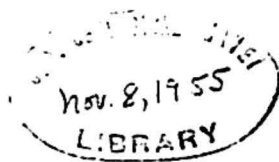
W. E. Wrather, Director

Detailed logs of 28 wildcat wells in... Virginia

Sample Record of the R. J. Carlson No. 1 well, Buchanan County,
Virginia

by

Elois T. Jacobsen, P. T. Stafford and Mary Beth McFarlan



Prepared in Cooperation with the Division of Geology of
the Virginia Department of Conservation and Development

OPEN FILE

This report is preliminary and has not
been edited or reviewed for conformity
with U. S. Geological Survey standards
and nomenclature.

Sample Record of the R. J. Carlson No. 1 well, Buchanan County,
Virginia

by

Eloise T. Jacobsen, P. T. Stafford and Mary Beth McFarlan

The R. J. Carlson No. 1 well, was drilled on the north side of
the Keen Mountain field. It was completed in 1949 as a gas well pro-
ducing from the Greenbrier limestone. The Pipeline Construction and
Drilling Company kindly made the samples of this well available for
description and publication. It started in the Pennsylvanian Norton
formation and stopped in the Mississippian Price sandstone at a depth
of 4,731 feet. The method of sample examination used in the study of
this well and the reasons for the correlations here given are explained
in ^{U.S.} ~~Virginia~~ Geological Survey Bulletin No. 1027, (in preparation).

R. J. CARLSON NO. 1 WELL

Green Mountain Field, Buchanan County, Virginia.

Pipe Line Construction and Drilling Company.

Located 0.67 miles W. of 81°55' and 5.59 miles S. of 37°20', Jaeger Quadrangle, Garden District; 600 ft NW of Spruce Branch of Dismal River.

Elevation, 2122.62 ft

Total depth, 4731 ft; cable tools.

Drilling commenced June 10, 1948; completed February 23, 1949.

Production: 400 MCF.

Gas shows at 1228-1233, 1900-1905, 3176-3176, 3833-3835 ft

Gas pay at 4040-4044 ft

Coal 1065-1074, 1176-1196, 1202-1212, 1735-1750, 1911-1920, 2323-2330 ft

Samples examined by Eloise T. Jacobsen, 638-1065 ft, March 1950; and 2735-4712 ft; by P. T. Stafford, 1055-1771 ft, April 1949; by Mary Beth McFarlan, 1771-2735 ft, June 1949.

Sample Library Reference: Kentucky Geological Survey and Virginia Geological Survey.

Depth (feet)	Thickness (feet)
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Norton formation

638-650	12	Sandstone 50%, shale 50%: sandstone, micaceous, light-gray (N7), very fine grained (almost a siltstone), subangular to subrounded, poorly sorted, slightly calcareous, about 80% quartz,
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dark-gray and brownish-gray grains present;

shale, silty, medium dark-gray (N4), slightly
micaceous.

h
(et)
h
(et)

Thickness
(feet)

60-657
61-680

7

Shale: mainly medium dark-gray (N4), slightly silty, finely micaceous; but including a little grayish-black (N2), very carbonaceous shale; coal; and a slight trace of pyrite.

57-665
7-0-1

8

No sample.

4-702

02-700

09-01

717-

725-

73-

747

75-

76-

Depth (feet)	Thickness (feet)	
665-673	8	Shale: silty to slightly silty, medium-gray (N5), micaceous to very slightly micaceous.
673-680	7	Shale: medium-gray (N5), very finely micaceous, slightly to very slightly silty.
680-687	7	Shale: mainly medium-gray (N5), slightly micaceous, slightly silty; but including very silty, medium light-gray (N6), very slightly calcareous to calcareous shale.
687-694	7	Shale: medium-gray (N5), slightly silty; and little very carbonaceous shale.
694-702	8	Shale: medium-gray (N5), slightly silty to non-silty, slightly micaceous; containing about 20% shale, very silty, medium light-gray (N6), slightly calcareous, with a trace of mica.
702-709	7	Shale 70%, sandstone 30%: shale, medium-gray (N5), slightly resinous luster; sandstone, argillaceous and silty, medium light-gray (N6), very fine grained, subangular to subrounded, very poorly sorted, about 70% quartz, with a few dark grains, clay and silt cement.
709-717	8	Sandstone 50%, shale 50%: sandstone, very shaly, like 702-709; shale, very carbonaceous to slightly carbonaceous, dark-gray (N3), trace plant fossil; contains trace of coal.
717-725	8	Shale: medium-gray (N5), slightly silty to part very silty, slightly micaceous.
725-735	10	Shale: medium-gray (N5), slightly silty to non-silty; contains a slight trace of very finely micaceous material.
735-747	12	Shale: silty to very silty, micaceous, medium-gray (N5), very slightly to slightly calcareous; contains trace of blocky coal.
747-757	10	Shale 80%, siltstone 20%: shale, like 735-747; siltstone, shaly, calcareous, medium light-gray (N6); sample lacks coal.
757-768	11	Like 747-757.
768-777	9	Shale: medium-gray (N5), slightly silty, finely micaceous, and very slightly calcareous.

Depth (feet)	Thickness (feet)	
777-785	8	Shale: like 768-777, non-silty to slightly silty.
785-795	10	Shale: medium-gray (N5), silty to slightly silty, very slightly calcareous, finely micaceous.
795-803	8	Shale: medium dark-gray (N4), non-silty to slightly silty, slightly fissile, trace very finely micaceous material; part medium-gray (N5), slightly calcareous to calcareous.
803-808	5	Shale: medium-gray (N5), very slightly calcareous, slightly fissile, trace very finely micaceous material.
810		<u>Lee formation</u> -- 1374 feet
808-816	8	Sandstone: micaceous, silty, light-gray (N7), very slightly calcareous, fine-grained, angular to subangular, very poorly sorted, grains ranging from very fine to medium-grained, about 70% quartz, and 30% dark, black, and green minerals, mica (muscovite, some chlorite, and phlogopite (?), and silt cement, moderately well cemented. Sample composed of loose grains and a few aggregates.
816-825	9	Like 808-816, predominantly loose grains.
825-831	6	Like 808-816, very fine grained, and more green grains.
831-838	7	Like 808-816, very fine to fine-grained.
838-844	6	Like 808-816, fine-grained, predominantly chips.
844-850	6	Like 808-816, some chert, and small fine-grained pebbles.
850-857	7	Like 808-816, loose grains.
857-872	15	Like 808-816, extremely poorly sorted, with grains ranging from very fine to coarse-grained.
872-881	9	No sample.
881-887	6	Sandstone: micaceous, medium brownish-gray (5YR 5/1), very fine grained, subangular to subrounded, poorly sorted, about 60% quartz, and 40% mica, dark-gray, brown, and some green mineral, silt and clay cement,

moderately well cemented; some brownish-gray
siltstone, micaceous, very well cemented.

Depth (feet)	Thickness (feet)	
887-894	7	Sandstone: light-gray (N7), fine-grained, angular to subangular, very poorly sorted, very fine to medium-grained, about 75% quartz, dark and some green grains, much silt cement, and moderately well cemented, many loose grains; some shale, very silty, micaceous, medium-gray (N5).
894-900	6	Siltstone: micaceous, medium light-gray (N6), very coarse grained, subrounded, poorly sorted, dark-gray grains; shale, medium dark-gray (N4), very slightly silty to nonsilty, slightly micaceous.
900-905	5	Shale: medium dark-gray (N4), very finely micaceous, very slightly fissile.
905-916	11	Like 900-905.
916-923	7	Like 900-905.
923-943	20	Like 900-905.
943-957	14	Like 900-905.
957-969	12	Shale: about 60% like 900-905; shale, very silty, medium light-gray (N6).
969-981	12	Shale: medium-gray (N5), nonsilty to slightly silty, very finely micaceous; little very silty shale, like 957-969.
981-994	13	Like 969-981.

Depth (feet)	Thickness (feet)	
94-1007	14-13	Siltstone 50%, shale 50%: siltstone, micaceous, calcareous to very slightly calcareous, medium light-gray (N6), shaly, coarse-grained, poorly sorted, some dark grains; shale, micaceous, very silty to nonsilty, medium dark-gray (N4).
1007-1021	14	Shale: medium dark-gray (N4), trace very finely micaceous material.
1021-1035	14	Like 1007-1021; little siltstone, light-gray (N7), slightly micaceous, very coarse grained, sub-rounded, moderately well sorted; contains dark-gray (N3) grains.

Depth (feet)	Thickness (feet)	
1035-1049	14	Shale: medium dark-gray (N4), very slightly fissile; contains trace very finely micaceous material.
1049-1055	6	Sandstone: calcareous to slightly calcareous, micaceous, light brownish-gray to light-gray (5YR 6/1 to N7), very fine grained (approaching siltstone), grains subangular, poorly sorted, about 70% quartz, with dark-gray, brownish-gray, and few green grains, much silt and clay cement; moderately well cemented to well cemented.
1055-1065	10	Siltstone 50%, sandstone 40%, shale 10%: siltstone, shaly, very micaceous, medium dark-gray (N4), containing other black minerals; sandstone, silty, micaceous, light-gray (N7), very fine grained, subangular to angular, poorly sorted, containing numerous green and black minerals; shale, very micaceous, medium dark-gray (N4).
1065-1074	9	Coal 40%, shale 30%, siltstone 20%, sandstone 10%: shale, like 1055-1065; siltstone, like 1055-1065; sandstone, like 1055-1065; one piece shale, brownish-gray (5YR 4/1).
1074-1082	8	Sandstone 85%, shale 10%, siltstone 5%: sandstone, light-gray (N7), very fine to fine-grained, angular, poorly sorted, slightly calcareous, micaceous, numerous black and green minerals (chlorite, hornblende?); shale, medium dark-gray (N4).
1082-1089	7	Shale 75%, siltstone 25%: shale, very micaceous, medium dark-gray (N4), slightly silty; siltstone, micaceous, shaly, medium dark-gray (N4) and brownish-gray (5YR 4/1).
1089-1109	20	Shale 85%, siltstone 10%, sandstone 4%, coal 1%: shale, like 1082-1089; siltstone, like 1082-1089; sandstone, like 1074-1082.
1109-1125	16	Shale 70%, sandstone 25%, siltstone 5%: shale, like 1082-1089; sandstone, micaceous, medium light-gray (N6), very fine-grained, angular, poorly sorted, silty, many dark and black minerals; siltstone, like 1082-1089.
1125-1135	10	Like 1109-1125.

Depth (feet)	Thickness (feet)	
1135-1141	6	Sandstone 75%, shale 20%, siltstone 5%: like 1109-1125.
1141-1150	9	Sandstone 80%, shale 20%: sandstone, like 1109-1125; shale, like 1109-1125.
1150-1166	16	Shale 65%, sandstone 35%: shale, micaceous, medium dark-gray (N4); sandstone, like 1109-1125.
1166-1176	10	Shale: micaceous, medium dark-gray (N4); shale, micaceous, dark-gray (N3).
1176-1188	12	Shale 95%, coal 5%: shale, dark-gray (N3), and medium dark-gray (N4).
1188-1196	8	Shale 75%, siltstone 20%, coal 5%: shale, micaceous, medium dark-gray (N4); and shale, dark-gray (N3), like 1176-1188; siltstone, micaceous, medium light-gray (N6), argillaceous, many black minerals.
1196-1202	6	Shale 90%, siltstone 5%, coal 5%: shale, silty, micaceous, dark-gray (N3); and shale, medium dark-gray (N4); and shale, dark-gray (N3); siltstone, like 1188-1196; sandstone, like 1109-1125.
1202-1212	10	Sandstone 75%, coal 25%: sandstone, micaceous, calcareous, white (N9), very fine to medium-grained, rounded to subrounded, poorly sorted, few aggregates, containing slight mottling of black and green due to numerous black and green minerals, slightly iron-stained; contains coal.

Depth (feet)	Thickness (feet)	
1212-1215	3	Sandstone: like 1202-1212; containing few pieces of shale and siltstone, and a trace of coal.
1215-1227	12	Sandstone 85%, shale 15%: sandstone, medium light-gray (N6), with numerous angular quartz fragments (conglomeratic?), medium grains well rounded, largely noncalcareous, much mica, green, and dark minerals present; shale, micaceous, medium dark-gray (N4), slightly silty.
1227-1232	5	Shale 60%, sandstone 25%, others 15%: shale, silty, micaceous, medium-gray (N5), some slightly calcareous; shale, medium dark-gray (N4), silty, micaceous; sandstone, like 1215-1227; siltstone, medium light-gray (N6) to light-gray (N7), shaly structure, many dark and black minerals.
1232-1240	8	Shale 70%, siltstone 15%, sandstone 15%: shale, micaceous, medium dark-gray (N4), slightly silty to very silty; siltstone, like 1227-1232; sandstone, like 1227-1232.
1240-1245	5	Shale 80%, sandstone 15%, siltstone 5%: shale, dark-gray (N3), very finely micaceous, some slightly silty; sandstone, like 1227-1232.

Depth (feet)	Thickness (feet)	
1245-1250	5	Sandstone 80%, shale 20%: sandstone, calcareous, micaceous, very light-gray (N8), fine- to medium-grained, rounded to subangular, poorly sorted, mostly loose grains, few to many green, dark-gray, and black minerals (chlorite?), some grains slightly iron-stained; shale, very micaceous, medium dark-gray (N4) and dark-gray (N3).
1250-1265	15	Sandstone 75%, shale 25%: sandstone, micaceous, white (N9), calcareous to noncalcareous, fine- to medium-grained, rounded to subrounded, few to many green and black minerals, mostly loose grains, some iron-stained; shale, medium dark-gray (N4), some silty.
1265-1282	17	Shale: medium dark-gray (N4), some silty.
1282-1302	20	Shale: like 1265-1282; siltstone, light-gray (N7); and a few black minerals.
1302-1322	20	Shale: like 1265-1282.
1322-1330	8	Sandstone 50%, shale 50%: sandstone, brownish-gray (5YR 4/1), very fine grained with few fine-grained aggregates, well rounded, very silty cement; shale, like 1265-1282; contains trace of coal.
1330-1340	10	Sandstone 95%, shale 3%, sandstone 2%: sandstone, micaceous, very light gray (N8), fine- to medium-grained, rounded to angular, mostly loose grains, few black minerals, some iron-stained; shale, like 1265-1282; sandstone, like 1322-1330.

Depth (feet)	Thickness (feet)	
1350-1357	17	Siltstone: micaceous, medium dark-gray (N4), argillaceous; trace of shale, like 1330-1340.
1357-1370	13	Sandstone 50%, shale 30%, siltstone 20%: sandstone, micaceous, medium light-gray (N6), very fine to fine-grained, subangular to angular, poorly sorted, abundant mica and many black minerals; shale, medium dark-gray (N4), slightly silty, very micaceous; siltstone, like 1340-1357.
1370-1384	14	Sandstone 95%, shale 5%: sandstone, very light gray (N8), very fine to medium-grained, rounded to angular, poorly sorted, slightly micaceous, few green and many black minerals present, silty cement; sandstone, medium light-gray (N6); shale, like 1357-1370.
1384-1407	23	Sandstone 95%, shale 5%: sandstone, very light gray (N8), medium- to coarse-grained, rounded to angular, very poorly sorted, loose and in aggregates, containing considerable black and white minerals other than quartz; sandstone, like 1370-1384; and shale, like 1370-1384.
1407-1424	17	Shale 99%, sandstone 1%: shale, dark-gray (N3); sandstone, like 1322-1330.
1424-1431	7	Shale: medium-gray (N5), slightly fissile.

Depth (feet)	Thickness (feet)	
1431-1451	20	Sandstone 99%, shale 1%: sandstone, micaceous, very light gray (N8), very fine to medium-grained, subrounded to angular, poorly sorted, loose and in aggregates, considerable black mineral, some red and green minerals present; shale, like 1424-1431.
1451-1480	29	Sandstone: very light gray (N8), very fine grained, rounded to subrounded, well sorted, slightly micaceous, few black minerals present; few pieces of sandstone, like 1431-1451.
1480-1533	53	Shale: medium dark-gray (N4).
1533-1553	20	Like 1480-1533.
1553-1565	12	Sandstone 60%, shale 40%: sandstone, like 1451-1480; shale, like 1480-1533, micaceous, little silty; trace of coal.
1565-1577	12	Sandstone 75%, shale 25%: sandstone, very light gray (N8), very fine to fine-grained, rounded to subangular, poorly sorted, mostly loose grains, containing a few dark minerals; shale, like 1480-1533; few pieces of coal.
1577-1583	6	Shale: medium dark-gray (N4), slightly fissile.
1583-1596	13	Shale 65%, sandstone 20%, siltstone 15%: shale, like 1577-1583, some silty, some slightly micaceous; sandstone, very light gray (N8), like 1565-1577; siltstone, medium-gray (N5), shaly structure.

Depth (feet)	Thickness (feet)	
1596-1624	28	Shale: micaceous, medium dark-gray (N4), slightly fissile.
1624-1633	9	Sandstone 70%, shale 30%: sandstone, very light gray (N8), very fine to fine-grained, rounded to subangular, fairly well sorted, mostly loose, slightly micaceous, few black minerals, much iron-stained; shale, like 1596-1624.
1633-1649	16	Sandstone 90%, shale 10%: sandstone, very light gray (N8), very fine to medium-grained, rounded to angular, very poorly sorted, nearly all loose grains, few black minerals, much iron-stained; shale, like 1596-1624.
1649-1661	12	Sandstone 90%, shale 10%: sandstone, like 1633-1649; shale, like 1633-1649.
1661-1669	8	Sandstone 95%, shale 5%: sandstone, like 1633-1649, slightly silty (?); shale, like 1633-1649.
1669-1680	11	Sandstone 95%, shale 5%: sandstone, very fine to fine-grained with few medium grains; shale, like 1633-1649.
1680-1700	20	Sandstone: like 1633-1649, with quartz conglomerate fragments; trace of coal.
1700-1723	23	Sandstone: conglomeratic, white (N9), very fine to medium-grained, rounded to angular, all loose grains, numerous fragments of quartz pebbles, very clean sandstone, much iron-stained.

Depth (feet)	Thickness (feet)	
1723-1735	12	Sandstone: like 1700-1723, but no pebble fragments; trace of green and black minerals.
1735-1750	15	Sandstone 85%, shale 10%, coal 5%: sandstone, like 1723-1735, fine- to coarse-grained, numerous angular quartz fragments of conglomerate (?); shale, dark-gray (N3); coal.
1750-1771	21	Sandstone 80%, coal 12%, shale 8%: sandstone, like 1735-1750, very calcareous to noncalcareous, conglomeratic, with numerous quartz pebble fragments, many dark, green, and black minerals, micaceous; coal; shale, like 1735-1750.
1771-1790	19	Sandstone: white (N9), very fine to fine-grained, free, angular to subangular, little limonite stain, one or two large fragments of sandstone; trace dark-gray shale; trace coal; occasional green mineral (glauconite?).
1790-1800	10	Siltstone 60%, shale 38%, sandstone 2%: siltstone, light-gray (N7) to medium-gray (N5), some argillaceous; shale, dark-gray (N3) to medium dark-gray (N4), occasionally slightly micaceous; sandstone, light-gray (N7), very fine to fine-grained, some argillaceous, two or three larger quartz fragments; trace coal.
1800-1810	10	Like 1790-1800.

Depth (feet)	Thickness (feet)	
1810-1830	20	Sandstone: white (N9), fine-grained to medium-grained, angular to subangular, free, some clusters, poorly sorted, little limonite stain, few scattered green (glauconite?) and black minerals, few pieces shaly; trace dark-gray shale.
1830-1851	21	Like 1810-1830, except sandstone, very fine- to fine-grained to some medium-grained, very few clusters.
1851-1880	29	Sandstone 98%, shale 20%: sandstone, argillaceous, white (N9) to some medium-gray (N5), fine- to medium-grained, angular to subangular, poorly sorted, free, some clusters, few scattered black and green (glauconite?) minerals, little limonite stain; shale, dark-gray (N3) to medium dark-gray (N4); sample contains two or three pieces coal.
1880-1900	20	Sandstone: white (N9), fine-grained to few pieces medium-grained, free, some clusters, angular to subangular, very few scattered black and green (glauconite?) minerals, little limonite stain, few pieces argillaceous; trace shale, dark-gray (N3); sample contains two or three pieces of coal.
1900-1911	11	Coal 97%, shale 3%: Coal; shale, medium dark-gray (N4); trace sandstone, light-gray (N7), very fine grained.

Depth (feet)	Thickness (feet)	
1911-1920	9	Sandstone 90%, shale 10%: sandstone, white (N9) to light-gray (N7), very fine grained, few pieces slightly argillaceous, clustered, scattered black and few green (glauconite?) minerals, little limonite stain; shale, medium dark-gray (N4) to dark gray (N3), occasional piece slightly micaceous; sample contains a few pieces coal.
1920-1940	20	Like 1911-1920, only sandstone free, some clusters, no black and green minerals; few pieces shale; no coal.
1940-1965	25	Sandstone: argillaceous, white (N9) to medium-gray (N5), very fine to some fine-grained, clustered, scattered black minerals, occasionally slightly micaceous; trace medium dark-gray (N5) shale.
1965-1985	20	Sandstone: argillaceous, white (N9) but some medium-gray (N5), mostly fine-grained, but some medium-grained, clusters, few scattered black and green (glauconite?) minerals, little limonite stain; sample contains trace dark-gray shale; and one piece coal.
1985-2000	15	Shale: medium dark-gray (N4); light-gray (N7) silty material.

Depth (feet)	Thickness (feet)	
200-2025	25	Siltstone 45%, sandstone 45%, shale 10%: siltstone, argillaceous, light-gray (N7) to medium-gray (N5); sandstone, fine-grained; shale, medium dark-gray (N4); sample contains scattered black minerals, little limonite stain.
2025-2050	25	Sandstone 99%, shale 1%: sandstone, white (N9) to some medium gray (N5), fine-grained, angular to subangular, clustered, some free, noncalcareous to calcareous, some slightly argillaceous, few scattered black minerals, little limonite stain; sample contains few pieces of shale, medium dark-gray (N4).
2050-2057	7	Sandstone: white (N9), very fine to fine-grained, with a few medium grains, clustered, some free, scattered black and few green (glauconite?) minerals, some argillaceous, little limonite stain, sample contains trace of shale, medium dark-gray (N4).
2057-2070	13	Sandstone 70%, siltstone 15%, shale 15%: sandstone, white (N9), some gray, fine- to medium-grained, free, some clusters, subangular to subrounded, little limonite stain, one or two larger quartz fragments; siltstone, shaly, medium-gray (N5); shale, medium-gray (N5).

Depth (feet)	Thickness (feet)	
2070-2093	23	Shale 70%, siltstone to sandstone 25%, siltstone 5%: shale, medium-gray (N5); siltstone or very fine grained sandstone, slightly argillaceous; sample containing few scattered black minerals.
2093-2105	12	Sandstone 60%, shale 40%: sandstone, white (N9), very fine to fine-grained, clustered and free, slightly calcareous; shale, medium-gray (N5) to some medium dark-gray (N4).
2105-2120	15	Sandstone 95%, shale 5%: sandstone, argillaceous, white (N9) to medium-gray (N5), very fine grained, clustered, noncalcareous to some slightly calcareous, contains scattered black minerals; shale, medium dark-gray (N4) to medium-gray (N5), trace limonitic stain.
2120-2131	11	Sandstone 98%, shale 2%: sandstone, white (N9), fine- to very fine grained, free, few clusters, few black and occasional green (glauconite?) minerals, some argillaceous, trace limonite stain; shale, dark-gray (N3) to medium dark-gray (N4).
2131-2153	22	Sandstone 97%, shale 3%: sandstone, white (N9), fine- to very fine grained, free and clustered, angular to subangular, few scattered black minerals, little limonite stain; shale, medium dark-gray (N4).

Depth (feet)	Thickness (feet)	
153-2162	9	Like 2131-2153, except sandstone clustered and slightly calcareous; and argillaceous pieces present.
162-2172	10	Sandstone 78%, sandstone to siltstone 20%, shale 2%: sandstone, angular to subrounded, poorly sorted, free, few clusters, slightly calcareous, limonite stain, few black and green (glauconite?) minerals; sandstone or siltstone, fine-grained; shale, medium dark-gray (N4).
		<u>Bluestone formation</u> — 481 feet
172-2184	12	Sandstone 99%, shale 1%: sandstone, white (N9), very fine to fine-grained, few pieces medium-grained, free, angular to subangular, few scattered black and green (glauconite?) minerals; shale, dark-gray (N3) to medium dark-gray (N4), little limonitic stain.
184-2196	14	Sandstone 80%, shale 20%: sandstone, white (N9), very fine to fine-grained, clustered, some free, angular to subangular, contains few scattered black minerals, noncalcareous to slightly calcareous, some limonite stain; shale, medium-gray (N5) to medium dark-gray (N4).
198-2210	12	Sandstone 90%, shale 10%: sandstone, white (N9), fine- to medium-grained, angular to subangular, free, occasional cluster, some limonite stain; shale, medium-gray (N5) to medium dark-gray (N4).

	Thickness (feet)	
2217	7	Shale: medium-gray (N5), slightly calcareous.
2225	8	Shale: medium-gray (N5) to grayish-red (5R 4/2), some very slightly calcareous.
2239	14	Shale: medium-gray (N5) and grayish-red (5R 4/2), very occasionally slightly calcareous.
2250	11	Shale: medium dark-gray (N3), some with brownish tint, and grayish-red (5R 4/2), very occasional piece calcareous.
2280	30	Sandstone 80%, shale 20%: sandstone, argillaceous, gray, very fine grained, clustered, few free, occasional piece calcareous; shale, silty, medium-gray (N5) to two or three pieces grayish- red (5R 4/2), trace limonite stain.
2290	10	Like 2250-2280; sandstone, noncalcareous to calca- reous; no red shale.
2290-2296	6	Sandstone 85%, shale 15%: like 2280-2290.
2296-2304	8	Like 2290-2296; contains a few pieces chert.
2304-2314	10	Sandstone 90%, shale 10%: sandstone, argillaceous, white (N9) and gray, fine- to very fine grained, clustered, some free, angular to subangular, little limonite stain, contains little scattered black mineral; shale, medium dark-gray (N4); sample contains a trace of pyrite.
2314-2323	9	Like 2304-2314; contains more free grains.

Thick- ness (feet)	Thickness (feet)	
2330-2330	7	Sandstone 85%, shale 15%: sandstone, white (N9) to gray, very fine to fine-grained, clustered, some free, some shaly, slightly calcareous to calcareous, scattered black minerals, little limonite stain; shale, medium dark-gray (N4), some carbonaceous, sample contains several pieces coal and a trace of pyrite.
2340-2340	10	Sandstone 97%, shale 3%: sandstone, white (N9) to gray, fine-grained to little very fine grained, clustered, noncalcareous to calcareous, some argillaceous, limonite stain; shale, medium dark-gray (N4) to dark-gray (N3); sample contains a trace of pyrite.
2356-2356	16	Siltstone 64%, shale 35%, sandstone 1%: siltstone, light-gray (N7) to medium-gray (N5), noncalcareous to slightly calcareous, some argillaceous; shale, medium dark-gray (N4), some slightly silty; sandstone, white (N9), fine-grained, slightly calcareous; sample contains a trace of white (N9) to gray crystalline limestone; few micro-fossils.
2356-2365	9	Siltstone 90%, shale 10%: siltstone, white (N9) to gray, clustered, noncalcareous to slightly calcareous, some shaly, scattered black minerals, little limonite stain; shale, medium dark-gray (N4), some silty; contains trace of brownish-gray (5YR 4/1) limestone.

Depth (feet)	Thickness (feet)	
2365-2376	11	Siltstone 90%, shale 10%: siltstone, light gray (N7) to gray, clustered, noncalcareous to calcareous, some argillaceous, few scattered black minerals; shale, medium dark-gray (N4).
2376-2395	19	Like 2365-2376.
2395-2405	10	Shale 95%, siltstone 5%: shale, medium dark-gray (N4); siltstone, argillaceous, gray, occasionally very slightly calcareous.
2405-2425	20	No sample.
2425-2445	20	Shale 85%, siltstone 15%: shale, like 2395-2405; siltstone, like 2395-2405.
2445-2465	20	Shale: medium dark-gray (N4); sample contains a trace of siltstone, like 2395-2405.
2465-2500	35	Like 2445-2465.
2500-2509	9	Shale 84%, siltstone 15%, limestone 1%: shale, like 2445-2465; siltstone, white (N9), few pieces argillaceous; limestone, white (N9) to gray, crystalline.
2509-2520	11	Siltstone 70%, shale 30%: siltstone, calcareous, white (N9) but a little gray, clustered, trace limonite stain; shale, dark-gray (N3).
2520-2529	9	Siltstone 89%, shale 10%, limestone 1%: like 2520-2529, except some of the siltstone is non-calcareous.

Depth (feet)	Thickness (feet)	
229-2536	7	Sandstone 70%, siltstone 15%, shale 15%: sandstone, white (N9), very fine grained, mainly clustered but some free, occasionally slightly calcareous, limonite stain; shale, dark-gray.
2536-2541	5	Sandstone 90%, shale 10%: sandstone, argillaceous, mainly white (N9) but a few pieces gray, very fine grained, free and clustered, occasional piece calcareous, limonite stain, contains a few scattered black minerals; shale, dark-gray (N3) to medium dark-gray (N4), few pieces very micaceous.
2541-2545	4	Sandstone 80%, shale 20%: sandstone, white (N9) to light-gray (N7), some yellow, very fine grained to fine-grained, free and some clusters, much limonite stain, slightly argillaceous and some calcareous; shale, dark-gray (N3) to medium dark-gray (N4), few pieces micaceous.
2545-2560	15	Shale 60%, siltstone 40%: shale, medium dark-gray (N4), few pieces silty, some slightly micaceous, little limonite stain; siltstone, white (N9) to gray, noncalcareous to slightly calcareous, some shaly; sample contains trace of pyrite and a trace of white to gray sandstone.
2560-2580	20	Shale 70%, siltstone 30%: shale, dark gray (N3) to medium dark-gray (N4), few pieces silty; siltstone, mainly white and some gray, argillaceous, occasionally very slightly calcareous, contains few scattered black minerals, little limonite stain and trace pyrite.

Depth (feet)	Thickness (feet)	
2580-2584	4	Siltstone 85%, shale 15%: siltstone, argillaceous, white (N9) to few pieces gray, clustered, few pieces calcareous, few scattered black minerals, limonite stain; shale, dark-gray (N3).
2584-2595	11	Shale: medium dark-gray (N4) to dark-gray (N3), noncalcareous to calcareous, some slightly silty; sample contains trace of siltstone, like 2580-2584, and trace of brownish-gray limestone.
2595-2617	22	Shale: medium dark-gray (N4), few pieces silty; sample contains trace of siltstone, like 2580-2584.
2617-2635	18	Like 2595-2617; a few pieces slightly silty.
2635-2650	15	Like 2519-2617; a few pieces slightly calcareous.
2650-2657	7	Shale 82%, siltstone 15%, limestone, 3%: shale, like 2595-2617, noncalcareous to calcareous, some silty; siltstone, argillaceous, gray, noncalcareous to calcareous; limestone, argillaceous, brownish-gray (5YR 4/1) to gray.
2657-2667	10	Sandstone 85%, shale 15%: sandstone, white, fine-grained to few pieces medium-grained, angular to subrounded, mostly free, limonite stain, noncalcareous to calcareous; shale, dark-gray (N3) to medium dark-gray (N4), contains trace brownish-gray limestone.

Depth (feet)	Thickness (feet)	
2667-2669	2	Sandstone 55%, shale 45%: sandstone, white (N9), very fine to fine-grained, angular to subangular, clustered, limonite stain, noncalcareous to calcareous; shale, dark-gray (N3) to medium dark-gray (N4).
2669-2673	4	Shale 60%, limestone 30%, sandstone 10%: shale, medium dark-gray (N4), noncalcareous to slightly calcareous; limestone, white (N9) to brownish-gray (5YR 4/1), shaly to crystalline, some dense; sandstone, white (N9) to some gray, very fine grained, very calcareous.
		<u>Princeton sandstone</u> 86 feet
2673-2675	2	Shale 50%, sandstone 35%, limestone 15%: shale, medium dark-gray (N4), occasional piece mica; sandstone, white (N9), very fine grained to fine-grained, very calcareous to some noncalcareous, some shaly, mostly clustered, three or four larger quartz fragments; limestone, white (N9) to brownish-gray (5YR 4/1) to gray, crystalline, some shaly, few dense, some very silty.
2675-2678	3	Sandstone 83%, shale 15%, limestone 2%: sandstone, white (N9), very fine grained to fine-grained, few large quartz fragments, angular to subrounded, free and some clusters; limestone, brownish-gray (5YR 4/1), and a little white and gray, dense, crystalline, little limonite stain; contains a trace of pyrite; shale, dark-gray (N3) to medium dark-gray (N4).

Thickness (feet)		
2678-2681	3	Sandstone 83%, shale 15%, limestone 2%: sandstone, white to some yellow, very fine grained to fine-grained, angular to subangular, free, few clusters, much limonite stain, slightly calcareous; shale, dark-gray (N3) to medium dark-gray (N4), one piece reddish-gray (10R 4/2); limestone, like 2675-2678.
2681-2684	3	Sandstone 70%, shale 30%: sandstone, like 2678-2681; shale; sample contains only a trace of limestone and no reddish-gray shale.
2684-2687	3	Like 2678-2681 with very much limonite stain; sample contains only trace of limestone, no reddish-gray shale and very occasional cluster of sandstone.
2686-2689	3	Sandstone 90%, shale 10%: sandstone, white to yellow, fine-grained, angular to subangular, mostly free, very occasional piece slightly calcareous, much limonite stain; shale, dark-gray (N3) to grayish-black (N2).
2689-2692	3	Sandstone 95%, shale 5%: sandstone, like 2686-2689, some very fine grained; shale, like 2686-2689.
2692-2695	3	Like 2686-2689.
2695-2697	2	Like 2686-2689, some sandstone, very fine grained, noncalcareous.
2697-2700	3	Like 2686-2689.

Depth (feet)	Thickness (feet)	
2700-2703	3	Like 2686-2689; some very fine grained sandstone, noncalcareous, contains trace of pyrite.
2703-2706	3	Like 2686-2689; sample contains no pyrite.
2706-2708	2	Like 2686-2689.
2708-2710	2	Sandstone 75%, shale 25%: sandstone, white (N9), very fine grained, clustered, few pieces free, much limonite stain, slightly calcareous; shale, dark-gray (N3) to grayish-black (N2); sample contains trace of pyrite.
2710-2713	3	Like 2708-2710; sample contains no pyrite.
2713-2716	3	Sandstone, 97%, shale 3%: sandstone, white (N9), to some yellow, very fine to fine-grained, angular to subangular, much limonite stain, slightly calcareous, free, some clustered; shale, dark-gray (N3) to grayish-black (N2); sample contains one or two pieces coal and trace pyrite.
2716-2721	5	Sandstone 95%, shale 5%: sandstone, like 2713-2716, shale, like 2713-2716; sample contains no coal.
2721-2724	3	Siltstone 85%, sandstone 10%, shale 5%: siltstone, grading into sandstone, white to yellow, very fine grained, clustered, some free, slightly calcareous, much limonite stain; shale, dark-gray (N3), contains pyrite.

Depth (feet)	Thickness (feet)	
2724-2726	2	Sandstone 99%, shale 1%: sandstone, calcareous, white (N9), very fine grained, free, some clusters, little limonite stain; shale, dark-gray (N3) to grayish-black (N2).
2726-2728	2	Sandstone 90%, shale 10%: like 2724-2726, only sandstone very fine grained to fine-grained, more limonite stain.
2728-2731	3	Sandstone 85%, shale 15%: like 2724-2726, but shale is occasionally calcareous.
2731-2735	4	Sandstone 90%, shale 10%: sandstone, white to yellow, very fine grained, clustered, some free, much limonite stain, occasionally slightly calcareous; shale, grayish-black (N2) to dark-gray (N3); sample contains pyrite.
2735-2739	4	Sandstone 80%, shale 20%: sandstone, white (N9), very fine grained, subrounded, moderately well sorted, few dark grains and slightly micaceous, 9/10 moderately friable in small clusters and 1/10 well cemented; shale, medium dark-gray (N4).
2739-2742	3	Sandstone 95%, shale 5%: sandstone, white (N9), very fine grained, subrounded to rounded, moderately well sorted, few dark grains, friable with small clusters; shale, medium-gray (N5) to dark gray (N3); sample contains considerable pyrite and iron-staining.

Thickh (feet)	Thickness (feet)	
2742-2745	3	Like 2739-2742.
2745-2750	5	Like 2739-2742; shale, grayish-black (N2).
2750-2755	5	Sandstone 90%, shale 10%: sandstone, like 2739-2742; shale, medium dark-gray (N4) and grayish-black (N2).
2755-2759	4	Like 2739-2742.
<u>Hinton formation</u>		
<u>formation</u> <u>Avis limestone member of Reger</u> <u>—81 feet—</u>		
2759-2765	6	Siltstone 50%, shale 50%: siltstone, medium light-gray (N6), coarse-grained, subrounded, moderately well sorted, very slightly calcareous; shale, silty, medium-gray (N5), trace mica; and shale, dark-gray (N3); sample contains abundant pyrite.
2765-2770	5	Shale 60%, siltstone 40%: shale, medium-gray (N5), like 2759-2765; siltstone, like 2759-2765; sample contains a trace shale, dark-gray (N3).
2770-2784	14	Shale 80%, siltstone 20%: shale, medium-gray (N5), part silty, finely micaceous; siltstone, like 2759-2765.
2784-2791	7	Sandstone 50%, shale 40%, limestone 10%: sandstone, silty, light-gray (N7), very fine grained, subrounded to subangular, poorly sorted, containing considerable dark minerals, calcareous cement,

1798

moderately well cemented; shale, medium dark-gray (N4), fossiliferous, part slightly micaceous; limestone, light brownish-gray (5YR 6/1), medium crystalline.

2800

... shale, medium dark-gray (N4), fossiliferous, part slightly micaceous; limestone, light brownish-gray (5YR 6/1), medium crystalline.

2820

... shale, medium dark-gray (N4), fossiliferous, part slightly micaceous; limestone, light brownish-gray (5YR 6/1), medium crystalline.

2830

... shale, medium dark-gray (N4), fossiliferous, part slightly micaceous; limestone, light brownish-gray (5YR 6/1), medium crystalline.

2840

... shale, medium dark-gray (N4), fossiliferous, part slightly micaceous; limestone, light brownish-gray (5YR 6/1), medium crystalline.

2850

... shale, medium dark-gray (N4), fossiliferous, part slightly micaceous; limestone, light brownish-gray (5YR 6/1), medium crystalline.

2860

... shale, medium dark-gray (N4), fossiliferous, part slightly micaceous; limestone, light brownish-gray (5YR 6/1), medium crystalline.

Depth (feet)	Thickness (feet)	
2791-2798	7	Shale 90%, sandstone 10%: shale, medium light-gray (N6), finely micaceous; shale, medium dark-gray (N4); sandstone, like 2784-2791.
2798-2806	8	Limestone 60%, shale 40%: limestone, medium dark-gray (N4), little light gray (N7), finely crystalline to some medium crystalline, slightly argillaceous, fossiliferous (crinoid, bryozoa, and other fragments); shale, medium dark-gray (N4), very calcareous to calcareous; sample contains a trace of sandstone.
2806-2820	14	Limestone 80%, shale 20%: limestone, like 2798-2806, more mottled with light-gray (N7); shale, like 2798-2806.
2820-2832	12	Limestone 90%, shale 10%: limestone, like 2798-2806; shale, like 2798-2806.
2806-2840	34	Like 2798-2806.
<u>Hinton formation(undivided) — 551 feet —</u>		
2840-2863	23	Shale 50%, limestone 20%: shale, grayish-red (10R 4/2) with little mottled with gray, slightly calcareous; shale, medium light-gray (N6); limestone, like 2798-2806.
2863-2873	10	Shale: grayish-red (10R 4/2); and shale, calcareous, medium-gray (N5).

Depth (feet)	Thickness (feet)	
2873-2883	10	Like 2863-2873.
2883-2893	10	Shale: grayish-red (10R 4/2), like 2863-2873.
2893-2900	7	Shale: grayish-red (10R 4/2), like 2863-2873; shale, calcareous, medium-gray (N5).
2900-2920	20	Shale 95%, sandstone 5%: shale, grayish-red (10R 4/2), medium-gray (N5), and medium light- gray (N6), slightly silty, slightly fossiliferous; sandstone, light-gray (N7), very fine grained.
2920-2927	7	Sandstone 50%, shale 50%: sandstone, argillaceous, medium light-gray (N6), very fine-grained, sub- angular to subrounded, moderately poorly sorted, contains considerable greenish and dark minerals, about one-half quartz, moderately friable with most in clusters; shale, medium-gray (N5), finely micaceous, slightly silty to little silty; and shale, grayish-red (10R 4/2) to very dusky red- dish purple (5RP 2/2).
2927-2945	18	Sandstone 50%, shale 50%: sandstone, silty, white (N9), very fine to fine-grained, subangular to subrounded, poorly sorted, very slightly cal- careous cement; shale, grayish-red (5R 4/2); and shale, medium dark-gray (N4), part finely micaceous.

Depth (feet)	Thickness (feet)	
2945-2955	10	Shale 95%, sandstone 5%: shale, grayish-red (10R 4/2) to medium-gray (N5), very finely micaceous; and shale, silty, medium-gray (N5); sandstone, white (N9), like 2927-2945, and sandstone, micaceous, silty, greenish-gray (5GY 6/1), very fine grained, subrounded, moderately well sorted, considerable green mineral, about one-half quartz.
2955-2961	6	Sandstone 75%, shale 25%: sandstone, white (N9), like 2945-2955, friable; sandstone, greenish-gray (5GY 6/1); shale, medium-gray (N5) and grayish-red, like 2945-2955.
2961-2970	9	No sample.
2970-2977	7	Shale 90%, siltstone 10%: shale, micaceous, medium-gray (N5); and shale, calcareous, medium light-gray (N6), slightly silty, finely micaceous; and shale, grayish-red (10R 4/2); siltstone, light-gray (N7), coarse-grained, subrounded, calcareous cement.
2977-2985	8	Like 2970-2977; sample contains a trace of white, fine-grained, finely micaceous sandstone.
2985-3005	20	Shale 60%, siltstone 40%: shale, medium dark-gray (N4), slightly calcareous to some calcareous; siltstone, like 2977-2985; shale, grayish-red (10R 4/2), like 2977-2985.

Depth (feet)	Thickness (feet)	
3005-3020	15	Shale 75%, sandstone 20%, limestone 5%: shale, calcareous, grayish-red (5Y 4/2), very finely micaceous; shale, medium dark-gray (N4); shale, light-gray (N7), silty; sandstone, pale-red (5R 6/2), very fine grained, very calcareous cement, some dark mineral grains, about one-half quartz; limestone, pale red (10R 6/2), very finely crystalline.
3020-3030	10	Shale 95%, limestone 5%: shale, grayish-red (5R 4/2), finely micaceous; medium-gray (N5) to dark-gray (N3); limestone, grayish-red (5R 4/2), and some light brownish-gray (5YR 6/1).
3030-3050	20	Shale 80%, sandstone 15%, limestone 5%: shale, like 3020-3030; sandstone, pale-red (10R 6/2).
3050-3063	13	Like 3030-3050.
3063-3085	22	Sandstone 80%, shale 15%, siltstone 5%: sandstone, micaceous, argillaceous, very light-gray (N8), coarse-grained, subangular to subrounded, moderately well sorted, calcareous cement, peppered with dark minerals, about 2/3 quartz, moderately friable with small clusters; shale, grayish-red (10R 4/2); siltstone, light brownish-gray (5YR 6/1), fine-grained, well cemented.
3085-3095	10	Siltstone 90%, shale 10%: siltstone, very light-gray (N8), like 3063-3085; shale, grayish-red (10R 4/2).

Depth (feet)	Thickness (feet)	
3095-3106	11	Shale 55%, siltstone 30%, limestone 15%: shale, medium dark-gray (N4) to dark greenish-gray (5GY 4/1); siltstone, argillaceous, light-gray (N7), subrounded to subangular, slightly micaceous; limestone, light brownish-gray (5YR 6/1), very finely crystalline.
3106-3118	12	No sample.
3118-3126	8	Sandstone, 75%, shale 25%: sandstone, white (N9), very fine grained, subrounded, moderately well sorted, moderately friable with small clusters; shale, dark-gray (N3); shale, medium-gray (N5) containing a trace of mica; shale, grayish-red (10R 4/2).
3126-3133	7	Sandstone 85%, shale 15%: sandstone, like 3118-3126; shale, like 3118-3126.
3133-3168	35	No sample.
3168-3172	4	Sandstone 70%, shale 30%: sandstone, silty, white (N9), very fine grained, subrounded to some subangular, moderate sorting, friable; shale, grayish-red (5R 4/2), some mottled with medium-gray (N5); shale, medium-gray (N5).
3172-3177	5	Sandstone 90%, shale, 10%: sandstone, like 3168-3172, considerable iron-staining, trace of dark mineral grains, slightly calcareous cement; shale, like 3168-3172.

Depth (feet)	Thickness (feet)	
3177-3184	7	Sandstone 95%, shale 5%: sandstone, like 3172-3177, very small clusters; shale, like 3172-3177, medium-gray (N5).
3184-3191	7	Shale 50%, sandstone 50%: shale, medium dark-gray (N4); sandstone, like 3172-3177; sample contains a trace of red shale.
3191-3202	11	Shale: medium dark-gray (N4), like 3172-3177; very dusky-red (10R 2/2), some mottled with medium dark-gray (N4), shale; sample contains trace of medium light-gray (N6), very silty shale and sandstone, like 3184-3191.
3202-3260	58	Shale: medium light-gray (N6), chunky.
3260-3270	10	No sample.
3270-3286	16	Sandstone 50%, shale 50%: sandstone, silty, white (N9), very fine grained, subrounded, moderately well sorted, calcareous cement, moderately friable in very small clusters; shale, medium dark-gray (N4) to medium-gray (N5) to grayish red (10R 4/2).
3286-3290	4	Shale 55%; sandstone 45%: shale, dark-gray (N3) to grayish-red (5R 4/2); sandstone, white (N9), very fine grained, subrounded, moderately well sorted, friable; sample contains a trace of pyrite.
3290-3300	10	Sandstone 60%, shale 40%: sandstone, like 3286-3290; shale, medium dark-gray (N4) and grayish-red (5 R 4/2), like 3286-3290.

Depth (feet)	Thickness (feet)	
3300-3308	8	Sandstone 50%, shale 50%: sandstone, like 3286-3290; shale, like 3286-3290, dark greenish-gray (5GY 4/1), medium-gray (N5).
3305-3313	8	Shale 80%, sandstone 20%: shale, calcareous, medium light-gray (N6), part silty; sandstone, light-gray (N7), medium-grained, moderately well sorted, some well cemented, slightly calcareous to calcareous cement.
3313-3335	22	Shale 90%, siltstone 10%: shale, medium light-gray (N6), noncalcareous; to grayish-red (5R 4/2); siltstone, like 3305-3313.
3335-3391	56	Shale 80%, siltstone 20%: shale, medium-gray (N5), silty to nonsilty, micaceous; siltstone, like 3305-3313, approaching very fine grained sandstone, noncalcareous; sample contains trace of red shale and pyrite.

Hinton formation (Stony Gap sandstone member) — 139 feet

3391-3395	4	Sandstone 90%, shale 10%: sandstone, white (N9), very fine grained, subrounded, moderately well sorted, friable; shale, medium-gray (N5), little very silty.
3395-3401	6	Like 3391-3395.
3401-3408	7	Sandstone 93%, shale 7%: sandstone, like 3391-3395 very fine to fine-grained; light-gray (N7), very fine grained, subrounded to subangular, moderately well sorted, well cemented; shale, like 3391-3395.

Depth (feet)	Thickness (feet)	
3408-3420	12	Sandstone 95%, shale 5%: like 3401-3408.
3420-3425	5	Sandstone 90%, shale 10%: sandstone, silty, white (N9), very fine grained, subrounded, moderately well sorted, friable; shale, grayish-red (5R 4/2) to dark-gray (N3).
3425-3430	5	Sandstone 95%, shale 5%: sandstone, like 3420-3425, very fine grained to fine-grained; shale, like 3420-3425.
3430-3435	5	Sandstone 95%, shale 5%: sandstone, white (N9), fine-grained, subrounded, poorly sorted, grains ranging from fine- to medium-grained; shale, like 3420-3425.
3435-3440	5	Shale 75%, sandstone 25%: shale, calcareous, medium-gray (N5) to medium dark-gray (N4); sandstone, like 3420-3425.
3440-3490	50	Shale: medium light-gray (N6), about one-third calcareous, fossiliferous.
3490-3505	15	Siltstone 40%, sandstone 40%, shale 20%: siltstone, very light-gray (N8), coarse-grained, subrounded to rounded, moderately well sorted, moderately friable; sandstone, very fine grained like siltstone; shale, very light-gray (N8), like 3440-3490 and medium dark-gray (N4).
3505-3520	15	Sandstone 90%, shale 10%: sandstone, like 3490-3505, and grayish-red.

Depth (feet)	Thickness (feet)	
3520-3530	10	Like 3490-3505.
<u>Bluefield shale</u> — 385 feet —		
3530-3545	15	Shale: medium dark-gray (N4), silty to little non-silty, trace mica; sandstone, like 3490-3505, part well cemented, trace mica; sample contains trace of pyrite and red shale.
3545-3575	30	Shale 80%, siltstone 10%, sandstone 10%: shale, medium dark-gray (N4) to medium light-gray (N6); siltstone, light-gray (N7), well cemented; sandstone, like 3490-3505; sample contains trace of limestone.
3575-3585	10	Shale 70%, siltstone 30%: shale, medium-gray (N5); siltstone, light-gray (N7), subrounded to rounded, moderately well sorted and cemented, slightly micaceous.
3585-3600	15	Shale 70%, siltstone 25%, limestone 5%: shale, medium-gray (N5), like 3575-3585; siltstone, like 3575-3585; limestone, medium-gray (N5), finely crystalline; sample contains trace red shale.
3600-3635	35	Siltstone, shale 50%: siltstone, medium light-gray (N6), subrounded, well sorted, contains considerable minute black mineral grains, moderately well cemented; shale, medium light-gray (N6), silty; to shale, dark gray (N3) and medium-gray (N5), slightly silty, finely micaceous.

Depth (feet)	Thickness (feet)	
3635-3665	30	Siltstone 70%, shale 30%: siltstone, like 3600-3635, grading to very fine grained sandstone; shale, medium-gray (N5), like 3600-3635; shale, medium-gray (N5), slightly calcareous to dark-gray (N3), like 3600-3635.
3665-3700	5	Shale: medium dark-gray (N4), trace fossiliferous.
3700-3740	40	Shale: medium-gray (N5).
3740-3810	70	Shale 70%, limestone 30%: shale, medium-gray (N5), calcareous to noncalcareous; limestone, light-gray (N7), finely to medium crystalline to some coarsely crystalline; limestone, medium-gray (N5), finely to medium crystalline.
3810-3835	25	Shale 90%, siltstone 10%: shale, medium-gray (N5), noncalcareous to 1/5 very calcareous; siltstone, light-gray (N7), fine-grained, very well cemented; sample contains trace limestone.
3835-3870	35	Shale 85%, limestone 15%: shale, medium-gray (N5), slightly calcareous to calcareous; limestone, argillaceous, medium-gray (N5), finely crystalline.
3870-3915	45	Shale: calcareous, medium dark-gray (N4) to medium-gray (N5).
		<u>Greenbrier limestone</u> — 569 feet
3915-3930	15	Shale 60%, limestone 40%: shale, like 3870-3915; limestone, argillaceous, medium dark-gray (N4), some light-gray (N7), medium to finely crystalline, slightly fossiliferous; sample contains trace of calcite.

Depth (feet)	Thickness (feet)	
3930-3940	10	Limestone 90%, shale 10%: limestone, medium-gray (N5), to some very light-gray (N8) and light brownish-gray (5YR 6/1), crinoidal, medium crystalline and some finely crystalline; shale, like 3915-3930.
3940-3950	10	Limestone 95%, shale 5%: like 3930-3940; limestone, with trace bryozoan.
3950-3960	10	Like 3930-3940; limestone, with trace bryozoan and little coarsely crystalline.
3960-3970	10	Like 3930-3940.
3970-3975	5	Limestone 95%, shale 5%: like 3930-3940; with fossil fragments in the limestone; shale, medium-gray (N5).
3975-3994	19	Shale 95%, limestone 5%: shale, calcareous, medium-gray (N5); limestone, like 3930-3940.
3994-4015	21	Shale 90%, limestone 10%: shale, like 3975-3994, very calcareous; limestone, argillaceous, medium-gray (N5), very finely crystalline.
4015-4021	6	Like 3994-4015.
4021-4038	17	Limestone: medium-gray (N5), very finely crystalline to very light-gray (N8), finely crystalline.
4038-4047	9	Limestone: like 4021-4038, medium crystalline, slightly oolitic; very light-gray (N8), medium crystalline, moderately oolitic.

Depth (feet)	Thickness (feet)	
4047-4058	11	Limestone: very light-gray (N8), like 4021-4038, moderately oolitic, slightly crinoidal; limestone, medium-gray (N5), like 4021-4038.
4058-4074	16	Limestone: medium dark-gray (N4), very finely crystalline; limestone, very light-gray (N8), finely crystalline.
4074-4093	19	Limestone: argillaceous, medium dark-gray (N4), finely crystalline; limestone, medium dark-gray (N4), like 4058-4074; limestone, very light-gray (N8), like 4058-4074, part oolitic.
4093-4102	9	Limestone: dark-gray (N3), finely crystalline, part mottled with light-gray (N7); limestone, argillaceous, medium dark-gray (N4), like 4058-4074; limestone, brownish-gray (5YR 4/1), very finely crystalline; limestone, very light-gray (N8), like 4058-4074.
4102-4110	8	Limestone: medium dark-gray (N4) to medium-gray (N5), very finely crystalline with trace of oolites; limestone, very light-gray (N8), like 4058-4074.
4110-4121	11	Limestone: like 4058-4074 to part medium crystalline, slightly oolitic and mottled with light-gray (N7); limestone, very light-gray (N8), like 4102-4110.
4121-4132	11	Like 4058-4074; part very light-gray (N8); limestone oolitic.

Depth (feet)	Thickness (feet)	
4132-4152	20	Limestone: medium dark-gray (N4), very finely crystalline; limestone, like 4058-4074, mottled with light-gray (N7).
4152-4160	8	Limestone: like 4058-4074; limestone, very light-gray (N8) to light-gray (N7), most oolitic.
4160-4174	14	Limestone: like 4058-4074; limestone, light-gray (N7), finely crystalline.
4174-4177	3	Like 4058-4074; limestone, slightly argillaceous, trace oolitic; limestone, light-gray (N7), finely crystalline to very finely crystalline.
4177-4189	12	Limestone: light brownish-gray (5YR 6/1), medium crystalline with trace finely to medium crystalline, oolitic, slightly mottled with very light-gray (N8) limestone, trace crinoid fragment.
4189-4202	13	Like 4177-4189 with more very light-gray limestone mottling.
4202-4219	17	Limestone: medium-gray (N5), very finely crystalline, some mottled with very light-gray (N8) limestone; limestone, light brownish-gray (5YR 6/1), very finely crystalline to some coarsely crystalline; limestone, very light-gray (N8), finely crystalline.
4219-4229	10	Like 4202-4219.
4229-4243	14	Like 4202-4219; limestone, medium-gray (N5); limestone, light brownish-gray (5YR 6/1); limestone, very light-gray (N8).

Depth (feet)	Thickness (feet)	
4243-4350	7	Like 4202-4219.
4250-4265	15	Like 4202-4219; limestone, light brownish-gray (5YR 6/1); limestone, medium-gray (N5); limestone, very light-gray (N8).
4265-4275	10	Like 4250-4265; limestone, light brownish-gray (5YR 6/1); limestone, medium-gray (N5); limestone, very light-gray (N8).
4275-4291	26	Like 4250-4265; sample contains a trace of chert, grayish-orange (10YR 7/4).
4291-4298	7	Like 4250-4265; limestone, light brownish-gray (5YR 6/1); limestone, medium-gray (N5); limestone, very light-gray (N8).
4298-4307	9	Limestone: medium dark-gray (N4), finely crystalline, part oolitic, part mottled with light-gray (N7) limestone; limestone, light brownish-gray (5YR 6/1), like 4250-4265.
4307-4325	18	Limestone: like 4250-4265, medium crystalline, oolitic; limestone, medium dark-gray (N4), non- oolitic; limestone, light-gray (N7).
4325-4340	15	Like 4250-4265; only less oolitic.
4340-4355	15	Like 4250-4265.
4355-4368	13	Limestone: medium light-gray (N6), very finely crystalline with a trace of medium crystalline; limestone, medium dark-gray (N4), finely crys- talline, trace oolitic; limestone, very light- gray (N8), medium to finely crystalline, part oo- litic; sample contains fossil fragments.

Depth (feet)	Thickness (feet)	
4368-4384	16	Like 4355-4368.
4384-4396	12	Limestone: medium brownish-gray (5YR 5/1), very finely to finely crystalline.
4396-4405	9	No sample.
4405-4420	15	Limestone: medium dark-gray (N4), very finely crystalline, some slightly mottled with light- gray (N7).
4420-4441	21	Limestone: medium brownish-gray (5YR 5/1), finely to some medium crystalline, part oolitic; lime- stone, medium dark-gray (N4), like 4005-4020; limestone, very light-gray (N8), like 4355-4368.
4441-4452	11	Limestone: medium brownish-gray (5YR 5/1), like 4420-4441; limestone, medium dark-gray, like 4005-4020; limestone, very light-gray (N8), like 4355-4368.
4452-4463	11	Limestone: light-gray (N7), very finely crystalline; limestone, very light-gray (N8) to white (N9), finely crystalline; limestone, medium dark-gray (N4) to medium light-gray (N6), very finely crystalline, slightly argillaceous.
4463-4476	13	Limestone: medium dark-gray (N4), finely crystalline, slightly argillaceous; limestone, light-gray (N7) to very light-gray (N8), finely crystalline; sample contains a trace of oolites.

Depth (feet)	Thickness (feet)	
4476-4484	8	Limestone: medium dark-gray (N4), very finely crystalline; limestone, light-gray (N7), finely crystalline.
		<u>Maccrady shale</u> 101 feet
4484-4499	15	Shale 90%, limestone 10%: shale, medium-gray (N5), part slightly silty to grayish-red (5R 4/2), slightly silty, and micaceous, and calcareous;
4499-4509	10	Shale 80%, limestone 20%: shale, silty, medium-gray (N5); limestone, very light brownish-gray (5YR 7/1), very finely crystalline; shale, grayish-red (5YR 4/2), like 4484-4499.
4509-4527	18	Shale: silty, medium light-gray (N6); shale, medium-gray (N5) to grayish-red (5YR 4/2), like 4484-4499.
4527-4543	16	Shale: medium-gray (N5) to medium light-gray (N6), like 4509-4527; shale, silty, medium dark-gray (N4), like 4476-4484; sample contains trace of red shale and limestone.
4543-4565	22	Shale 70%, limestone 30%: shale, medium-gray (N5), slightly silty to nonsilty; shale, light-gray (N7); limestone, very light-gray (N8), finely crystalline, fossiliferous.

Depth (feet)	Thickness (feet)	
4565-4575	10	Siltstone 85%, shale 15%: siltstone, light-gray (N7), subrounded, very well sorted, slightly sandy, calcareous cement, friable, some slightly peppered with black mineral; shale, silty, medium-gray (N5), slightly calcareous; trace limestone.
4575-4585	10	Like 4565-4575; siltstone, better cemented; trace red shale.
		Price sandstone Recent formation
4585-4598	13	Sandstone 80%, shale 20%: sandstone, light-gray (N7), very fine-grained, moderately well sorted, trace mica, very slightly calcareous cement, few dark mineral grains; shale, medium-gray (N5), like 4565-4575.
4598-4612	14	Sandstone 90%, shale 10%: like 4585-4598.
4612-4623	11	Like 4585-4598.
4623-4640	17	Shale 95%, sandstone 5%: shale, silty, medium-gray (N 4.8), trace mica; sandstone, like 4585-4598.
4640-4650	10	Sandstone 60%, shale 40%: like 4585-4598.
4650-4660	10	Siltstone 75%, sandstone 25%: siltstone, argillaceous, light-gray (N7), fine-grained, well sorted; sandstone, like 4585-4598.
4660-4662	2	No sample.
4662-4671	9	Siltstone 80%, shale 20%: siltstone, like 4650-4660; shale, medium-gray (N5).

Depth (feet)	Thickness (feet)	
4671-4686	15	Shale 70%, siltstone 30%: shale, dark-gray (N3), finely micaceous; siltstone, like 4650-4660; trace red shale.
4686-4700	14	Shale 50%, sandstone 50%: shale, medium dark-gray (N4); sandstone, light-gray (N7), very fine grained, subangular to subrounded, moderately poorly sorted, with numerous medium-grained angular and rounded quartz grains (conglomeratic?); trace red shale and pyrite.
4700-4712	12	Sandstone 50%, siltstone 30%, shale 20%: sandstone, like 4680-4700, with rounded and angular pieces of quartz to coarse-grained size, conglomeratic; siltstone, medium light-gray (N6), fine-grained, subrounded, moderately well sorted, shaly structure; shale, medium dark-gray (N4), like 4686-4700; trace red shale.

V

Summary of Carlson No. 1 Well 29

	Depth (feet)	Thickness (feet)
Norton formation	638- 808	170 +
Lee formation	808-2172	1364
Bluestone formation	2172-2673	501
Princeton sandstone	2673-2759	86
Hinton formation		
Avis limestone member of Reger	2759-2840	81
Hinton formation undivided	2840-3391	551
Stony Gap sandstone member	3391-3530	139
Bluefield shale	3530-3915	385
Greenbrier limestone	3915-4484	569
Kaccrady shale	4484-4585	101
Price sandstone	4585-4712	127 +

503-
DEPARTMENT OF THE INTERIOR

UNITED STATES GEOLOGICAL SURVEY *[Reports - Open file series]*

W. E. Wrather, Director

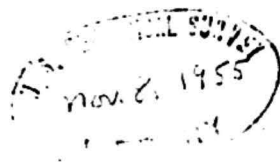
[Detailed logs of 28 wildcat wells in ... Virginia]

Sample Record of the National Shawmut Bank of Boston No. 5810 well,

Buchanan County, Virginia

by

Eloise T. Jacobsen and A. D. Williamson



Prepared in Cooperation with the Division of Geology of
the Virginia Department of Conservation and Development

OPEN FILE

This report is preliminary and has not
been edited or reviewed for conformity
with U. S. Geological Survey standards
and nomenclature.

Sample Record of the National Shawmut Bank of Boston No. 5810 well,
Buchanan County, Virginia

by

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The United Fuel Gas Company has kindly made available for examination and publication the samples of the National Shawmut Bank of Boston No. 5810 well. This well was drilled near the West Virginia State Line in eastern Buchanan County. It started in the Pennsylvanian Norton formation and stopped in the Devonian Millboro shale at a depth of 5302 feet. The method of sample examination and the explanation of the correlations here given is in ^{U.S.}~~Virginia~~ Geological Survey Bulletin No. 1027, (in preparation).

NATIONAL SHAWMUT BANK OF BOSTON NO. 5810 WELL

Buchanan County, Virginia.

United Fuel Gas Company.

Located 15,000 ft N. of $37^{\circ}20'$; 9,800 ft W. of $81^{\circ}55'$; Long Branch of
Tug Fork on Knox River, N. of White Oak Fork.

Elevation, 1263.12 ft Gr.

Total depth, 5302 ft; cable tools.

Drilling commenced February 2, 1949; completed August 12, 1949; plugged
and abandoned October 28, 1949.

Production: none.

Gas shows at 222, 494, 917, 1209, 1350, 2274-2279, 2308-2312, 2805,
2812, 3151-3200.

Coal at 385-391, 310-315, 335-345, 440-450, 828-836, 836-841, 915-926,
964-973 ft

Samples examined by Allen D. Williamson, 60-1032 ft, October 1949;
by Eloise T. Jacobsen, 1032-2798 ft, May and June 1949; and 2798-
5305 ft, January 1950.

Sample Library Reference: Virginia Geological Survey and Kentucky
Geological Survey

Depth (feet)	Thickness (feet)	
<u>Norton formation</u>		
0-60	60	No sample.
60-70	10	Sandstone: light-gray (N7), medium-grained, subangular to angular, poorly sorted, 75%

Depth
(feet)

Thickness
(feet)

quartz, fine-grained black mineral, trace
green mineral and pyrite.

Depth (feet)	Thickness (feet)	
70-79	9	Like 60-70.
79-85	6	Shale: medium light-gray (N6), slightly micaceous (muscovite ?).
85-95	10	Siltstone: medium light-gray (N6), fine-grained, poorly sorted, black mineral inclusions.
95-106	11	Sandstone: light-gray (N7), medium- to coarse- grained, subangular to angular, poorly sorted, 75% quartz, black mineral, little green mineral (glauconite).
106-114	8	Like 95-106.
114-122	8	Shale: black (N1), platy, carbonaceous (?).
122-132	10	Sandstone: light-gray (N7), fine-grained, sub- angular to angular, poorly sorted, 75% quartz, black mineral, trace of green mineral.
132-138	6	Like 122-132; slightly more clay cement.
138-150	12	Shale: silty, micaceous, medium-gray (N4), friable, slightly calcareous.
150-164	14	Like 138-150.
164-171	7	Like 138-150.
171-175	4	Like 138-150.
175-185	10	Like 138-150.
185-215	30	Like 122-132; sample contains more quartz.
215-225	10	Shale: silty, medium-gray (N5), slightly cal- careous, slightly micaceous; sample contains a trace of pyrite.

Depth (feet)	Thickness (feet)	
225-235	10	Sandstone: light-gray (N7), very fine grained, subangular to angular, little green mineral (chlorite ?), brown mineral (phlogopite ?), 40% quartz; sample contains a trace of pyrite.
235-242	7	Shale: medium-gray (N5), moderately silty, compact, moderately micaceous (muscovite ?).
242-250	8	Like 235-242.
250-256	6	Shale: silty, medium-gray (N5), slightly micaceous.
256-270	14	Shale: silty, micaceous, medium light-gray (N6); shale, carbonaceous, black (N1).
270-285	15	Like 256-270; sample contains no black shale.
285-291	6	Shale: silty, medium-gray (N5), fissile, slightly micaceous; sample contains a trace of coal and carbonaceous shale.
291-303	12	Like 285-291.
303-310	7	Shale: silty, micaceous, medium light-gray (N6).
310-315	5	Shale: like 303-310; sample contains a trace of coal and carbonaceous shale.
315-325	10	Sandstone: medium dark-gray (N4), very fine grained, subangular to angular, 25% quartz, slightly micaceous (muscovite and sericite ?), green mineral (chlorite ?), and black mineral.
325-335	10	Shale: dark-gray (N3), micaceous (muscovite ?); shale, carbonaceous, black (N1).

Depth (feet)	Thickness (feet)	
335-345	10	Shale 90%, coal 10%: shale, dark-gray (N3), compact, finely micaceous.
345-350	5	Shale: medium dark-gray (N4); sample contains a trace of coal and carbonaceous shale.
350-358	8	Shale: grayish-black (N2), slightly silty, finely micaceous.
358-365	7	Like 350-358.
365-371	6	Shale: black (N1), slightly silty, finely micaceous, carbonaceous (?).
371-378	7	Like 365-371.
378-381	3	Shale: micaceous, dark-gray (N3).
381-390	9	Shale: micaceous, medium-gray (N5), fissile.
390-400	10	Sandstone: silty, very light gray (N8), 80% quartz, little black mineral, little mica (muscovite ?), slightly calcareous cement.
400-411	11	Like 390-400; sample contains some fine-grained sandstone.
411-417	6	Sandstone: silty, micaceous, medium dark-gray (N4), black mineral, 70% quartz.
417-426	9	Shale: micaceous, carbonaceous, dark-gray (N3).
426-431	5	Like 417-426.
431-440	9	Shale: medium dark-gray (N4), fissile, carbonaceous (?).

Depth (feet)	Thickness (feet)	
440-450	10	Shale 95%, coal 5%: shale, medium-gray (N5), carbonaceous; sample contains a trace of calcite.
450-456	6	Shale: medium dark-gray (N4); sample contains a trace of pyrite.
456-463	7	Like 450-456.
463-471	8	Shale: medium dark-gray (N4), carbonaceous, slightly silty.
471-475	4	Shale: micaceous, medium-gray (N5), dense, blocky.
475-480	5	Like 471-475.
480-486	6	Like 471-475.
<u>Lee formation - 322 feet</u>		
486-491	5	Sandstone: very light gray (N8), very fine to fine-grained, subangular to angular, moderately well sorted, 90% quartz, little mica (muscovite ?), trace of black mineral, slightly porous.
491-496	5	Sandstone: very light gray (N8), fine- to medium-grained, subrounded to subangular, moderately well sorted, 90% quartz, little black mineral, slightly porous.
496-500	4	Sandstone: white (N9), fine- to medium-grained, subrounded to subangular, well sorted, 95% quartz, 30% of quartz grains frosted, friable, porous.

Depth (feet)	Thickness (feet)	
500-505	5	No sample.
505-510	5	Sandstone: white (N9), very fine to medium-grained, subrounded to angular, poorly sorted, 90% quartz, few frosted quartz grains, friable, little mica (muscovite ?), moderately porous.
510-527	17	Sandstone: micaceous, very light gray (N8), 80% quartz, friable, black mineral.
527-535	8	Sandstone: light-gray (N7), friable, 70% quartz, black mineral, micaceous (muscovite ?).
535-544	9	Sandstone: medium-gray (N5), micaceous (muscovite?) and black mineral inclusions, 70% quartz.
544-550	6	Shale: silty, medium dark-gray (N4), micaceous (muscovite ?).
550-560	10	Shale: silty, medium dark-gray (N4), platy, micaceous (muscovite ?).
560-566	6	Siltstone: medium dark-gray (N4).
566-575	9	Like 560-566.
575-584	9	Like 560-566; sample is more argillaceous and slightly micaceous.
584-592	8	Like 560-566; sample contains a trace of limestone, white (N9), very fine grained, crystalline (?).
592-598	6	Siltstone and limestone: siltstone, medium dark-gray (N4), argillaceous; sample contains a trace of limestone, like 592-598.

Depth (feet)	Thickness (feet)	
598-607	9	Siltstone: light-gray (N7), coarse-grained, black mineral, micaceous (muscovite ?).
607-616	9	Like 598-607.
616-625	9	Siltstone and shale: siltstone, micaceous, medium light-gray (N6), coarse-grained, banded; shale, dark-gray (N3), carbonaceous; sample contains a plant fossil.
625-635	10	Siltstone: medium dark-gray (N4), with dissem- inated carbonaceous material.
635-645	10	Sandstone: very light gray (N8), fine- to medium-grained, subrounded to subangular, moderately well sorted, little black mineral, moderately porous.
645-652	7	Like 635-645.
652-662	10	Sandstone: very light gray (N8), very fine to medium-grained, poorly sorted, less porous than 635-645.
662-673	11	Shale: medium light-gray (N6), slightly silty, churky, slightly micaceous.
673-685	12	Shale: medium light-gray (N6), laminated, finely micaceous.
685-695	10	Like 673-685.
695-705	10	Like 673-685.
705-715	10	Shale: medium dark-gray (N4), laminated.

Depth (feet)	Thickness (feet)	
715-722	7	Shale: dark-gray (N3), laminated.
722-730	8	Siltstone: light-gray (N7).
730-738	8	Like 722-730.
738-742	4	Like 722-730.
742-750	8	Sandstone: micaceous, very light gray (N8), very fine to fine-grained, 70% quartz, black and green mineral (glauconite ?).
750-754	4	Like 742-750.
754-762	8	Shale: silty, micaceous, medium dark-gray (N4), thin-bedded.
762-766	4	Sandstone: very light gray (N8), very fine to fine-grained, moderately well sorted.
766-770	4	Like 762-766.
770-775	5	Like 762-766.
775-782	7	Like 762-766.
782-786	4	Sandstone: very light gray (N8), very fine to fine-grained, 95% quartz, little black mineral, slightly porous.
786-790	4	Like 782-786.
790-795	5	Like 782-786.
795-805	10	Sandstone: grayish-orange (10YR 7/4), fine- grained, well sorted, 90% quartz, porous.
805-809	4	Shale: micaceous, medium dark-gray (N4).
809-817	8	Like 805-809.

Depth (feet)	Thickness (feet)	
817-822	5	Shale: sandy, medium dark-gray (N4), slightly carbonaceous; sample contains little chert (?).
822-828	6	Shale: medium dark-gray (N4), compact; sample contains a plant fossil.
828-836	8	Shale: medium dark-gray (N4), compact, carbonaceous; sample contains a trace of coal.
836-841	5	Shale 90%, coal 10%: shale, medium dark-gray (N4), like 828-836.
841-850	9	Shale: medium dark-gray (N4).
850-860	10	Like 841-850.
860-870	10	Shale 95%, coal 5%: shale, medium dark-gray (N4).
870-881	11	Sandstone: light-gray (N7), very fine to fine-grained, 60% quartz, black mineral.
881-890	9	Sandstone: medium light-gray (N6), fine- to medium-grained, 40% quartz, micaceous (muscovite).
890-900	10	Sandstone: light-gray (N7), very fine to fine-grained, 60% quartz, black mineral, micaceous (muscovite ?).
900-905	5	Sandstone: light-gray (N7), black mineral, 70% quartz, micaceous, slightly calcareous.
905-915	10	Shale: dark-gray (N3), slightly micaceous.
915-926	9	Shale and coal: shale, dark-gray (N3), carbonaceous; plant fossil; sample contains a trace of coal.

Depth (feet)	Thickness (feet)	
926-937	11	Shale: dark-gray (N3), compact.
937-946	9	Shale: medium dark-gray (N4), slightly micaceous, massive.
946-956	10	Shale 95%, chert 5%: shale, dark-gray (N3), massive.
956-964	8	Shale: micaceous, dark-gray (N3), massive.
964-973	9	Shale 50%, coal 50%: shale, grayish-black (N2); coal, with very thin interbedded seams of calcite (?).
973-980	7	Shale: dark-gray (N3).
980-985	5	Like 973-980.
985-991	6	Shale: silty, medium dark-gray (N4), platy.
991-1000	9	Like 985-991.
1000-1005	5	Shale: silty, medium-gray (N5), slightly micaceous.
1005-1011	6	Like 1000-1005.
1011-1022	11	Shale: sandy, medium dark-gray (N4).
1022-1030	8	Sandstone: silty, medium light-gray (N6), very fine to fine-grained, moderately well sorted, 70% quartz, black mineral.
1030-1032	2	Sandstone: light-gray (N7), very fine to fine- grained, subangular to angular, moderately well sorted, brown mineral, slightly porous.
1032-1038	6	Sandstone 85%, shale 15%: sandstone, micaceous, very light gray (N8), very fine grained, well

sorted, clustered, black minerals, noncalca-
reous, cementing material; shale, medium
light-gray (N6).

Thick- ness (feet)	Thickness (feet)	
1038-1046	8	Sandstone 80%, shale 20%: like 1032-1038.
1046-1052	6	Shale 80%, sandstone 20%: shale, medium light-gray (N6), silty.
1052-1060	8	Shale: medium light-gray (N6), very slightly silty.
1060-1070	10	Shale and coal: shale, like 1052-1060, slightly micaceous; sample contains a piece of coal with high luster.
1070-1076	6	Sandstone 65%, shale 35%: sandstone, very light gray (N8), very fine grained, subangular, poorly sorted, clustered, some green and black minerals with limonitic stain; shale, like 1052-1060; sample contains some quartz frag- ments, angular, 2 to 3 mm. in diameter.
1076-1082	6	Sandstone 90%, shale 10%: sandstone, very light gray (N8), medium-grained, subangular, mod- erately poorly sorted; sample contains angular white quartz, 2 to 4 mm. in diameter.
1082-1085	3	Sandstone: like 1076-1082.
1085-1090	5	Sandstone 90%, shale 10%: sandstone, fine- to medium-grained, limonitic stain; shale, like 1052-1060.

Thickness
(feet)

1095	5	Sandstone 90%, shale 10%: sandstone, fine- to medium-grained, clustered to friable, some green (glauconite?) and black mineral inclusions, one-half with limonitic stain; shale, like 1052-1060.
1098	3	Sandstone: like 1090-1095, with few clusters; sample contains quartz fragments, smaller in size than those in sample 1076-1082.
1102	4	Like 1095-1098; sample contains abundant limonitic stain.
1107	5	Like 1095-1098.
1110	3	Like 1095-1098; quartz fragments 2 to 4 mm. in diameter.
1113	3	Like 1095-1098.
1116	3	Like 1095-1098; sandstone, better sorted; quartz fragments with limonitic stain.
1118	2	Like 1095-1098.
1120	2	Like 1095-1098; quartz fragments up to 5 mm. in diameter.
1121	1	Like 1095-1098.
1124	3	Like 1095-1098; one-third quartz fragments smaller than in sample 1118-1120.
1129	5	Like 1095-1098; three-fourths quartz fragments up to 3.5 mm. in diameter.

Thick- ness (feet)	Thickness (feet)	
1133-1133	4	Like 1095-1098; one-half quartz fragments up to 2 mm. in diameter.
1133-1136	3	Like 1095-1098.
1136-1141	5	Like 1095-1098; one-fifth quartz fragments up to 2 mm. in diameter.
1141-1145	4	Like 1095-1098; sandstone, with few to some clusters.
1145-1150	5	Sandstone 50%, quartz fragments 50%: sandstone, very fine to medium-grained, subangular, very poorly sorted, friable, few clusters, some green minerals, translucent chert and a few pieces of brownish-gray chert; quartz fragments, very light gray (N8) to moderate-pink (5R 7/4), angular, translucent, up to 2.5 mm. in diameter.
1150-1157	7	Sandstone: micaceous, light-gray (N7) to medium-gray (N5), very fine grained, subrounded, moderately well sorted, less than 50% quartz, peppered with black minerals.
1157-1161	4	Sandstone: like 1095-1098, with white and yellowish, angular, quartz fragments; sandstone, like 1150-1157.
1161-1163	2	Like 1157-1161.
1163-1165	2	Like 1157-1161.

h t)	Thickness (feet)	
5-1170	5	Sandstone 95%, coal 5%: sandstone, like 1095-1098, clustered to some friable, with quartz fragments; sandstone, light-gray (N7) to medium-gray (N5), like 1150-1157; coal, partly argillaceous.
10-1174	4	Sandstone: like 1095-1098, medium- to coarse-grained, friable; quartz fragments; sandstone, like 1150-1157.
7-1176	2	Like 1170-1174.
76-1179	3	Sandstone, quartz fragments, and chert: sandstone, white (N9), coarse-grained, angular, poorly sorted; quartz, white (N9), angular; chert, dark bluish-gray (5B 4/1); sample contains a trace of green mineral.
79-1184	5	Like 1176-1179.
84-1189	5	Like 1176-1179; sample contains some shale, dark bluish-gray (5B 4/1).
89-1195	6	Sandstone: yellowish-gray (5Y 8/1), very fine grained, subrounded, rather well sorted, friable; sandstone, white (N9), like 1176-1179.
95-1198	3	Sandstone: yellowish-gray (5Y 8/1), very fine to medium-grained, friable; sample contains small angular quartz pieces.

Thick- ness (feet)	Thickness (feet)	
1198-1200	2	Sandstone: white (N9), medium- to coarse-grained, subangular, poorly sorted, friable, some limonitic stain; sample contains angular, quartz fragments, 1 to 2 mm. in diameter.
1200-1205	5	Like 1198-1200.
1205-1212	7	Like 1198-1200; quartz fragments, 1 to 3 mm. in diameter.
1212-1217	5	Shale 90%, sandstone 10%: shale, medium-gray (N5) to medium light-gray (N6), very silty to slightly silty, partly micaceous; sandstone, micaceous, light-gray (N7), very fine grained, very slightly calcareous.
1217-1220	3	Sandstone 75%, shale 25%: like 1212-1217; sandstone, micaceous, light-gray (N7).
1220-1227	7	Sandstone 90%, shale 10%: like 1212-1217.
1227-1230	3	Sandstone 90%, shale 10%: like 1212-1217; shale, very carbonaceous; sample contains numerous quartz grains, 1 to 2 mm. in diameter.
1230-1236	6	Shale: silty, medium-gray (N5), finely micaceous.
1236-1240	4	Sandstone 80%, shale 20%: sandstone, white (N9), medium-grained, subrounded to subangular, poorly sorted, friable to small clusters, some green (glauconite ?) and black minerals included; shale, like 1230-1236.

Depth (feet)	Thickness (feet)	
1240-1250	10	Shale: silty, micaceous, medium light-gray (N6).
1250-1258	8	Like 1240-1250.
1258-1260	2	Sandstone 70%, shale 25%, and chert 5%: sandstone, light-gray (N7), very fine grained, subrounded, poorly sorted, 50% quartz, clustered, abundant fine-grained black mineral; abundant chert, yellowish-gray (5Y 8/1) and white quartz fragments to 2.5 mm. in diameter; shale, like 1240-1250, to medium dark-gray (N4), carbonaceous.
1260-1268	8	Sandstone 85%, shale 15%: like 1258-1260.
1268-1273	5	Sandstone 95%, shale 5%: like 1258-1260; shale, slightly carbonaceous.
1273-1280	7	Sandstone 85%, shale 15%: like 1258-1260.
1280-1285	5	Sandstone 95%, shale 5%: like 1258-1260.
1285-1290	5	Sandstone 80%, shale 20%: like 1258-1260; shale, medium light brownish-gray (5YR 5/1), fissile; grading into siltstone, brownish-gray (5YR 5/1), very fine grained.
1290-1295	5	Sandstone 95%, shale 5%: sandstone, like 1258-1260; shale, medium-gray (N5), fissile.
1295-1300	5	Like 1258-1260.
1300-1307	7	Sandstone 80%, shale 20%: sandstone, like 1258-1260; shale, silty, medium light-gray (N6), micaceous.

Depth (feet)	Thickness (feet)	
1307-1314	7 1/2	Sandstone 95%, shale 5%: like 1253-1260.
1314-1324	10	Like 1258-1260.
1324-1327	3 1/2	Sandstone 85%, shale 15%: like 1258-1260; shale, very silty.
1327-1331	4 1/2	Sandstone 90%, shale 10%: sandstone, very light gray (N8), fine- to medium-grained, subangular to subrounded, few fine-grained dark mineral inclusions, micaceous (muscovite ?), about 50% quartz; shale, like 1258-1260, to part brownish-gray (5YR 4/1), resinous.
1331-1339	8 1/2	Sandstone 96%, shale 2%: like 1327-1331.
1339-1344	5	Sandstone 96%, shale 4%: like 1327-1331.
1344-1346	2	Sandstone 95%, shale 5%: sandstone, very light gray (N8), very fine grained, like 1327-1331, less quartz in sample; shale, silty, micaceous, medium-gray (N5).
1346-1350	4 1/2	Sandstone 90%, shale 10%: like 1344-1346; sand- stone, slightly conglomeratic; shale, partly very carbonaceous.
1350-1354	4 1/2	Sandstone 95%, shale 5%: like 1344-1346.
1354-1360	6	Sandstone 95%, shale 5%: like 1344-1346; sand- stone, medium-gray (N5).
1360-1365	5	Like 1344-1346.
1365-1371	6	Sandstone 95%, quartz 5%: sandstone, like 1344- 1346; quartz fragments up to 1 mm. in diameter.

Depth (feet)	Thickness (feet)	
1371-1376	5	Sandstone: like 1344-1346, medium- to coarse-grained.
1376-1381	5	Sandstone: like 1344-1346; sample contains a few quartz fragments, 1 mm. in diameter.
1381-1386	5	Like 1344-1346; abundant limonitic stain.
1386-1390	4	Like 1344-1346; abundant limonitic stain.
1390-1396	6	Sandstone: like 1344-1346, abundant limonitic stain; sandstone, yellowish-gray (5Y 8/1), very fine grained, subrounded, moderately well sorted, some green mineral (glauconite ?) inclusions, very calcareous cement.
1396-1399	3	Sandstone: medium-gray (N5), like 1344-1346.
1399-1404	5	Sandstone: white (N9), medium-grained, sub-angular, moderately well sorted, few dark mineral inclusions, slightly micaceous (muscovite ?), friable to few clusters.
1404-1407	3	Like 1399-1404.
1407-1410	3	Like 1399-1404; small clusters, some friable.
1410-1412	2	Like 1399-1404; sample contains abundant limonitic stain.
1412-1417	5	Like 1399-1404.
1417-1418	1	Like 1399-1404; sample contains a few quartz fragments, 3/4 mm. in diameter.

Depth
(feet)

Thickness
(feet)

Bluestone formation ~~374 feet~~

1418-1425	7	Sandstone 70%, shale 30%: sandstone, like 1399-1404; shale, carbonaceous; coal, argillaceous.
1425-1431	6	Shale 80%, sandstone 20%: shale, micaceous, medium-gray (N5); sandstone, like 1399-1404.
1431-1438	7	Sandstone 80%, shale 20%: sandstone, very light gray (N8), medium-grained, subangular, poorly sorted, friable with some clusters, about 50% quartz, numerous black mineral inclusions; shale, like 1425-1431.
1438-1448	10	Shale: micaceous, brownish-gray (5YR 4/1).
1448-1456	8	Shale: medium light-gray (N6), slightly silty to silty; shale, light olive-gray (5Y 6/1) to brownish-gray (5YR 4/1).
1456-1461	5	Shale: medium light-gray (N6), like 1448-1456; shale, sandy, medium light-gray (N6); shale, dark reddish-brown (10R 3/4), moderately fissile.
1461-1467	6	Shale: medium light-gray (N6), like 1448-1456; shale, dark reddish-brown, like 1456-1461; shale, brownish-gray to light olive-gray, like 1448-1456.
1467-1474	7	Shale 70%, siltstone 30%: shale, dark reddish-brown, like 1456-1461; shale, medium light-gray (N6), like 1448-1456, slightly micaceous;

Depth (feet)	Thickness (feet)	
1474-1482	8	Shale 80%, siltstone 20%: shale, grayish-red (5R 4/2) to blackish-red (5R 2/2); shale, medium-gray (N5), very slightly micaceous, silty to very silty; siltstone, like 1467-1474 to sandstone, very fine grained.
1482-1490	8	Shale: red; shale, medium-gray (N5), like 1474-1482, nonsilty to silty.
1490-1497	7	Shale: red; shale, medium dark-gray (N4), calcareous to noncalcareous.
1497-1506	9	Shale: medium dark-gray (N4); shale, red.
1506-1513	7	Shale: medium-gray (N5), slightly calcareous; shale, red.
1513-1520	7	Shale: medium dark-gray (N4).
1520-1529	9	Shale: like 1513-1520, very slightly calcareous.
1529-1535	6	Shale: like 1513-1520; shale, red, like 1474-1482.
1535-1545	10	Shale: like 1513-1520, calcareous; shale, calcareous, medium grayish-red (5R 3/1).
1545-1550	5	Shale: medium dark-gray (N4), like 1513-1520; shale, medium grayish-red (5R 3/1).
1550-1555	5	Shale 80%, sandstone 20%: shale, medium dark-gray (N4), like 1513-1520; shale, medium grayish-red (5R 3/1), like 1535-1545; sandstone,

light-gray (N7), very fine grained, subrounded,
rather poorly sorted, few green, red, and dark
minerals, very calcareous cement.

Depth (feet)	Thickness (feet)	
1555-1560	5	Shale 70%, sandstone 30%: shale, medium dark-gray (N4), like 1513-1520; shale, red, like 1474-1482; sandstone, like 1550-1555.
1560-1567	7	Shale 70%, sandstone 30%: like 1555-1560.
1567-1573	6	Shale 80%, sandstone 20%: shale, medium dark-gray (N4), like 1513-1520; sandstone, like 1550-1555.
1573-1579	6	Like 1567-1573; noncalcareous cement in sandstone.
1579-1580	1	Shale 50%, sandstone 50%: shale, medium dark-gray (N4), medium grayish-red (5R 3/1), like 1545-1550, to greenish-gray; sandstone, light-gray (N7), very fine grained, subrounded, poorly sorted, about 50% quartz, friable to clustered.
1580-1587	7	Shale 50%, sandstone 50%: like 1579-1580; sandstone, few large flakes of mica (muscovite ?), very slightly calcareous cement.
1587-1594	7	Sandstone 95%, shale 5%: sandstone, silty, very light gray (N8), very fine grained, subrounded, moderately well sorted, very slightly micaceous; shale, grayish-red (10R 4/2), slightly calcareous.
1594-1600	6	Sandstone 97%, shale 3%: like 1587-1594.

Depth (feet)	Thickness (feet)	
1600-1608	8	Siltstone 98%, shale 2%: siltstone, like sandstone in 1587-1594, coarse-grained.
1608-1616	8	Siltstone 70%, shale 30%: siltstone, like 1600-1608; shale, silty, medium light-gray (N6), very slightly micaceous.
1616-1621	5	Sandstone 65%, shale 35%: sandstone, very light gray (N8), very fine grained, like siltstone in 1600-1608, silty and argillaceous; shale, grayish-purple (5RP 4/2); shale, medium-gray (N5); shale, silty, medium light-gray (N6); shale, brown (5YR 4/2); sample contains a trace of variegated shale, light-gray (N7) and red.
1621-1628	7	Sandstone 70%, shale 30%: like 1616-1621; shale, grayish-purple (5RP 4/2); shale, silty, medium-gray (N5).
1628-1635	7	Sandstone 60%, shale 40%: like 1621-1628.
1635-1642	7	Siltstone 70%, shale 30%: siltstone, argillaceous, light-gray (N7), coarse-grained, sub-rounded, moderately well sorted, abundant dark and black minerals, very slightly micaceous; shale, medium-gray (N5), part very slightly micaceous.
1642-1650	8	Siltstone 60%, shale 40%: like 1635-1642; siltstone, very coarse-grained; shale, very silty.

Depth (feet)	Thickness (feet)	
1650-1658	8	Siltstone 70%, shale 30%: like 1635-1642; shale, very silty.
1658-1665	7	Shale 65%, siltstone 35%: shale, medium dark- gray (N4); siltstone, like 1635-1642.
1665-1672	7	Shale: medium-gray (N5), moderately calcareous; sample contains a trace of finely micaceous material.
1672-1679	7	Shale: calcareous, medium dark-gray (N4), very finely micaceous; sample contains a trace of red shale and very fine grained, white sandstone.
1679-1688	9	Shale: like 1672-1679; sample contains a trace of red shale.
1688-1694	6	Like 1672-1679.
1694-1700	6	Like 1672-1679; part silty.
1700-1707	7	Shale 60%, sandstone 40%: shale, like 1672- 1679; sandstone, very light gray (N8), very fine grained, subrounded, moderately well sorted, slightly calcareous cement; sample contains a trace of red shale.
1707-1714	7	Shale 75%, sandstone 25%: shale, silty, medium light gray (N6); sandstone, like 1700-1707; sample contains a trace of red shale.
1714-1721	7	Shale 85%, sandstone 15%: shale, like 1707-1714; sandstone, like 1700-1707.

Depth (feet)	Thickness (feet)	
1721-1730	9	Like 1714-1721.
1730-1738	8	Shale: medium dark-gray (N4), nonmicaceous to very finely micaceous; sample contains a trace of sandstone, like 1700-1707.
1738-1747	9	Shale 60%, siltstone 40%: shale, like 1707-1714, part slightly calcareous, part micaceous and silty; siltstone, micaceous, light-gray (N7), medium-grained, subrounded, abundant dark mineral inclusions; siltstone, very light gray (N8), fine-grained, subrounded, calcareous cement.
1747-1753	6	Siltstone 70%, shale 30%: siltstone, argillaceous, very light gray (N8), medium-grained, subrounded, poorly sorted, very slightly calcareous cement; siltstone, light-gray (N7), like 1738-1747; shale, medium-gray (N5); shale, silty, medium-gray (N5), finely micaceous; sample contains a trace of red shale.
1753-1760	7	Siltstone 60%, shale 40%: siltstone, very light gray (N8), coarse-grained, like 1747-1753; shale, medium-gray (N5); shale, silty, medium-gray (N5).

Depth (feet)	Thickness (feet)	
1760-1766	6	Sandstone 40%, siltstone 30%, shale 30%: sandstone, argillaceous, very light gray (N8), very fine grained, subrounded to subangular, poorly sorted, very slightly calcareous cement, very slightly peppered with dark minerals; siltstone and shale, like 1753-1760.
1766-1770	4	Sandstone 65%, shale 25%, siltstone 10%: sandstone, like 1760-1766; siltstone, like 1753-1760; shale, medium dark-gray (N4), part silty and micaceous; shale, calcareous, grayish-red (10R 4/2).
1770-1774	4	Sandstone 50%, siltstone 25%, shale 25%: sandstone, like 1760-1766; siltstone, like 1753-1760; shale, grayish-red (10R 4/2); sample contains a trace of red shale, noncalcareous to calcareous and a trace of pyrite.
1774-1782	8	Shale 85%, sandstone 15%: shale, silty, medium-gray (N5); shale, like 1770-1774, red, calcareous; sandstone, like 1770-1774, to white (N9); sample contains a trace of pyrite.
1782-1792	10	Shale: medium-gray (N5), like 1774-1782; shale, red.

Depth
(feet)

Thickness
(feet)

Princeton sandstone — ~~168 feet~~

1792-1797	5	Sandstone 75%, shale 25%: sandstone, light-gray (N7) to very light gray (N8), very fine grained, subrounded, moderately well sorted, slightly silty, slightly calcareous to calcareous cement, clustered; shale, like 1774-1782; sample contains a trace of red shale.
1797-1804	7	Like 1792-1797; part of shale, nonsilty.
1804-1808	4	Sandstone 80%, shale 20%: sandstone, like 1792-1797, coarse-grained, friable; shale, like 1774-1782.
1808-1815	7	Sandstone 70%, shale 30%: sandstone, white (N9), like 1804-1808; sandstone, light-gray (N7), very fine grained, subrounded, moderately poorly sorted, dark mineral inclusions, well cemented clusters; shale, medium dark-gray (N4); shale, red.
1815-1820	5	Sandstone 90%, shale 10%: sandstone, white (N9), like 1792-1797, some dark mineral inclusions, few clusters fine-grained, very calcareous cement; sandstone, light-gray (N7), like 1815-1820; shale, like 1808-1815; sample contains a trace of pyrite.

Depth (feet)	Thickness (feet)	
1820-1825	5	Sandstone 95%, shale 5%: sandstone, white (N9) to very light gray (N6).
1825-1828	3	Siltstone 85%, shale 15%: siltstone, light-gray (N7), coarse-grained, subrounded, moderately poorly sorted, very slightly micaceous, slightly peppered with dark minerals, slightly calcareous cement; shale, medium dark-gray (N4), nonsilty to silty, slightly micaceous.
1828-1837	9	Siltstone 90%, shale 10%: siltstone, like 1825-1828; shale, medium dark-gray (N4), like 1825-1828; shale, grayish red-purple (5RP 4/2) with one piece showing contact.
1837-1843	16	Sandstone 90%, shale 10%: sandstone, like siltstone in 1825-1828, light-gray (N7) to medium light-gray (N6), very fine grained; shale, medium dark-gray (N4); shale, purple.
1843-1850	7	Sandstone 50%, siltstone 35%, shale 15%: sandstone, like 1837-1843, part with very calcareous cement; siltstone, like 1825-1828; shale, medium dark-gray (N4), finely micaceous.
1850-1855	5	Sandstone 50%, shale 40%, siltstone 10%: sandstone, like 1837-1843; shale, medium dark-gray (N4), like 1843-1850; shale, grayish-red (10R 4/2), noncalcareous to part very calcareous; siltstone, like 1825-1828.

Depth (feet)	Thickness (feet)	
1855-1860	5	Sandstone 50%, shale 50%: like 1850-1855.
1860-1864	4	Sandstone 50%, shale 50%: like 1850-1855; sandstone approaching siltstone; sample contains a trace of pyrite.
1864-1867	3	Sandstone 80%, shale 20%: sandstone, white (N9), very fine grained, subrounded, moderately well sorted, slightly peppered with small black mineral grains, moderately friable; sandstone, white (N9), very fine to fine-grained, subangular to subrounded, poorly sorted, moderately friable; shale, dark-gray (N3); shale, grayish-red (5R 4/2), calcareous.
1867-1870	3	Sandstone 70%, shale 30%: like 1864-1867; sandstone, white (N9), very fine to fine- to medium-grained, friable; shale, red and gray; sample contains a trace of pyrite.
1870-1874	4	Sandstone 80%, shale 20%: like 1864-1867; sandstone, fine-grained.
1874-1879	5	Sandstone 50%, shale 50%: sandstone, white (N9), fine-grained, subangular to subrounded, moderately poorly sorted with some medium-grained, subrounded quartz grains, few dark mineral inclusions, friable; shale, medium dark-gray (N4), finely micaceous; shale, grayish-red (10R 4/2), finely micaceous.

Depth (feet)	Thickness (feet)	
1879-1881	2	Sandstone 50%, shale 50%: like 1874-1879; sandstone, with some subangular to angular, coarse-grained, quartz pieces, possibly conglomeratic.
1881-1885	4	Sandstone 93%, shale 7%: like 1874-1879; like 1874-1879; sandstone, conglomeratic.
1885-1887	2	Like 1874-1879.
1887-1889	2	Sandstone 90%, shale 10%: like 1874-1879.
1889-1891	2	Sandstone 80%, shale 20%: like 1874-1879.
1891-1893	2	Sandstone 95%, shale 5%: like 1874-1879.
1893-1895	2	Like 1874-1879; slightly conglomeratic.
1895-1900	5	Like 1874-1879: conglomeratic; sample also contains yellow-gray and very light bluish-gray chert.

Hinton formation

Hinton formation (Avis limestone member of Reger) - 37 feet

1900-1902	2	Sandstone 60%, shale 40%: shale, medium dark-gray (N4), part laminated, sandstone, like 1874-1879; shale, grayish-red, like 1874-1879, slightly calcareous; sample contains some very coarse grained, angular, quartz pieces.
1902-1905	3	Shale 50%, sandstone 50%: like 1874-1879.
1905-1913	8	Shale 90%, limestone 10%: shale, calcareous, medium light-gray (N6); limestone, argillaceous, light-gray (N7), finely crystalline, slightly fossiliferous (crinoidal); sample contains a trace of red shale and coarse-grained quartz.

Depth (feet)	Thickness (feet)	
1913-1918	5	Limestone: argillaceous, medium-gray (N5).
1918-1924	6	Like 1913-1918; sample contains a trace of light-gray (N7) limestone.
1924-1930	6	Like 1913-1918; sample contains a trace of red, noncalcareous shale.
1930-1937	7	Limestone 93%, shale 7%: limestone, like 1913-1918, medium crystalline; limestone, light-gray (N7), like 1918-1924; shale, light grayish-red (5R 5/2) with one piece showing transition from light-gray limestone.
		<u>Hinton formation (undivided)</u> 249 feet
1937-1948	11	Like 1930-1937; argillaceous, fossiliferous; sample contains a trace of red shale.
1948-1954	6	Shale 80%, siltstone 20%: shale, dark grayish-red (5R 2/2), very slightly micaceous, part slightly silty; shale, calcareous, medium dark-gray (N4); siltstone, calcareous, grayish yellow-green (5GY 7/2), sandy, abundant green mineral (glauconite ?); sample contains a trace of pyrite.
1954-1960	6	Shale: medium-gray (N5) to medium light-gray (N6); shale, red, like 1930-1937, in very calcareous mud.

Depth (feet)	Thickness (feet)	
1960-1967	7	Shale 97%, siltstone 3%: shale, red, like 1930-1937; shale, calcareous, medium dark-gray (N4), like 1948-1954; siltstone and some shale, like 1948-1954.
1967-1972	5	Shale: red, like 1930-1937, silty; shale, medium dark-gray (N4), like 1948-1954, very calcareous to slightly calcareous.
1972-1980	8	Shale: silty, micaceous, medium light-gray (N6); shale, red, like 1930-1937.
1986-1992	6	Shale: silty, medium-gray (N5), approaching siltstone, part slightly micaceous; shale, silty, grayish-red (5R 4/2), finely micaceous.
1992-1999	7	Shale 50%, siltstone 50%: shale, like 1986-1992; siltstone, argillaceous, light-gray (N7), medium-grained, subrounded, slightly peppered with dark mineral, very slightly calcareous cement.
1999-2004	5	Shale 60%, siltstone 40%: like 1992-1999.
2004-2009	5	Shale 70%, siltstone 30%: shale, medium dark-gray (N4), slightly silty to very silty, finely micaceous; siltstone, like 1992-1999.
2009-2015	6	Shale 85%, siltstone 15%: shale, medium dark-gray (N4), like 2004-2009; siltstone, like 1992-1999.