

Arch Rose No. 105 Well

Dickenson County Virginia

Clinchfield Coal Corporation

Located 37° 8' 5" N.; 82° 22' 22" W.

Elevation, 1431.3 ft.

Total Depth, 5364 ft.

Commenced drilling June 9, 1949; completed December 17, 1949

Production, Black shales; gas shows 620, 872, 1011, 4150-4157 (?) ft.

Coal at 35-44, 209-232, 425-431, 443-447, 793-800, 1086-1091, 1164-1174,  
1479-1484 ft.

Samples examined by Mary Beth McFarlan, 0-5364 ft., July 1950

Sample Library Reference: Kentucky Geological Survey

Depth	Thickness	
		Norton formation
0-15	15	Sandstone: silty, moderate yellowish-brown (10YR 5/4), very fine grained, few black minerals; trace shale, medium dark-gray (N4).
15-26	11	Sandstone 98%, shale 2%: Sandstone, very light gray (N8) to light-gray (N7) to some medium light-gray (N6) to some grayish-orange (10YR 7/4), fine-grained to coarse-grained, subrounded to sub-angular, some argillaceous, few pieces silty, few slightly micaceous, few green minerals; shale, silty, medium-gray (N5), shale, carbonaceous, medium dark-gray (N4).
26-35	9	Sandstone 95%, shale 5%: like 15-26.

Depth (feet)	Thickness (feet)	
35-44	9	Siltstone 57%, sandstone 40%, shale 2%, coal 1%: siltstone, medium light-gray (N6), nonargillaceous to argillaceous, few pieces sandy; sandstone, very light gray (N8) to yellowish-gray (5Y 8/1), very fine grained to medium-grained, subrounded to subangular, trace mica; shale, dark-gray (N3) to some medium dark-gray (N4), dark-gray is carbonaceous; coal.
44-55	11	Sandstone 83%, siltstone 15%, shale 2%: sandstone, very light gray (N8) to medium light-gray (N7), very fine grained to fine-grained to few larger quartz fragments, nonargillaceous to argillaceous, nonmicaceous to micaceous, some silty; siltstone, argillaceous, micaceous, medium light-gray (N6) to medium-gray (N5), some sandy; shale, medium dark-gray (N4), some silty, trace coal.
55-63	8	Shale, siltstone: silty shale grading into argillaceous siltstone, micaceous, medium light-gray (N6).
63-68	5	Sandstone 97%, shale 3%: sandstone, white (N9) to medium-gray (N5), very fine grained to fine-grained, nonargillaceous to argillaceous, few slightly calcareous, slightly micaceous, black and green minerals; shale, medium-gray (N5) to some medium dark-gray (N4), silty to nonsilty.

Depth (feet)	Thickness (feet)	
68-77	9	Sandstone 97%, shale 3%: sandstone, white (N9) to few light-gray (N7) to few yellowish-gray (5Y 8/1), very fine grained to few fine-grained, calcareous to noncalcareous, few green minerals; shale, medium dark-gray (N4) to dark-gray (N3), silty to nonsilty; few mica flakes.
77-87	10	Sandstone 70%, shale 30%: sandstone, like 68-77, except more fine-grained, less calcareous; shale, medium dark-gray (N4) to few medium-gray (N5), few silty.
87-100	13	Shale: medium-gray (N5) with little light-gray (N7) silty material covering sample; few pieces sandstone, white (N9) to light-gray (N7), fine-grained, few black and green minerals.
100-110	10	Shale: medium-gray (N5), trace light-gray (N7) silty material.
110-117	7	Siltstone 60%, shale 40%: siltstone, light-gray (N7) to medium-gray (N5), nonargillaceous to argillaceous, very few pieces calcareous; shale, medium dark-gray (N4) to some medium-gray (N5), some silty.
117-125	8	Like 110-117 except more shale, noncalcareous.
125-129	4	Shale 75%, siltstone 25%: shale, medium dark-gray (N4) to some medium-gray (N5), nonsilty to some silty; siltstone, very light gray (N8) to medium-gray (N5), nonargillaceous to argillaceous, few pieces calcareous.

Depth (feet)	Thickness (feet)	
129-135	6	Shale 70%, siltstone 30%: shale, medium-gray (N5), nonsilty to silty; siltstone, very light gray (N8) to some medium light-gray (N6), nonargillaceous argillaceous to few very slightly micaceous; trace yellowish-gray (5Y 8/1) silty material.
135-138	3	Siltstone and sandstone 80%, shale 20%: siltstone grading into very fine grained sandstone, yellowish-gray (5YR 8/1) to medium-gray (N5), nonargillaceous, very slightly micaceous, little iron stain; shale, medium-gray (N5), nonsilty to silty.
138-140	2	Sandstone 80%, shale 20%: sandstone, white (N9) to few light-gray (N7) to few dark-yellowish-orange (10YR 6/6), very fine grained, few argillaceous, calcareous to some noncalcareous; shale, medium dark-gray (N4) to grayish-black (N2).
140-145	5	Shale 65%, sandstone 35%: shale, medium-gray (N5); sandstone, very light gray (N8) to medium light-gray (N6), very fine grained to some siltstone, little iron stain.
145-152	7	Sandstone 85%, shale 15%: sandstone, very light gray (N8) to some light-gray (N7), very fine grained (almost a siltstone), very slightly micaceous, few pieces argillaceous, black minerals; shale, medium-gray (N5), few slightly sandy.

Depth (feet)	Thickness (feet)	
152-156	4	Like 145-152 except sandstone ranges from very light-gray (N8) to medium-gray, more argillaceous, little more micaceous; little more shale, medium-gray to medium dark-gray (N4), more sandy.
156-165	9	Sandstone 70%, shale 30%: sandstone, very light gray (N8) to some medium-gray (N5), very fine grained, nonargillaceous to some argillaceous, few pieces slightly micaceous, few black minerals; shale, medium dark-gray (N4), nonsilty to some silty.
165-168	3	Sandstone 85%, shale 15%: sandstone, white (N9) to some medium light-gray (N6), very fine grained, few pieces slightly calcareous, few argillaceous, black minerals; shale, medium dark-gray (N4) to few medium-gray (N5) to few dark-gray (N3), few silty.
168-173	5	Like 165-168.
173-177	4	Sandstone 98%, shale 2%: sandstone, white (N9) to very light gray (N8) to few light-gray (N7), very fine grained, black minerals, little iron stain; shale, medium-grain (N5), few pieces sandy.
177-186	9	Sandstone 80%, shale 20%: sandstone, light-gray (N7) to medium light-gray (N6), very fine grained, nonargillaceous to argillaceous, few pieces very slightly micaceous, very few black minerals; shale, medium-gray (N5), few slightly sandy, few slightly micaceous.

Depth (feet)	Thickness (feet)	
185-188	3	Sandstone 80%, shale 20%: sandstone, white (N9) to light-gray (N8) to some light-gray (N7), very fine grained, very few argillaceous, some black and very few green minerals, some iron stain; shale, medium dark-gray (N4), some slightly sandy, very slightly micaceous, little iron stain.
188-198	10	Like 185-188, less shale, less iron stain.
198-205	7	Like 188-198.
205-209	4	Sandstone, 95%, shale 5%: sandstone, like 188-198 shale, like 188-198, carbonaceous, more sandy, slightly more micaceous.
209-214	5	Shale and sandstone and coal: shale, medium-gray (N5); sandstone, very light gray (N8) to medium light-gray (N6), very fine grained, clustered, some argillaceous, some with calcareous cement, very little iron stain.
214-223	9	Shale, sandstone: shale, silty, medium-gray (N5), finely micaceous, very slightly calcareous, iron stain; little sandstone, very light gray (N8) to light brownish-gray (5YR 6/1), very fine grained, iron stain.
223-227	4	Shale, sandstone: shale, medium-gray (N5) to few light olive-gray (5Y 6/1) to few light-brownish-gray (5YR 6/1), slightly very finely micaceous, few pieces are silty, little iron stain; few pieces sandstone, very light-gray (N8) to medium light-gray (N6), very fine grained, slightly calcareous.

Depth (feet)	Thickness (feet)	
227-232	5	Raven coal?  Shale, coal: shale, medium-gray (N5) to little medium light-gray (N6), noncalcareous to slightly calcareous; little coal; few pieces sandstone, white (N9) to very light gray (N8), very fine grained.
232-237	5	Shale: medium-gray (N5).
237-242	5	Shale: medium-gray (N5).
242-249	7	Shale: medium-gray (N5), few pieces are slightly silty and very slightly micaceous.
249-256	7	Shale: medium-gray (N5), some slightly silty, some with light orange-gray (5Y 6/1) silty material, coal fragment.
256-262	6	Sandstone, shale: sandstone, very light-gray (N8) to light-gray (N7), very fine grained, clustered, very few mica flakes, black minerals, slightly argillaceous, little iron stain; shale, medium-gray (N5).
262-268	6	Sandstone, shale: sandstone, very light gray (N8) to light-gray (N7), very fine grained, clustered, some argillaceous, slightly micaceous (muscovite), little iron stain; shale, medium-gray (N5), trace pyrite.
268-270	2	Sandstone, shale: sandstone, white (N9) to very light gray (N8), very fine grained to fine-grained, subangular to subrounded, few pieces calcareous, little iron stain, few green minerals; shale,

Depth (feet)	Thickness (feet)	medium-gray (N5) to medium dark-gray (N4) to dark-gray (N3), few micaceous.
270-277	7	Like 268-270 except sample slightly dirtier and very few fragments of coal.
277-281	4	Sandstone, shale: sandstone, light-gray (N7), very fine grained, few pieces calcareous, few pieces micaceous, black and few green minerals, little iron stain; little shale, medium dark- gray (N4).
281-286	5	Like 277-281.
286-292	6	Siltstone, shale, sandstone: siltstone, medium- gray (N5) to little medium light-gray (N6), slightly finely micaceous; shale, medium dark- gray (N4) to medium-gray (N5), some silty and finely micaceous; very little sandstone, argillaceous, medium-gray (N5), very fine grained, trace coal.
292-298	6	Sandstone, shale; sandstone, white (N9) to light- gray (N7), very fine grained to fine-grained, some slightly argillaceous, very slightly micaceous, few green and black minerals, little iron stain; shale; medium-gray (N5) to medium dark-gray (N4), few pieces slightly silty.
298-304	6	Sandstone, shale: sandstone, white (N9) to very light-gray (N4 N8), very fine grained to fine- grained, subangular to subround, green and few black minerals, few mica flakes (muscovite); little shale, medium dark-gray (N4).



Depth (feet)	Thickness (feet)	
304-311	7	Shale, sandstone: shale, medium-gray (N5) to medium dark-gray (N4) to medium light-gray (N6); sandstone, white (N9) to light-gray (N7), very fine-grained to fine-grained, few black and green minerals.
311-318	7	Sandstone, shale: sandstone, very light gray (N8) to light-gray (N7), very fine grained to some medium-grained, some argillaceous, few black and green minerals, very few pieces mica; shale, medium dark-gray (N4).
318-323	5	Sandstone, shale: sandstone, white (N9) to medium light-gray (N6), fine-grained, subangular, some argillaceous, very slightly micaceous, dark and light green minerals, trace coal; shale, medium-gray (N5) to medium dark-gray (N4).
323-328	5	Sandstone, shale: sandstone, white (N9) to light-gray (N7), subangular to subrounded, some slightly argillaceous, few green minerals, iron stain; shale, medium-gray (N5).
328-332	4	No samples.
332-336	4	Sandstone, shale: sandstone, white (N9) to light-gray (N7), fine-grained to few medium-grained, subangular to subrounded, some slightly argillaceous some very slightly micaceous, few pieces calcareous, green minerals; shale, medium dark-gray (N4); very slight iron stain.

Depth (feet)	Thickness (feet)	
336-343	7	Sandstone, shale: sandstone, white (N9) to light-gray (N7), fine-grained to medium-grained, <u>subangular to subrounded, clustered and free, some</u> argillaceous, few pieces calcareous, very slightly micaceous, green minerals, and few black minerals, slight iron stain; shale, medium-gray (N5) to medium dark-gray (N4).
343-348	5	Sandstone, shale: sandstone, white (N9) to some light-gray (N7), fine-grained to medium-grained, subangular to subrounded, mostly free, few pieces calcareous, very few pieces micaceous, green minerals; little shale, medium-gray (N5) to medium dark-gray (N4), very little iron stain.
348-353	5	Sandstone, shale: sandstone, very light gray (N8) to light-gray (N7), very fine grained to medium-grained, subangular to subrounded, free and clustered, some argillaceous, some with calcareous cement, few green minerals; shale, medium-gray (N5) to medium dark-gray (N4).
435-359	6	Shale: medium dark-gray (N4); trace sandstone, white (N9), fine-grained, few green and black minerals.
359-365	6	Shale: medium-gray (N5).
365-370	5	Shale: medium-gray (N5).
370-376	6	Shale: medium-gray (N5).
376-380	4	Shale: medium-gray (N5).

Depth (feet)	Thickness (feet)	
380-384	4	Shale: medium-gray (N5).
384-391	3	Shale: medium-gray (N5), few light-gray (N6), some silty and finely micaceous.
391-394	3	No samples.
394-400	6	Shale: medium-gray (N5) to little medium light- gray (N6) and little medium dark-gray (N4), slightly silty and finely micaceous.
400-406	6	Shale: medium-gray (N5), nonsilty to silty and finely micaceous and slightly calcareous to some calcareous.
406-412	6	Shale: medium-gray (N5).
412-418	6	Shale: medium-gray (N5), some slightly silty and very slightly calcareous, very slightly finely micaceous.
418-425	7	Shale, siltstone: silty shale grading into argillaceous siltstone, medium light-gray (N6), finely micaceous, slightly calcareous.
425-431	6	Siltstone, shale: siltstone, argillaceous, medium light-gray (N6), slightly calcareous, very slightly micaceous; shale, medium light-gray (N6) to medium-gray (N5); few coal fragments - Jawbone coal.
431-435	4	Sandstone, shale: sandstone, argillaceous, medium light-gray (N6) to light-gray (N7), fine-grained to medium-grained, few coarse-grained, subrounded to subangular; shale, medium dark-gray (N4) to medium- gray (N5), some carbonaceous, slightly calcareous, few coal fragments.

Depth (feet)	Thickness (feet)	
435-438	3	Sandstone, shale: sandstone, light-gray (N7) to medium light-gray (N6), fine-grained to medium-grained to few coarse-grained, subangular to subrounded, few pieces slightly calcareous, few slightly micaceous, few black and green minerals; shale, medium-gray (N5) to dark-gray (N3), few slightly micaceous, some carbonaceous; trace pyrite, few coal fragments.
438-443	5	Sandstone, shale: sandstone, conglomeratic, white (N9) to medium light-gray (N6), very fine grained to coarse-grained, angular to subangular, very slightly micaceous, black and few green minerals; shale, medium dark-gray (N7); coal fragment.
443-447	4	Sandstone, coal, shale: sandstone, conglomeratic, white (N9) to light-gray (N7), fine-grained to coarse-grained, angular to subrounded, very slightly micaceous, black mineral and one red mineral; coal; little shale, medium dark-gray (N4), few pieces slightly finely micaceous.
447-450	3	Sandstone, shale: sandstone, white (N9) to light gray (N7) to grayish-yellow (5Y 8/4), fine-grained to coarse-grained, subangular to subrounded, much limonite stain, few slightly argillaceous, few green and black minerals, piece black black magnetic mineral, very few mica flakes; little shale, medium-gray (N5) to medium dark-gray (N4), some slightly micaceous, trace coal.

Depth (feet)	Thickness (feet)	
550-558	8	Sandstone, shale; sandstone, argillaceous, very light gray (N8) to medium light gray (N6), fine-grained to medium-grained, few coarse-grained, subangular to subrounded, black minerals, few green minerals, iron stain; little shale, medium-gray (N5) to medium dark-gray (N4), some sandy.
458-461	3	Sandstone, shale: sandstone, white (N9) to light gray (N7), fine-grained to medium-grained, angular to subangular, green and black minerals, slight iron stain, few mica flakes; little shale, medium-gray (N5) to medium dark-gray (N4).
461-467	6	Sandstone: white (N9) to medium light-gray (N6) fine-grained to medium-grained, subangular to subrounded, some argillaceous, few pieces slightly micaceous, black and green minerals, slight iron stain; few pieces shale, medium-gray (N5).
467-472	5	Sandstone, shale: sandstone, very light gray (N8) to light-gray (N7), fine-grained to medium-grained, subrounded to subangular, some argillaceous, black and green minerals, little iron stain; little shale, medium-gray (N5) to medium dark-gray (N4), few pieces slightly micaceous.
472-476	4	Sandstone: white (N9) to light-gray (N7), fine-grained to medium-grained, subrounded to subangular, few slightly argillaceous, slightly porous to moderately porous, few green minerals, little iron stain; few pieces shale, medium-gray (N5) to medium dark-gray (N4).

Depth (feet)	Thickness (feet)	
476-483	7	Sandstone: white (N9) to very light gray (N8), very fine grained to fine-grained to siltstone, mostly free, few green minerals, slight iron stain; trace shale, medium dark-gray (N4); trace mica.
483-490	7	Sandstone: light-gray (N7), very fine grained, slightly micaceous, calcareous to noncalcareous cement, slightly porous, few green and black minerals, slight iron stain, few pieces medium dark-gray (N4) shale.
490-495	5	Sandstone: light-gray (N7), very fine grained, slightly micaceous, noncalcareous to slightly calcareous, some argillaceous, black and few green minerals, some iron stain, few pieces medium-gray (N5) shale.
495-501	6	Shale: medium-gray (N5), slightly finely micaceous; few pieces sandy; few pieces sandstone, very light gray (N8), very fine grained.
501-505	4	Shale: medium-gray (N5), slightly very finely micaceous, some pieces slightly carbonaceous, trace sandstone, white (N9), very fine grained.
505-512	7	Shale, sandstone: shale, medium dark-gray (N4), slightly finely micaceous; sandstone, white (N9) to light-gray (N7), fine-grained, some slightly argillaceous, very slightly micaceous, few slightly calcareous, slightly porous, black and green minerals.

Depth (feet)	Thickness (feet)	
512-521	9	Like 505-512.
521-526	6	Sandstone 90%, shale 10%: sandstone, micaceous, medium light-gray (N6) to very light gray (N8), very fine grained, very slightly calcareous, few green minerals and some black minerals; shale, medium-gray (N5), finely micaceous, noncarbonaceous to carbonaceous, several fragments coal.
526-632	6	Sandstone 95%, shale 5%: sandstone, light-gray (N7), very fine grained, slightly micaceous, slightly calcareous to calcareous, slightly porous, black and few green minerals; shale, micaceous, carbonaceous, medium dark-gray (N4), few pieces sandy.
532-539	7	Like 526-523 except little more shale and shale non sandy.
539-545	6	Sandstone 95%, shale 5%: sandstone, calcareous to very calcareous, very light gray (N8) to medium-gray (N5), slightly micaceous, abundant black minerals; shale, medium-gray (N5) to medium dark-gray (N4), finely micaceous.
545-550	5	Sandstone 90%, shale 10%: sandstone, micaceous, argillaceous, light-gray (N7) to medium-gray (N5), very fine grained, noncalcareous to calcareous, black minerals; shale, carbonaceous, medium dark-gray (N4), micaceous, few pieces sandy, fossil imprint.

Depth (feet)	Thickness (feet)	
550-560	10	Shale: medium-gray (N5), slightly calcareous, non-micaceous to micaceous, few pieces sandy.
560-572	12	Like 550-560.
572-584	12	Shale: medium-gray (N5), slightly calcareous, few pieces sandy and calcareous.
584-589	5	No samples.
589-595	6	Shale: medium-gray (N5), slightly calcareous, very slightly micaceous.
595-604	9	Like 589-595.
604-616	12	Like 589-594, few pieces more calcareous.
616-628	12	Shale: medium-gray (N5) to medium dark-gray (N4), very slightly calcareous, few pieces slightly sandy, slightly micaceous and more calcareous.
628-640	12	Shale: medium dark-gray (N4), very few pieces carbonaceous, trace pyrite.
640-650	10	Shale: medium dark-gray (N4), very few fossil imprints.
650-658	8	Shale, medium dark-gray (N4), some pieces very slightly carbonaceous.
658-668	10	Shale: medium dark-gray (N4).
668-676	8	Shale: medium dark-gray (N4), trace pyrite, trace sandstone, light-gray (N7), very fine grained, few pieces slightly carbonaceous.
676-679	3	Shale 90%, sandstone 10%: shale, medium dark-gray (N4); sandstone, white (N9) to light-gray (N7), very fine grained to occasional pieces medium-grained, angular to rounded (medium grained), trace pyrite.



Depth  
(feet)

Thickness  
(feet)

Lee formation - 1027 feet

679-682

3

Sandstone 75%, shale 25%: sandstone, white (N9) to light-gray (N7), fine-grained to medium-grained, angular to subangular, few green and black minerals, iron stain; shale, medium dark-gray (N4) to dark-gray (N3), trace mica.

682-683

1

Sandstone 90%, shale 10%: sandstone, white (N9), fine-grained to medium-grained, angular to subangular, mostly free, very few larger quartz fragments, few green minerals, little iron stain; shale, medium dark-gray (N4).

683-687

4

Sandstone 90%, shale 10%: sandstone, white (N9) to light-gray (N7) to grayish-yellow (5Y 8/4), very fine grained to fine-grained to few larger fragments, angular to subangular to subrounded, few green and black minerals, much limonite stain; shale, medium dark-gray (N4), noncarbonaceous to carbonaceous.

687-693

6

Sandstone 95%, shale 5%: sandstone, white (N9) to some grayish-yellow (5Y 8/4), fine-grained, subangular to subrounded, few black and green minerals; limonite stain; shale, medium-gray (N5) to medium dark-gray (N4).

Depth (feet)	Thickness (feet)	
693-700	3	Sandstone 95%, shale 5%: sandstone, white (N9) to little grayish-yellow (5Y 8/4), very fine grained to fine-grained, subrounded to subangular, mostly free, few green minerals, iron stain; shale, medium dark-gray (N4) to grayish-black (N2).
700-708	8	Sandstone 98%, shale 2%: sandstone, white (N9) to light-gray (N7), fine-grained, few pieces <u>slightly calcareous, slightly porous, few green</u> minerals, little iron stain; shale, carbonaceous, dark-gray (N3).
708-714	14	Sandstone 99%, shale 1%: sandstone, white (N9) to light-gray (N7), fine-grained to medium-grained to some very coarse-grained (conglomeratic?), angular to subangular, mostly free, few very dark-gray (N3), trace coal.
714-722	8	Sandstone 97%, shale 3%: Sandstone, white (N9) to light-gray (N7), fine-grained to very coarse grained (conglomeratic?), angular to subrounded, few pieces slightly argillaceous, little silty material, little iron stain; shale, medium dark-gray (N4) to dark-gray (N3).
722-730	8	Sandstone 97%, shale 3%: sandstone, white (N9) to medium light-gray (N6), fine-grained to very coarse grained, angular to subrounded some argillaceous, few green minerals, little iron stain; shale, medium dark-gray (N4) to dark-gray (N3), some carbonaceous, trace pyrite.

Depth (feet)	Thickness (feet)	
730-	3	Sandstone 85%, shale 15%: sandstone, white (N9), fine-grained to very coarse grained (conglomeratic?), angular to subrounded, few green minerals, little iron stain; shale, carbonaceous, medium dark-gray (N4) to black (N1), trace coal.
733-740	7	Sandstone: white (N9), fine-grained to coarse-grained, angular to subangular, quartz, very few black minerals, one blue mineral, slight iron stain; trace shale, dark-gray (N3) to black (N1).
740-747	7	Sandstone: white (N9), fine-grained to coarse-grained, light-gray (N7), fine-grained to coarse-grained, angular to subangular, few green minerals, some iron stain, trace shale, black (N1).
747-757	10	Sandstone 85%, shale 15%: sandstone, argillaceous, micaceous, light-gray (N7) to medium light-gray (N6), very fine grained, slightly calcareous, few larger quartz fragments (cavings?), very slight iron stain; shale, medium-gray (N5) to medium dark-gray (N4), nonmicaceous to slightly very finely micaceous.
757-768	11	Shale, sandstone: sandy shale grading into argillaceous sandstone, light-gray (N7) to medium light-gray (N6), finely micaceous, very slightly calcareous, few black minerals.

Depth (feet)	Thickness (feet)	
767-776	9	Shale 90%, sandstone 10%: Shale, medium-gray (N5), slightly micaceous, very slightly calcareous, few pieces sandy; sandstone, micaceous, argillaceous, light-gray (N7), to medium light-gray (N6), very slightly calcareous, black minerals.
770-785	15	Shale: medium-gray (N5).
785-793	8	Shale: medium-gray (N5).
793-800	7	Sandstone 50%, shale 49%, coal 1%: sandstone, white (N9) to light-gray (N7), fine-grained to medium-grained few coarse-grains, some slightly argillaceous, some slightly calcareous cementing material, few green minerals, little iron stain; shale, medium-gray (N5) to medium dark-gray (N4), medium dark-gray is carbonaceous, slightly finely micaceous, some sandy; coal.
800-807	7	Like 793-800, more shale - 60%.
807-815	18	Sandstone 95%, shale 5%: sandstone, white (N9) to light-gray (N7) to little yellowish-gray (5Y 8/1), fine-grained <del>coarse-grained to</del> few very coarse grained, angular to subround, few argillaceous, few green and black minerals, some iron stain; shale, medium-gray (N5) to medium dark-gray (N4).
815-821	6	Sandstone, shale: sandstone, white (N9) to very light gray (N8), fine-grained to coarse-grained, sub-angular to subrounded, few larger quartz fragments, green, black and one pink mineral, slight iron stain; trace shale, medium-gray (N5) to medium dark-gray (N4).

Depth (feet)	Thickness (feet)	
821-830	9	Sandstone: white (N9) to light-gray (N7), fine-grained to medium-grained to few larger quartz fragments, subangular, clustered, some slightly argillaceous, moderately porous, black and few green minerals; trace shale, carbonaceous, medium dark-gray (N4), very few pieces micaceous.
830-836	6	Sandstone: white (N9) to few yellowish-gray (5Y 8/1), fine-grained to medium-grained, angular to subangular, few green minerals, little iron stain; trace shale, medium dark-gray (N4) to black, (N1) black is carbonaceous.
836-843	7	Like 830-836.
843-847	4	Sandstone: white (N9) to yellowish-gray (5Y 8/1), fine-grained to some medium-grained, angular to subangular, iron stain; trace shale, medium dark-gray (N4) to black, black (N1) is carbonaceous.
847-850	3	Sandstone: white (N9) to yellowish-gray (5Y 8/1), fine-grained to medium-grained, angular to subangular, iron stain; trace shale, medium dark-gray (N4).
850-853	3	Like 847-850.
853-857	4	Like 847-850, less medium-grained.
857-863	6	Like 847-850, less medium-grained sandstone, more iron stain.

Depth (feet)	Thickness (feet)	
863-866	3	Sandstone: white (N9) to some yellowish-gray (5Y 8/1), fine-grained, angular to subangular, few green minerals; limonite stain; trace shale, medium dark-gray (N4).
866-869	3	Sandstone: grayish-yellow (5Y 8/4) to little white (N9), fine-grained to few pieces medium-grained, subangular to angular, limonite stain; trace shale, medium-gray (N5).
869-871	2	Sandstone: white (N9) to grayish-yellow (5YR 8/4), very fine grained to fine-grained, angular to subangular, very few green minerals, limonite stain; trace shale, medium-gray (N5).
871-877	6	Shale 50%, sandstone 50%: shale, medium-gray (N5), very finely micaceous, nonsandy to sandy; sandstone, white (N9) to grayish-yellow (5Y 8/4) to light-gray (N7), fine-grained to some very fine-grained to some medium-grained, angular to subangular, argillaceous to nonargillaceous, limonite stain.
877-885	8	Sandstone 50%, shale 50%: sandstone, micaceous, light-gray (N7) to medium-gray (N5), argillaceous to nonargillaceous, few larger quartz fragments, white (N9), black minerals, little iron stain; shale, medium-gray (N5), finely micaceous, nonsandy to some sandy.

Depth (feet)	Thickness (feet)	
885-893	8	Like 877-885 except no larger quartz fragments.
893-895	2	Sandstone 80%, shale 20%: sandstone, white (N9) to medium-gray (N5), very fine grained, slightly micaceous, few larger quartz fragments, black minerals, little iron stain; shale, medium dark- gray (N4), finely micaceous.
895-901	6	Shale 50%, sandstone and siltstone 50%: shale, medium-gray (N5), nonmicaceous to slightly micaceous, some silty, noncarbonaceous to carbon- aceous; sandstone, very fine grained grading into siltstone, argillaceous, light-gray (N7) to medium-gray (N5), slightly micaceous, few black minerals.
901-904	3	Sandstone 85%, shale 15%: sandstone, argillaceous, very light gray (N8) to medium light-gray (N6), very fine grained, few pieces slightly micaceous, few black minerals, trace iron stain; shale, micaceous, medium dark-gray, nonsandy to sandy, some carbonaceous.
904-917	13	Shale 97%, sandstone 3%: shale, medium-gray (N5), very slightly micaceous, few pieces silty; sandstone, argillaceous, medium light-gray (N6), trace iron stain.
917-921	4	Shale 98%, sandstone 2%: shale, medium-gray (N5), slightly finely micaceous, few sandy; sandstone, argillaceous, medium light-gray (N6), very fine grained to siltstone, finely micaceous.

Depth (feet)	Thickness (feet)	
921-929	8	Like 917-921.
929-939	10	Shale: medium-gray (N5), some silty; few pieces siltstone, argillaceous, medium light-gray (N6).
939-948?	9	Like 929-939 except more siltstone.
948-957	9	Shale 85%, sandstone 15%: shale, medium-gray (N5), few pieces slightly sandy; sandstone, argillaceous, light-gray (N7), very fine grained, black minerals.
957-966	9	Like 948-957, less sandstone - 10%.
966-973	7	Shale 60%, sandstone 40%: shale, medium dark-gray (N4) to medium-gray (N5), some finely micaceous and some sandy; sandstone, white (N9) to medium- gray (N5), very fine grained to fine-grained, argillaceous to nonargillaceous, subangular to subrounded, few black minerals, trace iron stain.
973-984	11	Sandstone 90%, shale 10%: sandstone, white (N9) to medium light-gray (N6), very fine grained to fine-grained, angular to subangular, some argil- laceous, few pieces with calcareous cement, moderately porous, black and few green minerals, little iron stain; shale, medium-gray (N5), to medium dark-gray (N4).
984-989	5	Sandstone 85%, shale 15%: sandstone, white (N9) to light-gray (N7), very fine grained to fine-grained, free and clustered, moderately porous, few pieces micaceous, black and few green minerals, iron stain; shale, medium dark-gray (N4).



Depth (feet)	Thickness (feet)	
989-992	3	Sandstone 95%, shale 5%: sandstone, white (N9) to grayish-yellow (5Y 8/4), very fine grained, few larger fragments, much limonite stain; shale, medium-gray (N5) to medium dark-gray (N4) to some finely micaceous.
992-994	2	Sandstone 98%, shale 2%: sandstone, white (N9) to some grayish-yellow (5Y 8/4), very fine grained, few black and light green minerals, moderately porous, iron stain; shale, medium dark-gray (N4).
994-998	4	Like 992-994.
998-1002	4	Shale 60%, sandstone 40%: shale, medium-gray (N5), slightly micaceous, some sandy; sandstone, white (N9) to medium light-gray (N6), argillaceous to nonargillaceous, few black minerals, slight iron stain.
1002-1005	3	Sandstone 75%, shale 25%: sandstone, white (N9) to medium light-gray (N6) to grayish-yellow (5Y 8/4), very fine grained, some argillaceous, moderately porous, black minerals, iron stain; shale, medium-gray (N5) to medium dark-gray (N4), slightly micaceous, few pieces sandy.
1005-1008	3	No samples.
1008-1010	2	Sandstone 97%, shale 3%: sandstone, white (N9) to some grayish-yellow (5Y 8/4), very fine grained, free, limonite stain; shale, medium-gray (N5) to dark-gray (N3), few mica flakes.

Depth (feet)	Thickness (feet)	
1010-1013	3	Sandstone 98%, shale 2%: sandstone, white (N9) to grayish-yellow (5Y 8/4), very fine grained; few black minerals, much limonite stain; shale, medium dark-gray (N4) to dark-gray (N3).
1013-1015	2	Like 1010-1013.
1015-1018	3	Like 1010-1013, little less shale.
1018-1024	6	Sandstone 70%, shale 30%: sandstone, white (N9) to medium light-gray (N6), very fine grained, some argillaceous, noncalcareous to calcareous, some black and few green minerals, little limonite stain; shale, medium-gray (N5) to medium dark-gray (N4), few pieces micaceous.
1024-1030	6	Shale 55%, sandstone 45%: shale, medium-gray (N5) to medium dark-gray (N4), finely micaceous, some sandy, some carbonaceous; sandstone, white (N9) to medium-gray (N5), fine-grained to very fine grained, argillaceous to nonargillaceous, slightly micaceous, few pieces calcareous, moderately porous, black and some green minerals, slight iron stain.
1030-1037	7	Sandstone 95%, shale 5%: sandstone, white (N9) to light-gray (N7) to some grayish-yellow (5Y 8/4), very fine grained to fine-grained, subangular to angular, few larger quartz fragments, slightly calcareous, very slightly micaceous (muscovite), few green and black minerals; shale, medium dark-gray (N5) to grayish-black (N2).

Depth (feet)	Thickness (feet)	
1037-1044	7	Like 1030-1037, shale about 2%.
1043-1046	3	Sandstone: white (N9) to grayish-orange (10YR 7/4), very fine grained to fine-grained, angular to subangular, few pieces calcareous, few green minerals, much limonite stain; trace shale, medium dark-gray (N4).
1041-1048	7	Sandstone 95%, shale 5%: sandstone, white (N9) to some grayish-orange (10YR 7/4), very fine grained to fine-grained, angular to subangular, very few mica flakes (muscovite), few green minerals, limonite stain; shale, carbonaceous, dark-gray (N3) to black (N1), trace coal.
1046-1048	2	Sandstone 99%, shale 1%: sandstone, white (N9) to pale yellowish-orange (10YR 8/6), fine-grained, angular to subangular, much limonite stain; shale, medium dark-gray (N4) to dark-gray (N3).
1048-1052	4	Like 1046-1048.
1050-1055	5	Sandstone: white (N9) to pale yellowish-orange (10YR 8/6), fine-grained to some medium-grained, angular to subangular, limonite stain; trace shale, dark-gray (N3) to grayish-black (N2).
1055-1060	5	Shale 85%, sandstone 15%: shale, medium dark-gray (N4) to medium-gray (N5), slightly micaceous, nonsandy to sandy, limonite stain; sandstone, white (N9) to medium-gray (N5), very fine grained to fine-grained, argillaceous to nonargillaceous.

Depth (feet)	Thickness (feet)	
1060-1069	9	Shale 95%, sandstone 5%: shale, medium-gray (N5), very slightly micaceous, few pieces sandy; sandstone, argillaceous, medium light-gray (N6) to medium-gray (N5), very fine-grained.
1069-1079	10	Like 1060-1069 except less sandstone and sandstone is light-gray (N7) to medium-gray (N5).
1079-1084	5	Shale 70%, sandstone 30%: shale, medium dark-gray (N4), few pieces sandy; sandstone, conglomeratic, light-gray (N7), medium-grained to very coarse grained, few pieces very fine grained, angular to subangular, argillaceous (caving?), few green minerals, very slightly ironed stained.
1084-1086	2	Sandstone 95%, shale 5%: sandstone, white (N9) to grayish-yellow (5Y 8/4) and pale yellowish-orange (10YR 8/6), fine-grained to medium-grained, angular to subangular, limonite stain; shale, medium dark-gray (N4).
1086-1091	5	Like 1084-1086 except few green minerals, few larger quartz fragments; 1% coal and shale.
1091-1099	8	Shale 70%, sandstone 30%: shale, medium dark-gray (N4), slightly micaceous, some carbonaceous and some sandy; sandstone, white (N9) to medium-gray (N5), argillaceous to nonargillaceous, cement slightly calcareous, few green and black minerals, limonite stain.

Depth (feet)	Thickness (feet)	
1099-1107	8	Sandstone 95%, shale 5%: sandstone, white (N9) to light-gray (N7) to pale yellowish-orange (10YR 8/6), very fine grained to fine-grained, slightly micaceous, some cement calcareous, black and some green minerals, much limonite stain; shale, medium dark-gray (N4) to dark-gray (N3), dark-gray is carbonaceous.
1107-1116	9	Shale 80%, sandstone 20%: shale, medium dark-gray (N4), some sandy, noncarbonaceous to very carbonaceous, trace coal; sandstone, argillaceous, very light gray (N8) to medium-gray (N5), very fine grained, very slightly micaceous.
1107-1123	16	Sandstone 65%, shale 35%: sandstone, very light gray (N8) to medium-gray (N5), very fine grained, some argillaceous, very slightly calcareous, few black and green minerals, slight iron stain; shale, medium dark-gray (N4) to grayish-black (N2), carbonaceous to noncarbonaceous, some sandy, nonmicaceous to micaceous, trace coal.
1123-1130	7	Sandstone 95%, shale 5%: sandstone white (N9) to pale yellowish-orange (10YR 8/6) to light-gray (N7), fine-grained to some medium-grained, some argillaceous, few green minerals, very few black magnetic minerals, limonite stain; shale, medium dark-gray (N4) to dark-gray (N3), some micaceous, some carbonaceous.

Depth (feet)	Thickness (feet)	
1130-1137	7	Like 1123-1130, less shale, trace coal.
1137-1146	9	Sandstone 99%, shale 1%: sandstone, white (N9) to light-gray (N7), very fine grained fine-grained, nonargillaceous to slightly argillaceous, very slightly micaceous, black and few green minerals, limonite stain; trace pyrite; shale, medium dark-gray (N4) to dark-gray (N3).
1146-1157	11	Sandstone, shale: sandstone, white (N9) to light-gray (N7), very fine-grained to fine-grained, slightly micaceous, some slightly argillaceous, black and few green minerals, little limonite stain; shale, medium-gray (N5) to medium dark-gray (N4), finely micaceous, trace coal.
1157-1164	7	Sandstone: white (N9) to light-gray (N7), fine-grained to medium-grained, very slightly calcareous, very slightly micaceous, some slightly argillaceous, black and green minerals, slight limonite stain, few pieces coal; trace shale, medium-gray (N5) to medium dark-gray (N4).
1164-1174	10	Sandstone 97%, coal 2%, shale 1%: sandstone, white (N9) to medium light-gray (N6), very fine grained to fine-grained to very few medium-grained, subangular to subrounded, free and clustered, slightly micaceous, few pieces slightly calcareous, black and few green minerals, slightly iron stain; coal; shale, carbonaceous, medium dark-gray (N4).

Depth (feet)	Thickness (feet)	
1174-1182	8	Sandstone: white (N9), to yellowish-gray (5Y 8/1), very fine grained to some fine-grained, moderately porous, black and green minerals, slight iron stain, trace coal; trace shale, medium dark-gray (N4).
1182-1189	7	Like 1174-1182, slightly micaceous, very slightly calcareous.
1189-1197	8	Shale 70%, sandstone 30%: shale, medium dark-gray (N4); sandstone, light gray (N7) to very light gray (N6), very fine grained, slightly calcareous, slightly micaceous, few black minerals, very slight iron stain.
1197-1207	10	Shale: medium-gray (N5) to medium dark-gray (N4), few pieces silty, trace coal; trace sandstone, very light gray (N8), very fine grained, black minerals.
1207-1220	13	Sandstone: light-gray (N7), very fine grained to siltstone, some argillaceous, slightly micaceous, moderately porous, black minerals; trace shale, medium-gray (N5).
1220-1237	17	Shale 60%, siltstone and sandstone 40%: shale, silty, medium-gray (N5), slightly micaceous; siltstone grading into very fine grained sandstone, argillaceous, light-gray (N7) to medium light-gray (N6), moderately porous, black minerals.

Depth (feet)	Thickness (feet)	
1236-1249	13	Sandstone and siltstone 97%, shale 3%: very fine grained sandstone grading into siltstone, argillaceous, light-gray (N7) to medium light-gray (N6), very slightly micaceous, moderately porous, black minerals; shale, silty, medium-gray (N5) to medium dark-gray (N4), slight iron stain.
1249-1260	11	Like 1236-1249, few pieces sandstone, slightly calcareous to calcareous, no iron stain.
1260-1271	11	Sandstone to siltstone 60%, shale 40%: Like 1236-1249, slightly calcareous.
1271-1281	10	Like 1236-1249, more iron stain.
1280-1290	10	Shale, sandstone, siltstone: shale, medium-gray (N5) to medium dark-gray (N4), few pieces slightly sandy, trace coal; sandstone grading into siltstone, argillaceous, light-gray (N7) to medium light-gray, moderately porous, black minerals, very slight iron stain.
1290-1304	14	Shale 99%, siltstone 1%: shale, medium (N5), few pieces silty; siltstone, calcareous, medium light-gray (N6).
1304-1317	13	Like 1290-1304, trace siltstone.
1317-1327	10	Shale 85%, sandstone 15%: shale, medium-gray (N5) to medium dark-gray (N4), slightly finely micaceous; sandstone, argillaceous, calcareous, very light gray (N8) to medium light-gray (N6), very fine grained to siltstone, slightly micaceous; pieces asphalt-like material.



Depth (feet)	Thickness (feet)	
1327-1337	10	Sandstone 80%, shale 20%: sandstone, white (N9) to medium light-gray (N6), fine-grained to very fine grained, few medium-grained pieces, angular to subangular, some argillaceous, slightly calcareous, very slightly micaceous, few black and green minerals, slight iron stain; shale, medium-gray (N5), slightly finely micaceous, trace coal.
1337-1347	10	Shale: carbonaceous, medium dark-gray (N4), plant? imprints, trace coal; trace sandstone, very light-gray (N8), fine-grained, slightly calcareous.
1347-1357	10	Sandstone 50%, shale 50%: sandstone, very light gray (N8) to light-gray (N7), few pieces argillaceous, very slightly micaceous, few pieces calcareous; shale, medium-gray (N5) to medium dark-gray (N4), noncarbonaceous to carbonaceous.
1357-1362	5	Sandstone 85%, shale 15%: sandstone, very light gray (N8) to medium light-gray (N6), fine-grained to very fine grained, some with calcareous cement, few black and green minerals, slight iron stain; shale, medium-gray (N5) to dark-gray (N3).
1362-1370	8	Sandstone 95%, shale 5%: sandstone, white (N9) to light-gray (N7), fine-grained, noncalcareous to calcareous cement, few black and green minerals, limonite stains; shale, medium dark-gray (N4) to dark-gray (N3).

Depth (feet)	Thickness (feet)	
1370-1381	11	Sandstone: white (N9), medium light-gray (N5), fine-grained to some very fine grained to few medium-grained, few pieces argillaceous, noncalcareous to calcareous cement, black and some green-minerals, slight ironstain, trace shale, medium dark-gray (N4).
1381-1391	10	Like 1370-1380 except shale 3%, medium dark-gray (N4) to dark-gray (N3).
1391-1399	8	Sandstone 99%, shale 1%: sandstone, white (N9) to pale yellowish-orange (10YR 8/6), very fine grained to medium-grained, few larger quartz fragments, some pieces slightly calcareous, few black and green minerals, slight iron stain; shale, medium dark-gray (N4), nonmicaceous to slightly micaceous.
1399-1401	2	Sandstone 99%, shale 1%: sandstone, pale yellowish-orange (10YR 8/6) to little white (N9), very fine grained to fine-grained, few larger quartz fragments, free, some slightly calcareous, few mica flakes; shale, medium-gray (N5) to dark-gray (N3).
1401-1404	3	Sandstone 98%, shale 2%: sandstone, white to dark yellowish-orange (10YR 6/6), very fine grained to fine-grained, much limonite stain; shale, medium dark-gray (N4).

Depth (feet)	Thickness (feet)	
1404-1407	3	Like 1401-1404, shale, medium dark-gray (N4) to dark-gray (N3).
1407-1409	2	Like 1401-1404, more sandstone, white (N9), less shale.
1409-1412	3	Like 1401-1404, more sandstone, white (N9), few pieces calcareous.
1412-1418	6	Like 1401-1404, less shale few pieces calcareous.
1418-1422	4	Sandstone 99%, shale 1%: sandstone, pale yellowish-orange (10YR 8/6) to little white (N9), very fine grained to fine-grained, slightly calcareous, limonite stain; shale, dark-gray (N3).
1422-1425	3	Sandstone 99%, coal 1%: sandstone, white (N9) to some pale yellowish-orange (10YR 8/6), very fine grained to some fine-grained, limonite stain; coal; trace shale, grayish-black (N2).
1425-1429	4	Sandstone: white (N9) to dark-yellowish-orange (10YR 6/6), very fine grained to fine-grained, much limonite stain; trace shale, medium dark-gray (N4).
1429-1434	5	Sandstone: conglomeratic, white (N9) to some dark yellowish-orange (10YR 6/6), medium-grained to very coarse-grained, angular to subangular, much limonite stain; trace shale, medium dark-gray (N4) to grayish-black (N2).

Depth (feet)	Thickness (feet)	
1434-1441?	7	Sandstone: conglomeratic, white (N9) to little pale yellowish-orange (10YR 8/6), very coarse grained to medium-grained, angular to subangular, very few pieces slightly argillaceous, piece white amorphous mineral, trace pyrite.
1441-1445	4	Like 1434-1441 except no argillaceous sandstone or white mineral or pyrite; light-green and red minerals.
1445-1448	3	Sandstone: white (N9) to pale yellowish-orange (10YR 8/6), medium-grained to coarse-grained, little very coarse-grained, limonite stain; trace shale, grayish-black (N2).
1448-1453	5	Sandstone: white (N9 to pale yellowish-orange (10YR 8/6), medium-grained to coarse-grained, angular to subangular, green minerals,; trace shale, medium dark-gray (N4) to grayish-black (N3).
1453-1462	9	Like 1448-1453, conglomeratic, medium-grained to very coarse grained.
1462-1472	10	Sandstone 99%; shale 1%: sandstone, conglomeratic, white (N9) to pale yellowish-orange (10YR 8/6), fine-grained to very coarse grained, few green minerals, limonite stain; shale, dark-gray (N3), trace coal.

Depth (feet)	Thickness (feet)	
1472-1479	7	Sandstone: white (N9) to medium light-gray (N6) to dark yellowish-orange (10YR 6/6), fine-grained to medium-grained to few coarse-grained, some argillaceous, few pieces calcareous, few black and green minerals, limonite stain; trace shale, medium dark-gray (N4) to dark-gray (N3).
1479-1484	5	Sandstone 95%, shale 5%: sandstone, white (N9) to some medium light-gray (N6) to some pale yellowish-orange (10YR 8/6), fine grained to medium-grained with few pieces coarse-grained, angular, some pieces calcareous, few green minerals, limonite stain; shale, very carbonaceous to little coal, black (N1).
1484-1493	9	Sandstone 65%, shale 35%: sandstone, light-gray (N7) to pale yellowish-orange (10YR 8/6), very fine grained, few medium-grained to coarse-grained quartz fragments, subrounded to subangular, few very slightly calcareous; shale, medium dark-gray (N4); limonite stain.
1493-1499	6	Sandstone 80%, shale 20%: sandstone, calcareous, very light gray (N8) to medium light-gray (N4), very fine grained to fine-grained, few larger quartz fragments, some argillaceous, few green and black minerals, limonite stain; shale, medium dark-gray (N4) to dark-gray (N3), some sandy and slightly micaceous.

Depth (feet)	Thickness (feet)	
1499-1506	7	Sandstone 99%, shale 1%: sandstone, white (N9) to medium light-gray (N6), very fine grained to fine-grained, few medium-grained, angular to subangular, calcareous to noncalcareous, some argillaceous, black and few green minerals; shale, medium dark-gray (N4) to dark-gray (N3), some sandy, slightly micaceous.
1506-1512	12	Sandstone 99%, shale 1%: sandstone, white to pale yellowish-orange (10YR 8/6) to light-gray (N7), very fine grained to fine-grained, few larger quartz fragments, subangular to subrounded, few slightly calcareous, few black and green minerals, limonite stain; shale, medium-gray (N5).
1512-1518	6	Sandstone: white (N9) to dark yellowish-orange (10YR 6/6), very fine grained, few very slightly calcareous, few black minerals, limonite stain; shale, black (N1) to medium dark-gray (N4).
1518-1525	7	Like 1512-1518.
1525-1530	5	Sandstone 95%, shale 5%: sandstone, conglomeratic, white (N9) to dark yellowish-orange (10YR 6/6), fine-grained to very coarse grained, angular to subangular, few argillaceous, few very slightly calcareous, few black minerals, limonite stain; shale; medium dark-gray (N4), slightly very finely micaceous.

Depth (feet)	Thickness (feet)	
1530-1537	7	Sandstone: white (N9) to dark yellowish-orange (10YR 6/6), very fine grained to medium-grained, few larger quartz fragments, subangular, few pieces very slightly calcareous, limonite stain; trace shale, medium dark-gray (N4).
1537-1544	7	Sandstone: white (N9) to dark yellowish-orange, fine-grained to few medium-grained, piece black magnetic mineral, limonite stain; trace shale, medium dark-gray (N4) to dark-gray (N3).
1544-1548	4	Like 1537-1544, no black magnetic mineral; few black minerals.
1548-1550	2	Sandstone: white (N9) to dark yellowish-orange (10YR 6/6), fine-grained, very few medium-grained, subangular to subrounded, few green minerals; trace shale, grayish-black (N2).
1550-1555	5	Like 1548-1550, no green mineral.
1555-1558	3	Like 1548-1550, no green mineral, more dark yellowish-orange sandstone.
1558-1561	3	Like 1548-1550, no green mineral, more dark yellowish-orange sandstone.
1561-1567	6	Sandstone: dark yellowish-orange (10YR 6/6) to some white (N9), fine-grained to medium-grained, much limonite stain, few pieces very slightly calcareous.
1567-1569	2	Like 1561-1567.

Depth (feet)	Thickness (feet)	
1569-1573	4	Sandstone: white (N9) to dark yellowish-orange (10YR 6/6), fine-grained to medium-grained, angular to subangular, limonite stain; trace dark-gray (N3) shale.
1573-1578	5	Like 1561-1667.
1578-1583	5	Sandstone: dark yellowish-orange (10YR 6/6) to pale yellowish-orange (10YR 8/6), fine-grained to medium-grained, angular to subangular, few very slightly calcareous, limonite stain.
1583-1590	7	Sandstone: white (N9) to dark yellowish-orange (10YR 6/6), fine-grained to medium-grained, angular to subangular, few very slightly calcareous, limonite stain.
1590-1595	5	Sandstone: conglomeratic, white (N9) to grayish-orange (10YR 7/4) to some dark yellowish-orange (10YR 6/6), medium-grained to very coarse grained, subangular, noncalcareous to some calcareous, few green minerals, limonite stain; trace shale, grayish-black (N2).
1595-1604	9	Sandstone 60%, shale 40%: sandstone, conglomerate, white (N9) to very light gray (N8), medium-grained to granules, angular, few pieces argillaceous, few green minerals, limonite stain; shale, medium dark-gray (N4), very finely micaceous.



Depth. (feet)	Thickness (feet)	
1604-1608	4	Sandstone 95%, shale 5%: sandstone, white (N9) to very light gray (N8) to pale yellowish-orange, medium-grained to coarse-grained, some very fine grained, angular to subangular, non-calcareous to calcareous, trace mica (muscovite), limonite stain; shale, medium dark-gray (N4), very finely micaceous.
1608-1610	2	Sandstone 95%, shale 5%: sandstone, pale yellowish-orange (10YR 8/6) to white (N9) to very light gray (N8), fine-grained to medium-grained to few coarse-grained, angular to subangular, some calcareous, limonite stain; shale, medium dark-gray (N4), some finely micaceous.
1610-1615	5	Sandstone 80%, shale 20%: sandstone, white (N9) to yellowish-gray (5Y 8/1) to some light-gray (N7), fine-grained to medium-grained to some very fine grained, few pieces coarse-grained, angular to subangular, few pieces argillaceous, few pieces calcareous cement, limonite stain; shale, medium dark-gray (N4) to some dark-gray (N3), slightly micaceous.
1615-1620	5	Sandstone 85%, shale 15%: sandstone, white (N9) to pale yellowish-orange (10YR 8/6) to some light-gray (N7), fine-grained to medium grained to few coarse-grained, angular to subangular, noncalcareous to some calcareous, limonite stain; shale, medium dark-gray (N4), few pieces sandy.

Depth (feet)	Thickness (feet)	Lithology
		Huntersville chert?
5361-5364	3	Limestone 85%, shale 15%: limestone, very light gray (N8) to medium-gray (N5), crystalline, argillaceous to nonargillaceous, few chert (?) fragments; shale, medium dark-gray (N4) to black (N1), noncarbonaceous to carbonaceous, trace pyrite.
1620-1625	5	Sandstone: very light gray (N8) to medium light-gray (N6) to few pale yellowish-orange (10YR 8/6), very fine grained to fine-grained, few slightly calcareous, few argillaceous, few larger quartz fragments, black and few green minerals; trace shale, medium dark-gray (N4) to dark-gray (N3), nonsandy to slightly sandy.
1625-1630	5	Sandstone: white (N9) to some pale yellowish-orange (10YR 8/6) to few light-gray (N7), fine-grained to very fine grained, very few slightly slightly calcareous, few black and green minerals, limonite stain; trace medium dark-gray (N4) shale.
1630-1637	7	Sandstone: white (N9) to pale yellowish-orange (10YR 8/6) to dark yellowish-orange (10YR 6/6), very fine grained to few fine-grained, few slightly calcareous, limonite stain.

Depth (feet)	Thickness (feet)	
? -1643		Sandstone 99%, shale and coal 1%: sandstone, white (N9) to pale yellowish-orange (10YR 8/6), very fine grained to fine-grained to some medium-grained, angular to subangular, few green and black minerals, limonite stain; coal grading into carbonaceous shale, grayish-black (N2).
1643-1650	4	Like 1643-1646, more white sandstone, less very fine grained sandstone.
1650-1655	5	Like 1643-1646.

Depth (feet)	Thickness (feet)	
1655-1658	3	Sandstone: white (N9) to pale yellowish-orange (10YR 8/6), fine-grained to medium-grained, angular to subangular, very few green minerals, limonite stain; trace shale, dark-gray (N3).
1658-1664	6	Sandstone: white (N9) to dark yellowish-orange (10YR 6/6), fine-grained to few medium-grained, angular to subangular, limonite stain; trace shale, dark-gray (N3) to black (carbonaceous).
1664-1669	5	Sandstone: white (N9) to dark-yellowish-orange (10YR 6/6), fine-grained to medium-grained, angular, limonite stain; trace dark-gray (N30) shale.
1669-1674	5	Sandstone: dark-yellowish-orange (10YR 6/6) to white (N9), fine-grained to medium-grained, angular to subangular, very few green minerals, limonite stain; trace dark-gray (N8) shale.
1674-1678	4	Like 1669-1674 except less medium-grained sandstone and no green minerals
?-1679		Sandstone: white (N9) to yellowish-gray (5Y 8/1) to some dark yellowish-orange (10YR 6/6), fine-grained to medium-grained, angular to subangular, limonite stain.
1678-1681	3	Like ? -1679 except more white sandstone.
1681-1688	7	Sandstone: conglomeratic, white (N9) to dark yellowish-orange (10YR 6/6) medium-grained to very coarse grained, angular, limonite stain, trace dark-gray (N3) shale.

Depth (feet)	Thickness (feet)	
1683-1690	7	Sandstone: conglomeratic, white (N9) to dark yellowish-orange (10YR 6/6), fine-grained to coarse-grained, few very coarse grained, angular, few green minerals, limonite stain; trace shale, dark-gray (N3).
1690-1700	10	Sandstone: conglomerate, dark yellowish-orange (10YR 6/6) to grayish-yellow (5Y 8/1), medium-grained to very coarse grained, angular to sub-angular, noncalcareous to few calcareous, few green minerals, limonite stain.
1770-1706	6	Sandstone 98%, shale 2%: sandstone, dark yellowish-orange (10YR 6/6) to grayish-yellow (5Y 8/1), fine-grained to coarse-grained, very fine grained, angular to subangular, noncalcareous to slightly calcareous, few pieces argillaceous, few black minerals, limonite stain; shale, medium dark-gray (N4) to between brownish-gray (5YR 4/1) and grayish-red (10YR 4/2).
Bluestone formation - 451 feet		
1706-1717	11	No samples.
1717-1724	7	Shale 95%, sandstone 5%: shale, medium dark-gray (N4), few pieces slightly calcareous; sandstone, argillaceous, light-gray (N7) to white (N9), very fine grained, few black minerals, very slightly iron stain, trace pyrite.

Depth (feet)	Thickness (feet)	
1724-1736	12	Shale: silty, medium light-gray (N6) to medium-gray (N5).
1736-1743	7	Shale, sandstone: shale, medium dark-gray (N4) to medium-gray (N5), few pieces silty; sandstone, very light gray (N8) to medium light-gray (N6), very fine grained, argillaceous to nonargillaceous, few pieces calcareous, very slightly micaceous, black minerals.
1743-1751	8	No samples.
1751-1759	8	Shale: medium light-gray (N6) to light-gray (N7) some silty, slightly calcareous, few pieces siltstone, argillaceous, calcareous, light-gray (N7), black minerals.
1759-1764	5	Shale: medium-gray to between grayish-red (10R 4/2) and medium-gray (N5) to few light-olive-gray (5Y 6/1), slightly calcareous; few pieces siltstone, very calcareous, light-gray (N7).
1764-1775	11	Shale: medium-gray (N4) to grayish-red (10R 4/2), few pieces silty, few pieces very calcareous.
1775-1779	4	Shale: medium-gray (N5) to grayish-red (10R 4/2), some silty and very calcareous; trace medium-gray (N5), argillaceous limestone.
1779-1786	7	Shale: grayish-red (10R 4/2) to medium dark-gray (N4), few pieces greenish-gray (5GY 6/1); light brownish-gray (5YR 6/1), argillaceous limestone or calcareous shale.

Depth (feet)	Thickness (feet)	
1786-1793	7	Like 1779-1786, few pieces greenish-gray (5GY 6/1) no limestone, few pieces shale, calcareous, grayish-red (10R 4/2).
1793-1803	10	Like 1786-1793, also few pieces greenish-gray (5GY 6/1) very calcareous.
1803-1810	7	Sandstone 79%, shale 20%, limestone 1%: sandstone, calcareous, very light gray (N8) to light-gray (N7), very fine grained, few black and green minerals; shale, grayish-red (10R 4/2) to medium-gray (N5); limestone yellowish-gray (5Y 7/3), piece crinoid stem.
1812-1817	5	Sandstone: calcareous, very light gray (N8) to medium light-gray (N6), very fine grained, very slightly micaceous, some argillaceous, 1% large quartz fragments (very coarse grained size), clear to pale yellowish-gray (MOR 8/6), angular, few black and green minerals, trace white chalky looking minerals, very calcareous, trace shale, medium dark-gray (N4) to grayish-red (10R 4/2).
1817-1823	6	No samples.
1823-1827	4	Sandstone 50%, shale 50%; like 1812-1817 except shale, medium-gray (N5) to some grayish-red (10R 4/2), trace coal.

Depth (feet)	Thickness (feet)	
1827-1834	7	No samples.
1834-1840	6	Sandstone 60%, shale 40%: sandstone, calcareous, white(N9) to light-gray (N7), very fine grained to fine-grained, few larger quartz fragments, few black minerals, slight iron stain; shale, medium-gray (N5) to medium dark-gray (N4) to few grayish-red (10R 4/2).
1840-1884	44	No samples.
1884-1894	10	Sandstone: very light gray (N8) to light-gray (N7) to few pale yellowish-orange (10YR 8/6), slightly calcareous, black and few green minerals, limonite stain; trace shale, medium dark-gray (N4).
1894-1906	17	No samples.
1906-??		Shale 90%, siltstone 10%: shale, medium dark-gray (N4), some silty; siltstone, light-gray (N7), slightly calcareous, very slight limonite stain.
? -1910		Shale: medium dark-gray (N4); trace siltstone, light-gray (N7).
? -1930		Shale 75%, siltstone 25%: like 1906-?; very slightly limonite stained.
1930-1940	10	Sandstone 60%, shale 40%: sandstone, very light-gray (N8) to medium light-gray (N6), very fine grained to siltstone, noncalcareous to calcareous, very slightly micaceous, few black minerals; shale, medium dark-gray (N4), nonsilty to silty, slightly micaceous.



Depth (feet)	Thickness (feet)	
1940-1957	17	Shale 90%, shale 10%; shale, medium dark-gray (N4); sandstone, very light gray (N8) to medium light-gray (N6), very fine grained, calcareous to slightly calcareous, few black minerals.
? -1982		Shale: medium dark-gray (N4), few pieces slightly calcareous, few pieces slightly sandy.
1982-2057	75	No samples.
2057-2067	10	Shale: medium dark-gray (N4).
2067-2079	12	Shale: medium dark-gray (N4), slightly calcareous.
2079-2088	9	Shale: medium dark-gray (N4), slightly calcareous.
2088-2112	24	No samples.
2112-2118	6	Sandstone 85%, shale 15%: sandstone, calcareous, very light gray (N8) to medium light-gray (N6), very fine grained, slightly micaceous, black minerals, limonite stain; shale, medium-gray (N5) to medium dark-gray (N4), nonmicaceous to micaceous, piece asphaltic material.
2118-2123	5	Like 2112-2118, less shale - 10%.
? -2128		Shale 90%, sandstone 10%: shale, medium dark-gray (N4), noncalcareous to very calcareous, some sandy; sandstone, calcareous, very light gray to medium light-gray (N6), very fine grained, trace pyrite.

Depth (feet)	Thickness (feet)	
2127-2135	8	Shale 99%, sandstone 1%: shale, medium-gray (N5), few pieces calcareous, slight limonite stain; sandstone, calcareous, argillaceous, light-gray (N7).
2135-2147	12	Shale 80%, sandstone 20%: shale, medium-gray (N5) to medium dark-gray (N4); sandstone, very light gray (N8) to medium light-gray (N6), very fine grained, some argillaceous, noncalcareous to slightly calcareous, slightly micaceous; slight limonite stain, piece asphaltic material.
2147-2151	4	Sandstone 90%, shale 10%: sandstone, white (N9) to medium light-gray (N6), very fine grained to fine-grained, some slightly calcareous, few black minerals, limonite stain; shale, medium-gray (N5) to medium dark-gray (N4), nonmicaceous to micaceous.
2145-2157	12	Shale: medium dark-gray (N4), piece white (N9) chalky calcareous mineral.  Princeton sandstone - 125 feet
2157-2161	4	Sandstone 98%, shale 2%: sandstone, white (N9) to light-gray (N7), very fine grained, noncalcareous to slightly calcareous, very few pieces micaceous (muscovite), few pieces argillaceous, few black minerals, very limonitic; shale, medium dark-gray (N4).

Depth (feet)	Thickness (feet)	
2161-2167	6	Sandstone 65%, shale 35%: sandstone, white (N9) to medium light-gray (N6), very fine grained, few pieces calcareous, some argillaceous, few black and brown minerals, limonite stain; shale, medium dark-gray (N4), nonmicaceous to finely micaceous, some sandy.
2167-2171	4	Sandstone 95%, shale 5%: sandstone, white (N9) to pale yellowish-orange (10YR 8/6) very fine grained, very few pieces calcareous, limonite staining; shale, medium dark-gray (N4).
2171-2174	3	Like 2167-2171 except more limonite stain and only trace shale.
2174-2181	7	Sandstone: calcareous, white (N9) to medium light-gray (N6), very fine grained, black and green minerals, limonite stain, trace shale, medium-gray (N5).
2181-2184	3	Sandstone 98%, shale 2%: sandstone, white (N9) to pale yellowish-orange (10YR 8/6), very fine grained, noncalcareous to calcareous, few black and green minerals, limonite stain; shale, micaceous, medium dark-gray (N4).
2184-2188	4	Like 2181-2184.
2188-2191	3	Like 2181-2184, less limonite stain, very few black minerals, no green minerals, less shale.
2191-2193	2	Sandstone: white (N9) to dark yellowish-orange (10YR 6/6), very fine grained, noncalcareous to calcareous, few green and black minerals, much limonite stain, trace shale, micaceous medium dark-gray.

Depth (feet)	Thickness (feet)	
2193-2197	4	Sandstone 99%, shale 1%: sandstone, dark yellowish-orange (10YR 6/6) to some white (N9), very fine grained to some fine-grained, few pieces calcareous, much limonite stain; shale, micaceous, medium-gray (N5).
2198-2201	3	Sandstone 98%, shale 2%: sandstone, white (N9) to dark yellowish-orange (10YR 6/6), very fine grained to some fine-grained, few pieces calcareous, few green minerals, limonite stain; shale, medium dark-gray (N4), finely micaceous.
2201-2204	3	No samples.
2204-2209	5	Like 2198-2201, more limonite staining, slightly more calcareous, no green mineral.
2209-2218	9	Like 2204-2209.
2218-2220	2	Sandstone 99%, shale 1%: sandstone, white (N9) to dark yellowish-orange (10YR 6/6), very fine grained to fine-grained, few pieces calcareous, few black minerals, much limonite stain; shale, medium dark-gray (N4), micaceous to nonmicaceous.
2220-2221	1	Like 2218-2220, no black mineral.
2221- ?		Sandstone 97%, shale 3%: sandstone, white (N9) to pale yellowish-orange (10YR 8/6), very fine grained to fine-grained, noncalcareous to few calcareous, few green minerals, limonite stain; shale, medium dark-gray (N4), finely micaceous.

Depth (feet)	Thickness (feet)	
2221-2228	7	Sandstone: white (N9) to dark yellowish-orange (10YR 6/6), fine-grained to medium-grained to few coarse-grained to very coarse-grained, angular to subangular, few pieces slightly calcareous, limonite stain; shale, medium dark-gray (N4), finely micaceous.
2228-2231	3	Sandstone 90%, shale 10%: sandstone, white (N9) to dark yellowish-orange (10YR 6/6), fine-grained to some medium-grained, angular to subangular, limonite stain; shale, medium dark-gray (N4), finely micaceous.
2231-2233	2	Sandstone 99%, shale 1%: sandstone, white (N9) to pale yellowish-orange (10YR 8/6), very fine grained to few fine-grained, limonite stain; shale, black (N1), some asphaltic (?) material.
2233-2236	3	Like 2231-2233, shale, dark-gray (N3) to black (N1).
2236-2237	1	Like 2231-2233, shale, dark-gray (N3), only trace asphaltic (?) material.
2237-2239	2	Sandstone 98%, shale 3%: sandstone, white (N9) to dark yellowish-orange (10YR 6/6), very fine grained to fine-grained, angular, limonite stain; shale, medium dark-gray (N4) to black (N1).

Depth (feet)	Thickness (feet)	
2239-2243	4	Sandstone: white (N9) to some dark yellowish-orange (10YR 6/6), very fine grained to fine-grained, few green minerals, limonite stain, piece soft white calcareous material; trace shale, medium dark-gray (N4).
2240-2244	4	Sandstone: white (N9) to little dark yellowish-orange (10YR 6/6) very fine grained to fine-grained, very few green minerals, limonite stain; trace shale, grayish-black (N2), little asphaltic (?) material.
2244-2248	4	Sandstone 90%, shale 10%: sandstone, white to few pale yellowish-orange (10YR 8/6), very fine grained to fine-grained, few larger quartz fragments, few pieces argillaceous and calcareous, limonite stain, piece soft white calcareous material; shale, medium-gray (N5) to medium dark-gray (N4).
2248-2253	5	Sandstone 95%, shale 5%: sandstone, white (N9) to pale yellowish-orange (10YR 8/6), very fine grained to fine-grained, very fine green minerals, limonite stain; shale, medium dark-gray (N4), some finely micaceous.
2253-2255	2	Sandstone: white (N9) to yellowish-gray (5Y 8/1), fine-grained to some medium-grained, few pieces calcareous, limonite stain, yellowish-gray (5Y 8/1) silty calcareous material covering sample; trace shale, dark-gray (N3).

Depth (feet)	Thickness (feet)	
2255-2260	5	Sandstone 99%, shale 1%: sandstone, white (N9) to dark yellowish-orange (10YR 8/6), very fine grained to fine-grained, few pieces medium-grained, angular to subangular, few pieces calcareous, limonite stain; shale, medium dark-gray (N4); trace asphaltic (?) material, trace pyrite.
2260-2265	5	Sandstone, white (N9) to dark yellowish-orange (10YR 8/6), fine-grained to medium-grained, angular to subangular, few pieces calcareous, few green minerals, limonite stain; trace shale, medium dark-gray (N4).
2265-2267	2	Like 2260-2265.
2267-2272	5	Like 2260-2265, more limonite staining, some very fine grained sandstone, shale 1%:
? -2275		Like 2267-2272.
2275-2279	4	Sandstone: white (N9) to dark yellowish-orange (10YR 8/6), very fine grained to fine-grained, few pieces calcareous, limonite stain, few pieces white chalky looking mineral; trace shale medium dark-gray, trace coal.
2279-2285	6	Sandstone 99%, shale 1%: sandstone, white (N9) to light-gray (N7) to pale yellowish-orange (10YR 8/6), medium-grained to some very fine grained, angular to subrounded, few larger quartz fragments, noncalcareous to calcareous, limonite stain, covered with yellowish-gray (5Y 8/1) silty material, little asphaltic (?) material, shale, medium dark gray (N4).

Depth  
(feet)

Thickness  
(feet)

Hinton formation, Avislimestone member of Roger - 46 feet

2282-2287	5	Shale 50%, sandstone 50%: shale, grayish-red (5R 4/2) to medium-gray (N5) to few medium dark-gray (N4), very finely micaceous; sandstone, calcareous, very light gray (N7) to medium light-gray (N6), very fine grained, few pieces micaceous, some argillaceous, black and few green minerals; trace limestone, yellowish-gray (5Y 7/2).
2287-2292	5	Like 2282-2287 except more sandstone.
2285-2291	6	Shale 98%, sandstone 2%: shale, calcareous, grayish-red (5R 4/2) to medium dark-gray (N4), slight limonite stain; sandstone, white (N9), very fine grained to medium-grained, subangular.
2291-2297	6	Shale 75%, sandstone 25%: shale, grayish-red (5R 4/2) to medium dark-gray (N4) to some greenish-gray (5G 6/1), noncalcareous to calcareous; sandstone, calcareous, white (N9), very fine grained to some fine-grained to few medium-grained, few black minerals; trace limestone, pale yellowish-brown (10YR 6/2).
2292-2298	6	Shale 97%, sandstone 3%: shale, calcareous, medium dark-gray (N4) to grayish-red (10R 4/2), slight limonite stain; sandstone, calcareous, white (N9), medium-grained to little fine-grained.



Depth (feet)	Thickness (feet)	
2297-2305	8	Shale 99%, sandstone 1%: shale, medium-gray (N5) to grayish-red (10R 4/2), slightly calcareous; <u>sandstone, calcareous, white (N9) to light-gray (N7)</u> , very fine grained, few black minerals; trace limestone, yellowish-gray (5Y 7/2).
2298-2310	12	Shale 97%, siltstone 3%: shale, medium-gray (N5) to medium dark-gray (N4) to reddish-gray to little dark-gray (N3), noncalcareous to slightly calcareous, some silty, some finely micaceous; siltstone, calcareous, light-gray (N7) to very light-gray (N8); trace shale, argillaceous.
2310-2315	5	Sandstone, siltstone 50%, shale 50%: very fine sandstone grading into siltstone, calcareous, very light-gray (N8) to medium light-gray (N6), nonargillaceous to argillaceous, slightly micaceous, black minerals; shale, micaceous, medium-gray (N5), silty to nonsilty, noncalcareous to slightly calcareous.
2315-2318	3	No samples.
2318-2323	5	Shale 97%, sandstone 3%: shale, medium dark-gray (N4), noncalcareous to calcareous; sandstone, like 3210-3215, trace very dusky red (10R 2/2).
2323-2333	10	No sample  Hinton formation, undivided - 271 feet
2333-2335	2	Shale: calcareous, medium-gray (N5) to medium dark-gray (N4) to grayish-red (10R 4/2), slightly micaceous, some sandy; dolomite, medium light-gray (N6) 1%.

Depth (feet)	Thickness (feet)	
2335-2344	9	Shale: grayish-red (10R 4/2) to medium-gray (N5) to medium dark-gray (N4), noncalcareous to slightly calcareous, very slightly micaceous, few pieces sandy and calcareous.
2344-2350	6	Like 2335-2344.
2350-2355	5	Shale: calcareous, grayish-red (10R 4/2) to some medium-gray (N5), slightly finely micaceous; trace sandstone, calcareous, very light gray (N8) to light-gray (N7), very fine grained.
2355-2365	10	Like 2350-2355, some only slightly calcareous.
2365-2375	10	Shale 85%, sandstone 15%; shale, medium-gray (N5) to some medium dark-gray (N4) to some grayish-red (10R 4/2), some slightly sandy and finely micaceous; sandstone, very light gray (N7) to medium light-gray (N6), slightly calcareous, some argillaceous.
2375-2377	3	Like 2365-2375 except more sandstone and more grayish-red shale, few black minerals.
-2381		Sandstone 80%, shale 20%: sandstone, very fine grained grading into siltstone, very light gray (N8) to light-gray (N7), few pieces slightly calcareous, very slightly micaceous, few black minerals, very slight limonite stain, little yellowish-gray (5R 7/2) silty material covering sample: shale, medium-gray (N5) to medium dark-gray (N4) to grayish-red (10R 4/2).

Depth (feet)	Thickness (feet)	
2381-2387	6	Sandstone 75%, shale 25%: sandstone, very light gray (N8) to light-gray (N7), very fine grained, noncalcareous to slightly calcareous, very slightly micaceous, black minerals; shale, grayish-red (10R 4/2) to medium-gray (N5) to medium dark-gray (N4), slight limonite stain.
2389-2392	3	Like 2381-2387 except less shale.
2392-2396	4	Like 2381-2387 except less shale, less grayish-red shale.
2396-2399	3	Like 2392-2396, shale 10%, more limonite stain.
23? - ?		Like 2381-2387, more calcareous, more shale, medium-gray (N5) to medium dark-gray (N4) to some grayish-red (10R 4/2).
2407-2412	3	Sandstone 75%, shale 25%: sandstone, very light gray (N8) to medium light-gray (N6), very fine grained, finely micaceous, slightly calcareous, argillaceous to nonargillaceous, black minerals; shale, silty, medium dark-gray (N4) to medium-gray (N5), finely micaceous, noncalcareous to slightly calcareous, few pieces grayish-red (10R 4/2) shale.
2412-2420	8	Like 2407-2412, less shale, more calcareous.
2420-2428	8	No samples

Depth (feet)	Thickness (feet)	
2428-2434	6	Sandstone 98%, shale 2%: sandstone, white (N9) to medium light-gray (N6), very fine grained, slightly calcareous, slightly micaceous, some argillaceous, black and few green minerals; shale, medium-gray (N5) to dark-gray (N3) to grayish-red (10R 4/2), some sandy and slightly micaceous.
2434-2440	6	Shale 95%, sandstone 5%: shale, medium-gray (N5) to medium dark-gray (N4), noncalcareous to very slightly calcareous, some sandy, some slightly finely micaceous; sandstone, white (N9) to light-gray (N7), very fine grained, noncalcareous to calcareous, nonargillaceous to argillaceous, very slightly micaceous.
2440-2446	6	Like 2434-2440.
2446-2456	10	Shale 75%, sandstone 25%: shale, medium-gray (N5), finely micaceous, some sandy; sandstone, argillaceous, light-gray (N7) to medium light-gray (N6), very fine grained, slightly calcareous, finely micaceous, few black minerals, trace pyrite.
2456-2465	9	Shale 80%, sandstone 20%: shale, medium-gray (N5), very slightly micaceous; sandstone, very light gray (N8) to light-gray (N7), very fine grained, slightly calcareous, few black minerals, very slight limonite stain, trace pyrite.

Depth (feet)	Thickness (feet)	
2465-2473	8	Like 2456-2465 except less sandstone, no pyrite, trace shale, grayish-red (10R 4/2), little silty material covering sample.
2473-2483	10	Shale 90%, sandstone 10%: shale, medium-gray (N5); trace brownish-gray (5YR 6/1), noncalcareous to some calcareous, very slightly micaceous; sandstone, white (N9) to medium light-gray (N6), very fine grained, slightly calcareous to calcareous, nonargillaceous to argillaceous, few black minerals, trace pyrite.
2483-2487	4	Sandstone 80%, shale 20%: sandstone, white (N9) to medium light-gray (N6), very fine grained, noncalcareous to slightly calcareous, some argillaceous, shale, medium-gray (N5) to some grayish-red (10R 4/2), finely micaceous.
2487-2491	4	Like 2483-2487, more shale.
2491-2493	2	Sandstone 90%, shale 10%: sandstone, white (N9) to light-gray (N7), very fine grained, noncalcareous to calcareous, limonite stain; shale, medium dark-gray (N4) to medium-gray (N5) to little grayish-red (10R 4/2) to trace dark greenish-gray (5GY 4/1), few pieces finely micaceous.

Depth (feet)	Thickness F (feet)	
2493-2500	7	Shale 99%, sandstone 1%: shale, grayish-red (10R 4/2) to medium-gray (N5), noncalcareous to slightly calcareous, trace shale, light olive-gray (5Y 6/1); sandstone, white (N9) to light-gray (N7), very fine grained, slightly calcareous to calcareous.
2500-2510	10	Like 2493-2500, shale, noncalcareous to calcareous, only trace sandstone.
2510-2522	12	Like 2500-2510.
2522-2537	15	Shale: medium-gray (N5) to medium dark-gray (N4) to some grayish-red (10R 4/2), noncalcareous to few slightly calcareous, few pieces silty, few pieces shale, olive-gray (5Y 4/1).
2537-2542	5	Shale; medium-gray (N5) to trace grayish-red (10R 4/2), few pieces silty.
2542-2551	9	Shale 95%, sandstone and siltstone 5%: shale, medium-gray (N5) to medium dark-gray (N4) to trace grayish-red (10R 4/2), noncalcareous to slightly calcareous, some silty; very fine grained sandstone grading into siltstone, argillaceous, light-gray (N7) to medium light-gray (N6), slightly calcareous, trace pyrite, piece of coal.
2551-2561	10	Like 2542-2551, more sandstone to siltstone and slightly calcareous to calcareous, no coal.

Depth. (feet)	Thickness (feet)	
2561-2566	5	Shale, sandstone: shale, medium-gray (N5) to medium dark-gray (N4), noncalcareous to calcareous, some silty; sandstone, calcareous, argillaceous, light-gray (N7) to medium light-gray (N6), few pieces pyrite.
2566-2573	5	Shale 98%, sandstone 2%: shale, medium-gray (N5) to dark-gray (N3) to some grayish-red (10R 4/2), noncalcareous to some calcareous, some silty; <u>sandstone, calcareous, very light gray (N8) to</u> medium light-gray (N6), trace pyrite.
2573-2583	10	Shale 99%, siltstone 1%: shale, medium-gray (N5) to medium dark-gray (N4) to few grayish-red (10R 4/2), noncalcareous to slightly calcareous; siltstone, very calcareous, very light gray (N7) to light-gray (N6).
2583-2593	10	Shale 95%, siltstone 5%: shale, medium-gray (N5) to medium dark-gray (N4), noncalcareous to very calcareous, trace grayish-red (10R 4/2) shale; siltstone, very calcareous, very light gray (N8) to light-gray (N7), some argillaceous.
2593-2604	11	Shale 99%, siltstone 1%: shale, medium-gray (N5) to medium dark-gray (N4); trace shale, grayish-red (10R 4/2); siltstone, like 2583-2593, trace pyrite, little very light gray calcareous silty material covering sample.

Depth (feet)	Thickness (feet)	
2604- ?		Shale: medium dark-gray (N4) to medium-gray (N5), few pieces silty and slightly calcareous.  Stony Gap sandstone member - 94 feet
?--2634		Sandstone 70%, shale 30%: sandstone, argillaceous, white (N9) to medium light-gray (N6), very fine grained, slightly calcareous, few black minerals; shale, medium dark-gray (N4) to medium-gray (N5), very slightly micaceous, nonsandy to sandy, trace grayish-red (10R 4/2) shale.
2634-264?		Like ?-2634.
2645-2653	8	Like ?-2634, more shale and shale noncalcareous to slightly calcareous.
2653-2671	18	Shale 99%, siltstone 1%: shale, medium-gray (N5), few pieces silty and slightly micaceous; siltstone, calcareous, light-gray (N7), pyrite, little calcareous silty material on sample.
2671-2685	14	Like 2653-2671.
2685-2700	15	Sandstone 70%, shale 30%: sandstone, argillaceous, very light gray (N8) to medium-gray (N5), very fine grained, very slightly micaceous, few pieces calcareous; shale, medium-gray (N5) to medium dark-gray (N4), nonsandy to sandy, very slightly limonite stain.
2700-2706	6	Like 2685-2700, more very light gray (N8), some slightly calcareous, black minerals, less shale, pyrite.



Depth (feet)	Thickness (feet)	
2704-2713	9	Sandstone 70%, shale 30%: sandstone, white (N9) to light-gray (N7), very fine grained, calcareous to few noncalcareous, few black minerals, limonite stain; shale, medium dark-gray (N4) to medium-gray (N5), noncalcareous to some slightly calcareous, few pieces sandy, nonmicaceous, some slightly finely micaceous, trace grayish-red (10R 4/2).
2706-2711	5	Like 2704-2713 except few pieces calcareous, more limonite stain.
2711-2713	2	No samples.
2713-2718	5	Sandstone 70%, shale 30%: sandstone, white (N9) to light-gray (N7), very fine grained, calcareous to few slightly calcareous, limonite stain; shale, medium-gray (N5), to medium dark-gray (N4) to trace grayish-red (10R 4/2), few pieces silty.
2718-2738	10	No samples.  Bluefield formation - 434 feet
2728-2743	15	Shale 98%, sandstone 2%: shale, medium dark-gray (N4) to some medium-gray (N5), noncalcareous to calcareous, trace grayish-red (10R 4/2) shale; sandstone, calcareous, very light-gray (N8) to medium light-gray (N6), very fine grained, some argillaceous.
2743-2756	13	Like 2728-2743, only few pieces shale calcareous, little more sandstone.

Depth (feet)	Thickness (feet)	
2756-2758	2	No samples.
2758-2763	5	Shale 85%, sandstone 15%: shale, medium dark-gray (N4) to dark-gray (N3), trace dark greenish-gray (5GY 4/1), few pieces sandy; sandstone, white (N9) to medium light-gray (N6), very fine grained, few argillaceous, few pieces calcareous, few black minerals, slight limonite stain.
2763-2765	2	Shale 90%, sandstone 10%: shale, medium-gray (N5) to medium dark-gray (N4); sandstone, white (N9) to light-gray (N7), very fine grained, few pieces calcareous, few black minerals, slight limonite stain.
2765-2768	3	Like 2763-2765, slightly more sandstone.
2768-2770	2	Shale 85%, sandstone 15%: shale, medium dark-gray (N4) to dark-gray (N3), trace dark greenish-gray (5GY 4/1), trace grayish-red (10R 4/2); sandstone, white (N9), very fine grained, noncalcareous to calcareous, few black mineral.
? -2770		Sandstone 60%, shale 40%: Like 2768-2770 except no dark greenish-gray (5GY 4/1) or grayish-red (10R 4/2).
2771-2772	1	Shale 99%, sandstone 1%: shale, medium dark-gray (N4), moderate limonite stain, few pieces carbonaceous; sandstone, white (N9), very fine grained, trace light-gray (N7) soft, silty, very calcareous rock.

Depth (feet)	Thickness (feet)	
2772-2774	2	Like 2771-2772, except more sandstone - 5%, few pieces calcareous.
2774-2775	1	Shale 98%, sandstone 2%: shale, medium dark-gray (N4); sandstone, white (N9), very fine grained.
2775-2777	2	Shale 98%, sandstone 2%: shale, medium dark-gray (N4); sandstone, white (N9), very fine grained, trace very light gray (N8) soft silty calcareous mineral.
2777-2782	5	Like 2775-2777.
2782-2784	2	Like 2775-2777 except less sandstone, more calcareous material.
2784-2786	2	Shale 60%, sandstone 40%: shale, medium dark-gray (N4) to dark-gray (N3), few pieces carbonaceous; sandstone, white (N9), very fine grained, few pieces calcareous.
2786-2788	2	Shale 70%, sandstone 30%: shale, dark-gray (N3) to medium dark-gray (N4); sandstone, white (N9) very fine grained to fine-grained, few pieces calcareous.
2788-2790	2	Shale 90%, sandstone 10%: shale, medium dark-gray (N4) to dark-gray (N3), noncalcareous to some calcareous and sandy, slight limonite stain; sandstone, calcareous, white (N9) to medium light-gray (N6), very fine grained, argillaceous to nonargillaceous; trace limestone, argillaceous, medium-gray (N5).

Depth (feet)	Thickness (feet)	
2790-2797	7	Shale, sandstone: shale, medium-gray (N5) to medium dark-gray (N4), noncalcareous to slightly calcareous, sandy, to silty; sandstone, light-gray (N7) to few white (N9), very fine grained, slightly calcareous to few very calcareous.
2797-2806	9	Shale: medium dark-gray (N4), trace pyrite.
2806-2809	3	Like 2797-2806 but some medium-gray (N5) and 1% sandstone, light-gray (N7), few pieces calcareous.
2809-2814	5	Shale: medium dark-gray (N4), few pieces slightly calcareous, trace sandy shale.
2814-2824	10	Shale: medium dark-gray (N4), to medium-gray (N5), fossil imprint (brachiopod?).
2824-2835	11	Shale: medium-gray (N5) to medium dark-gray (N4) to few greenish-gray (5GY 6/1) to few medium-gray with reddish tint, nonsandy to sandy, few pieces calcareous.
2835-2839	4	Shale, sandstone and siltstone: shale, medium dark-gray (N4) to medium-gray (N5) to some between medium-gray (N4) and grayish-red (10R 4/2), some sandy, few slightly micaceous; very fine grained sandstone grading into siltstone, light-gray (N7) to medium light-gray (N6), finely micaceous, slightly calcareous to very calcareous, some argillaceous.

Depth (feet)	Thickness (feet)	
2839-2846	7	Shale: medium dark-gray (N4) to medium-gray (N5), some very light-gray (N8), noncalcareous to calcareous to argillaceous limestone, trace pyrite.
2846-2857	11	Shale 99%, dolomite 1%: shale, medium light-gray (N6) to medium dark-gray (N4), nondolomitic to dolomitic, few pieces calcareous; dolomite, medium light-gray (N6).
2857-2865	9	Shale 99%, sandstone and siltstone 1%: shale, medium light-gray (N6) to medium dark-gray (N4), noncalcareous to calcareous, some sandy, slightly finely micaceous; trace shale, grayish-red (10R 4/2); very fine grained sandstone grading into siltstone, calcareous, medium light-gray (N6), trace pyrite.
2865-2869	4	Shale 80%, sandstone and siltstone 20%: shale, medium-gray (N5) to medium dark-gray (N4), nonsilty to silty, very slightly finely micaceous, trace shale, grayish-red (10R 4/2); sandstone, very fine grained grading into siltstone, white (N9) to medium light-gray (N6), noncalcareous to calcareous, very slightly micaceous, very few black minerals.
2869-2872	3	Like 2865-2869, only few pieces sandstone calcareous.

Depth (feet)	Thickness (feet)	
2872-2883	11	Shale 50%, siltstone and sandstone 50%: shale, medium-gray (N5), some silty; siltstone grading into very fine grained sandstone, medium light-gray (N6) to very light gray (N8), some argillaceous, noncalcareous to slightly calcareous.
2883-2885	2	Shale 60%, sandstone 40%: shale, medium-gray (N5) to medium dark-gray (N4), few pieces silty sandstone, white (N9) to medium light-gray (N6), very fine grained, calcareous to noncalcareous, few black minerals, trace pyrite.
2885-2888	3	Sandstone 70%, shale 30%: sandstone, white (N9) to light-gray (N7), very fine grained, noncalcareous to calcareous, few black minerals; shale, medium dark-gray (N4) to few medium-gray (N5), noncalcareous to slightly calcareous, few sandy, trace pyrite.
2888-2892	4	Like 2885-2888.
2890-2911	21	Shale 90%, sandstone 10%: shale, medium-gray (N5) to medium dark-gray (N4), few pieces slightly calcareous, few slightly sandy, some pieces slightly micaceous, few black minerals; sandstone, argillaceous, very light gray (N8) to medium light-gray (N6), very fine grained, noncalcareous to slightly calcareous.

Depth. (feet).	Thickness (feet).	
2911-2917	6	Shale 95%, sandstone 5%: shale, medium dark-gray (N4) to medium-gray (N5), few pieces sandy; sandstone, argillaceous, very light gray (N8) to medium light-gray (N6), very fine grained, slightly calcareous, trace pyrite.
2917-2929	12	Shale 99%, sandstone 1%: shale, medium dark-gray (N4) to medium-gray (N5), few pieces calcareous; sandstone, medium light-gray (N6), very fine grained, calcareous to noncalcareous, trace pyrite.
2929-2942	13	Like 2917-2929 except shale, noncalcareous, trace sandstone.
2942-2955	13	Shale: medium dark-gray (N4), noncalcareous to very calcareous to few pieces argillaceous limestone, crystalline, few crinoid stems.
2955-2970	15	Like 2942-2955, except more argillaceous limestone.
2970-2982	12	Like 2942-2955, except more argillaceous limestone, no crinoid stems.
2982-2994	12	Shale 75%, limestone 25%: shale, medium dark-gray (N4), noncalcareous to some calcareous, some pieces slightly micaceous; limestone, argillaceous, white (N9) to medium-gray (N5), crystalline, few crinoid stems.
2994-3007	13	Shale 75%, limestone 25%: shale, medium dark-gray (N4), noncalcareous to very calcareous; limestone, like 2982-2994, trace coal.

Depth (feet)	Thickness (feet)	
3004-3014	10	Shale 80%, limestone 20%: shale, medium dark-gray (N4), noncalcareous to very calcareous; limestone, argillaceous, light-gray (N7) to medium dark-gray (N4), crystalline.
3014-3022	8	Limestone 90%, shale 10%: limestone, argillaceous, very light gray (N8) to medium-gray (N5), crystalline to dense; shale, medium-gray (N5) to medium dark-gray (N4), noncalcareous to slightly calcareous.
3022-3027	55	Limestone 85%, shale 15%: limestone, very light gray (N8) to medium-gray (N5), very light gray is rather chalky appearing, other is crystalline to dense to argillaceous, piece calcite; shale medium dark-gray (N4), noncalcareous to slightly calcareous, several quartz fragments.
3027-3032	5	Like 3022-3027, little more shale.
3032-3037	5	Limestone 98%, shale 2%: very light gray (N8) to medium dark-gray (N4), crystalline to dense, trace oolites, trace chalky limestone; shale, medium dark-gray (N4).
3037-3043	6	Shale 70%, limestone 30%: shale, medium-gray (N4) noncalcareous to calcareous; limestone, argillaceous, very light gray (N8) to medium-gray (N5), crystalline, some chalk-like.



Depth (feet)	Thickness (feet)	
3042-3053	11	Shale 97%, limestone 30%: shale, calcareous, medium-gray (N5), few fossil imprints; limestone, argillaceous, light-gray (N7) to medium-gray (N5), very few crinoid stems.
3053-3065	12	Like 3042-3053.
3062-3072	10	Like 3042-3053.
3072-3082	10	Like 3042-3053, little more limestone, plant imprint, some medium dark-gray (N4) shale.
3082-3092	10	Shale 70%, limestone 30%: shale, medium dark-gray (N4), calcareous to some noncalcareous; limestone, argillaceous, light-gray (N7) to medium-gray (N5).
3092-3097	5	Like 3082-3092, shale, very calcareous, little more limestone, very few fossil imprints.
3092-3104	12	Like 3082-3092, except more medium-gray (N5) shale, and more calcareous, less limestone.
3104-3107	3	Shale 70%, limestone 30%: shale, medium dark-gray (N4), noncalcareous to slightly calcareous; limestone, white (N9) to medium-gray (N5) very few oolites, argillaceous to nonargillaceous, trace pyrite.
3107-3113	6	Like 3104-3107, some shale more calcareous.
3112-3117	5	Shale 90%, limestone 10%: shale, medium-gray (N5) to medium dark-gray (N4), noncalcareous to slightly calcareous to some calcareous; limestone, light-gray (N7) to medium light-gray (N6), crystalline, some argillaceous.

Depth (feet).	Thickness (feet).	
3117-3120	3	Shale 96%, limestone 3%; coal 1%: shale, medium dark-gray (N4), noncalcareous to slightly calcareous; limestone, light-gray (N7) to medium light-gray (N6), crystalline, some argillaceous; coal, trace pyrite.
3120-3128	8	Like 3117-3120 except no coal, some shale more calcareous, little more limestone, imprints of fossil plants.
3128-3140	12	Shale 80%, limestone 20%: shale, medium dark-gray (N4) to medium-gray (N4), slightly calcareous to calcareous; limestone light-gray (N7) to medium-gray (N5), crystalline, nonargillaceous to argillaceous, trace calcite; 1% fragments of brownish-gray (5YR 4/1) transparent mineral, some slightly calcareous.
3140-3150	10	Shale 75%, limestone 25%: shale, medium dark-gray (N4) to medium-gray (N5), slightly calcareous to very calcareous; limestone, white (N9) to medium-gray (N5), crystalline, nonargillaceous to argillaceous, little calcite, few fragments brownish-gray (5YR 4/1) transparent mineral.
3150-3153	3	Like 3140-3150.
3153-3162	9	Like 3140-3150, trace quartz, few pieces coal, more limestone, trace calcite, very few fossils.

Depth (feet)	Thickness (feet)	
3162-3172	10	Shale 60%, limestone 40%: shale, calcareous to very calcareous; medium dark-gray (N4) to medium-gray (N5); limestone, very light gray (N8) to medium-gray (N5), crystalline to noncrystalline, argillaceous to nonargillaceous, few coal fragments.
		Greenbrier limestone = 373 feet
3172-3180	8	Limestone 98%, shale 2%: limestone, white (N9) to medium dark-gray (N4), some crystalline, some argillaceous; shale, calcareous, medium dark-gray (N4).
3180-3185	5	Like 3172-3180, except limestone more crystalline with few oolites, more shale, medium-gray (N5), to some medium dark-gray (N4), slightly calcareous to calcareous, trace calcite.
3175-3189		Like 3180-3185.
3189-3193	4	Limestone 97%, shale 3%: limestone, very light gray (N8) to medium-gray (N5), dense to some crystalline; shale, medium dark-gray (N4), non-calcareous to slightly calcareous.
3193-3199	6	Like 3189-3193 except only trace shale.
3199-3203	4	Like 3189-3193 except only trace shale, trace coal, little silty calcareous material covering sample.
3203-3209	6	Like 3193-3199, trace oolites.
3209-3214	5	Like 3193-3199.

Depth (feet)	Thickness (feet)	
3214-3223	9	Like 3193-3199, trace oolites, trace coal.
3223-3228	5	Like 3193-3199.
3228-3236	8	Like 3193-3199, little silty material covering sample.
3236-3246	10	Limestone: very light gray (N8) to medium-gray (N5), crystalline to noncrystalline, very slightly oolitic; trace shale, medium dark-gray (N4).
3246-3252	6	Like 3236-3246, shale, slightly calcareous.
3252-3263	11	Limestone 90%, shale 10%: limestone, very light gray (N8) to medium dark-gray (N4), dense to crystalline, few crinoid stems; shale, calcareous, medium dark-gray (N4).
3263-3274	11	Like 3252-3263, except less shale, no crinoid stems, trace pyrite.
3274-3285	11	Like 3252-3263 except trace shale, no crinoid stems.
3286-3296	10	Limestone 99%, shale 1%: limestone, medium-gray (N5) to very light gray (N8), crystalline to some dense, nonoolitic to moderately oolitic, few pieces calcite; shale, medium-gray (N5) to medium dark-gray (N4), calcareous.
3291-3300	9	Like 3286-3296, few pieces calcite, few chalky pieces, trace shale.
3300-3306	6	Limestone: medium-gray (N5) to very light gray (N6), crystalline to dense; trace medium dark-gray (N4) to medium-gray (N5) shale.
3306-3318	12	Like 3300-3306, little more crystalline, shale slightly calcareous.

Depth (feet).	Thickness (feet).	
3318-3330	12	Like 3300-3306.
3330-3333	3	Limestone: medium-gray (N5) to very light gray (N8), mostly crystalline, some dense, trace shale, medium dark-gray (N4).
3333-3335	2	No samples.
3335-3341	6	Like 3330-3333.
3341-3347	6	Like 3330-3333.
3347-3353	6	Like 3330-3333.
3353-3363	10	Like 3330-3333.
3362-3371	9	Limestone: medium-gray (N5) to very light gray (N8), dense to some crystalline, sample covered by silty calcareous material, very light gray (N8), few coal fragments.
3371-3376	5	Like 3362-2271, trace coal.
3376-3384	8	Like 3362-3371, trace coal.
3384-3391	7	Limestone: medium-gray (N5) to very light gray (N8), dense to crystalline; trace shale, medium dark- gray (N4).
3391-3400	9	Like 3384-3391.
3400-3406	6	Limestone: medium light-gray (N7) to few very light gray (N8), dense to some crystalline; very few pieces shale, medium dark-gray (N4), slightly calcareous.
3406-3413	7	Like 3400-3406.
3413-3426	13	Like 3400-3406.

Depth (feet)	Thickness (feet)	
3426-3435	9	Limestone: medium-gray (N5) to very light gray (N7), dense to crystalline; trace shale, medium dark-gray (N4).
3435-3446	11	Like 3426-3434, shale 1%, slightly calcareous.
3440-3450	10	Like 3426-3434, trace silty material.
3450-3455	5	Like 3426-3434, trace silty material.
3455-3458	3	Limestone 90%, shale 10%: limestone, medium-gray (N5) to white (N9), dense to some crystalline, few oolites; shale, medium dark-gray (N4), non-calcareous to slightly calcareous, few coal fragments.
3458-3462	4	Like 3455-3458, few pieces oolitic.
3462-3467	5	Limestone: very light gray (N8) to light-gray (N9), very finely crystalline to some dense, slightly fossiliferous (ostracod?), very few oolites; trace shale, medium dark-gray (N4), slightly calcareous.
3467-3472	5	Limestone: very light gray (N8) to light-gray, very finely crystalline to some dense; trace shale, medium dark-gray (N4), several coal fragments.
3473-3476	3	Like 3467-3472, no coal, more crystalline.
3476-3480	4	Like 3462-3467.
3480-3487	7	Like 3467-3472, few pieces oolitic, no coal.

Depth (feet)	Thickness (feet)	
3487-3493	6	Limestone: very light gray (N8) to light-gray (N7), finely crystalline to dense, very few oolites; trace shale, medium dark-gray (N4).
3493-3495	2	Limestone: very light gray (N8) to medium-gray (N5), finely crystalline to dense; trace shale, calcareous, medium dark-gray, trace coal.
3495-3501	6	Limestone: very light gray (N8) to medium-gray (N5), very finely crystalline to dense; trace shale, medium dark-gray (N4), trace coal.
3501-3509	8	Limestone: very light gray (N8) to medium light- gray (N6), very finely crystalline, very few oolites; trace shale, medium dark-gray (N4), few pieces calcite.
3509-3517	8	Limestone: medium-gray (N5) to light-gray (N7), very finely crystalline and slightly silty, few pieces calcite; trace shale, medium dark-gray (N4).
3517-3522=	5	Limestone: very light gray (N8) to medium-gray (N5), dense to very finely crystalline, few oolites, trace shale, medium dark-gray (N4).
3522-3527	5	Like 3517-3522, no oolites, shale calcareous.
3527-3534	7	Limestone: very light gray (N8) to medium-gray (N5), crystalline to dense.
3534-3537	3	Limestone: very light gray (N8) to medium-gray (N5), finely crystalline to dense to crystalline; trace shale, medium dark-gray (N4).

Depth (feet)	Thickness (feet)	
3537-3548	11	Limestone 98%, shale 2%: limestone, very light gray (N8) to medium-gray (N5); finely crystalline to dense; shale, medium dark-gray (N4) to some with reddish tint, slightly calcareous.  Maccrady shale 66 feet
3545-3551	6	Limestone 65%, siltstone 35%: Limestone, like 3537-3548; siltstone, argillaceous, medium-gray (N5) with reddish tint to medium-gray (N5), noncalcareous to slightly calcareous, few pieces calcite, coal fragments, few rounded quartz fragments.
3551-3556	5	Like 3545-3551 except little more siltstone, trace shale, medium dark-gray (N4) to dark-gray (N3), slightly silty, quartz fragments, angular to rounded.
3556-3561	5	Siltstone 77%, shale 20%, sandstone 3%: siltstone, grayish-red (5R 4/2) to some medium light-gray (N6), slightly micaceous; few pieces slightly calcareous; shale, medium-gray (N5) to medium dark-gray (N4), few pieces carbonaceous; sandstone, light-gray (N7), very fine grained, few black minerals; several pieces calcite.
3561-3564	3	Siltstone 70%, shale 30%: siltstone, like 3556-3561; shale, medium-gray (N5) to medium dark-gray (N4), slightly finely micaceous; trace calcite.



Depth (feet)	Thickness (feet)	
3564-3575	11	Sandstone 75%, siltstone 25%; shale, medium-gray (N5) to grayish-red (5R 4/2), slightly finely micaceous, some argillaceous; siltstone, grayish-red (5R 4/2) to some light brownish-gray (5YR 6/1), few medium-gray (N5), some argillaceous, slightly micaceous.
3575-3584	9	Like 3564-3575, less siltstone.
3584-3593	9	Siltstone 85%, shale 10%, sandstone 5%; siltstone, grayish-red (5R 4/2) to medium-gray (N5), some argillaceous, slightly micaceous; shale, medium-gray (N5) to medium dark-gray (N4) to grayish-red (5R 4/2), some slightly micaceous, some silty, trace coal; sandstone, argillaceous, medium-gray (5R 4/2), very fine grained.
3593-3598	5	Like 3584-3593, less shale, less sandstone.
3598-3603	5	Siltstone 99%, shale 1%; siltstone, grayish-red (5R 4/2) to light brownish-gray (5YR 6/1), few pieces argillaceous, slightly micaceous, some sandy; shale, medium-gray (N5) to medium dark-gray (N4).
3603-3606	3	Like 3598-3603, little more shale, some dark-gray (N3), trace coal, few pieces very light gray (N8) soft calcareous material, trace limestone, medium light-gray (N5).

Depth (feet)	Thickness (feet)	
3606-3611	5	Siltstone 99%, shale 1%: siltstone, medium-gray (N5) to light-gray (N7) to grayish-red (5R 4/2), some argillaceous, some sandy, slightly micaceous; shale, medium dark-gray (N4).  Pocono formation - 286 feet
3611-3621	10	Siltstone 97%, shale 3%: siltstone, medium light-gray (N6) to medium-gray (N5) to light brownish-gray (5YR 4/1) to some grayish-red (5R 4/2), argillaceous to nonargillaceous, very slightly micaceous; shale, medium-gray (N5).
3621-3626	5	Siltstone 97%, shale 3%: siltstone, grayish-red (5R 4/2) to pale-red (5R 6/2) to light-gray (N7) to medium-gray (N5), some sandy, some argillaceous, very slightly micaceous; shale, medium dark-gray (N4) to medium-gray (N5), to few silty, trace coal.
3626-3534	8	Like 3621-3626, more sandy.
3634-3639	5	Like 3621-3626, more light-gray (N7) to medium-gray (N5) siltstone, more shale.
3639-3644	5	Like 3634-3639.
3644-3648	4	Siltstone 89%, sandstone 10%, shale 1%: siltstone grading into very fine grained sandstone, grayish-red (5R 4/2) to light-gray (N7) to medium-gray (N5), few black minerals; shale, medium-gray (N5) to medium dark-gray (N4).

Depth (feet)	Thickness (feet)	
3648-3652	4	Siltstone, sandstone, shale: siltstone, light-gray (N7) to medium-gray (N5) to some grayish-red (5R 4/2), noncalcareous to slightly calcareous, few black minerals; sandstone, light-gray (N7) to medium-gray (N5), very fine grained; shale, medium-gray (N5), to few grayish-red (5R 4/2), trace pyrite.
3652-3655	3	No samples.
3655-3661	6	Siltstone 95%, shale 5%: Siltstone, light-gray (N7) to medium-gray (N5), noncalcareous to slightly calcareous, few pieces grayish-red (5R 4/2), few pieces slightly micaceous; shale, medium dark-gray (N4) to medium-gray (N5).
3661-3666	5	Siltstone 98%, shale 2%: siltstone, light-gray (N7) to medium dark-gray (N4) to pale brown (5YR 5/2), few pieces slightly calcareous, few black minerals; shale, medium dark-gray (N4).
3666-3669	3	Like 3661-3666 except little more shale and more pale brown (5YR 5/2) grains.
3669-3674	5	Siltstone 95%, shale 5%: siltstone, light-gray (N7) to some medium-gray (N4), noncalcareous to slightly calcareous, few black minerals, few pieces slightly micaceous; shale, medium dark-gray (N4) to medium-gray (N5), some silty, few pieces slightly micaceous, few coal fragments.

Depth (feet)	Thickness (feet)	
3674-3677	3	Like 3669-3674, little less shale.
3677-3681	4	Like 3667-3674, little less shale.
3681-3691	10	Shale 75%, siltstone 25%: shale, medium-gray (N5) to medium dark-gray (N4), very slightly finely micaceous, some silty; siltstone, light-gray (N7) to some medium-gray (N5), few pieces calcareous.
3691-3696	5	Siltstone 85%, shale 15%: siltstone, light-gray (N7) to medium-gray (N5), slightly micaceous, few pieces calcareous; shale, medium-gray (N5) to medium dark-gray (N4), nonmicaceous to slightly micaceous, some silty, trace coal.
3696-3704	8	Like 3691-3696 except noncalcareous, shale 3%, no coal.
3704-3712	8	Shale 95%, siltstone 5%: shale, medium-gray (N5), few pieces silty; siltstone, light-gray (N7) to medium-gray (N5).
3712-3717	5	Siltstone 90%, shale 10%: siltstone, light-gray (N7) to medium dark-gray (N4), slightly finely micaceous, few pieces calcareous; shale, medium-gray (N5) to few medium dark-gray (N4).
3717-3723	6	Shale 70%, siltstone 30%: shale, medium dark-gray (N4) to medium-gray (N5), slightly finely micaceous, few slightly slightly micaceous; siltstone, light-gray (N7) to medium-gray (N5), noncalcareous to calcareous; very few pieces grayish-red (5R 4/2) siltstone, trace coal.

Depth (feet)	Thickness (feet)	
3723-3733	10	Like 3717-3723 except less siltstone and only slightly calcareous, no grayish-red siltstone, some dark-gray (N3) shale, no coal.
3722-3737	4	Shale 90%, siltstone 10%: shale, medium dark-gray (N4) to medium-gray (N5), noncalcareous to slightly calcareous to few calcareous, very slightly finely micaceous; siltstone, very light gray (N7) to medium-gray (N5), noncalcareous to calcareous, slightly finely micaceous.
3737-3745	8	Like 3733-3737 except shale noncalcareous to slightly calcareous, only 5% siltstone.
3745-3751	6	Like 3737-3745, some shale slightly silty.
3751-3760	9	Shale 98%, siltstone 2%: shale, medium-gray (N5), few slightly silty and slightly calcareous; siltstone 2%, very light gray (N7) to medium-gray (N5), slightly calcareous, trace pyrite.
3760-3770	10	Like 3751-3760 except little less siltstone.
3770-3780	10	No samples.
3780-3784	4	Shale 97%, siltstone 3%: shale, medium-gray (N5), few pieces silty; siltstone, light-gray (N7) to medium-gray (N5), very few pieces slightly calcareous, few pieces coal, few pieces very light-gray (N8) soft calcareous material.
3784-3800	16	Like 3780-3784, little less siltstone, no coal.

Depth (feet)	Thickness (feet)	
3800-3810	10	Shale 99%, siltstone 1%: shale, medium-gray (N5); siltstone, medium light-gray (N6), crinoid stem, trace pyrite.
3810-3819	9	Shale: medium-gray (N5), few pieces slightly silty, few pieces with brownish tint, trace pyrite, trace very light gray (N8) soft calcareous material.
3819-3827	8	Shale: medium-gray (N5), trace pyrite.
3827-3836	9	Shale: medium-gray (N5), trace pyrite, one piece with reddish tint.
3836-3850	14	Shale; medium-gray (N5), trace pyrite.
3850-3865	15	Shale; medium-gray (N5), trace pyrite.
3862-3874	12	Shale: medium-gray (N5), trace pyrite.
3874-3884	10	Shale: medium-gray (N5), trace pyrite.
3884-3894	5	Shale: medium-gray (N5), few pieces silty, few coal fragments.
3893-3897	4	Siltstone 97%, shale 3%: siltstone, medium-gray (N5) to grayish-red (5R 4/2), some medium light- gray (N6) to light-gray (N7), few pieces slightly micaceous; shale, medium-gray (N5) to medium dark- gray (N4), few pieces silty.
		Big Stone Gap shale
3894-3902	8	Shale: medium dark-gray (N4), very few pieces slightly silty, trace pyrite.
3902-3910	8	Shale: medium-gray (N5).

Depth (feet)	Thickness (feet)	
3910-3921	11	Shale: medium-gray (N5).
3921-3933	12	Shale: medium dark-gray (N4).
3933-3944	11	Shale: medium-gray (N5), coal fragments.
3944-3957	13	Shale: medium-gray (N5), few pieces with brownish tint and silty.
3957-3971	14	Shale: medium-gray (N5), few pieces silty.
3971-3985	14	Shale: medium dark-gray (N4) to medium-gray (N5), few pieces silty, very few pieces silt stone, light-gray (N7).
3985-4000	15	Shale: medium-gray (N5), coal fragments.
4000-4010	10	Shale: medium-gray (N5).
4010-4025	15	Shale: medium-gray (N5).
4015-4020	5	Siltstone 85%, shale 15%: siltstone, grayish-red (5R 4/2) to medium-gray (N4) to light-gray (N7), few pieces calcareous, few pieces slightly micaceous; shale, medium dark-gray (N4), silty to nonsilty; trace limestone, medium light-gray (N6).
4020-4025	5	No samples.
4025-4030	5	Shale: medium-gray (N5).
4030-4041	11	Shale: medium-gray (N5), few pieces silty.
4041-4055	14	Shale: medium dark-gray (N4).
4055-4062	7	Shale: medium-gray (N5), few pieces slightly silty and slightly calcareous; 1% very light gray (N7) silty material, slightly calcareous.
4062-4073	11	Like 4055-4062 except very few pieces soft silty material.

Depth (feet)	Thickness (feet)	
4073-4085	12	Shale: medium dark-gray (N4), very few pieces slightly silty, trace pyrite.
4085-4095	10	Shale: medium dark-gray (N4), trace pyrite; very few pieces limestone, argillaceous, white (N9), crystalline.
4095-4103	8	Shale: medium dark-gray (N4), trace pyrite.
4103-4117	14	Shale: medium dark-gray (N4), trace pyrite, piece very soft medium-gray (N5) material.
4117-4130	13	Shale 60%, siltstone 40%: shale, medium dark-gray (N4) to medium-gray (N5); siltstone, light-gray (N7) to medium-gray (N5), few pieces micaceous, several pieces pyrite.
4130-4135	5	Like 4117-4130 except more siltstone.
4135-4138	3	Shale 70%, sandstone and siltstone 30%: shale, medium dark-gray (N4) to brownish-gray (5YR 4/1); very fine grained sandstone to siltstone; very light gray (N8) to medium-gray (N7).
4138-4140	2	Like 4135-4138, few pieces siltstone calcareous.
4140-4145	5	Shale 70%, sandstone and siltstone 30%: shale, dark-gray (N3) to medium dark-gray (N4) to some brownish-gray (5YR 4/1); sandstone, very fine grained grading into siltstone, very light gray (N8) to medium-gray (N5), very few pieces calcareous, few coal fragments.



Depth (feet)	Thickness (feet)	
4145-4150	5	Siltstone 95%, shale 5%: siltstone, medium-gray (N5) to light-gray (N7), very few pieces calcareous; shale, medium dark-gray (N4).
4150-4155	5	Like 4145-4150, few pieces siltstone, very slightly calcareous, trace pyrite.
4150-4155	5	Like 4145-4150, few pieces siltstone, very slightly calcareous, trace pyrite.
4155-4160	5	Like 4145-4150, except noncalcareous.
4160-4164	4	Like 4145-4150, except shale, dark-gray (N3) to medium dark-gray (N4), more shale, very few pieces very light gray soft calcareous material.
4164-4166	2	Like 4160-4164, no soft calcareous material, few pieces calcareous.
4166-4169	3	Like 4160-4164, no soft calcareous material, few pieces slightly calcareous, little more shale.
4169-4174	5	Siltstone 95%, shale 5%: siltstone, medium light gray (N6) to medium-gray (N5), few pieces slightly calcareous, little brown limonite staining and cementing material; shale, dark-gray (N3), few pieces light-gray soft calcareous material.
4174-4179	5	Like 4169-4174.
4179-4182	3	Like 4169-4174, except siltstone from light-gray (N7) to medium-gray (N5), no soft calcareous material, trace coal.
4182-4186	4	Like 4179-4182, no coal.

Depth (feet)	Thickness (feet)	
4186-4189	3	Siltstone 85%, shale 15%: siltstone, medium-gray (N5) to some light-gray (N7), few pieces very slightly micaceous, little limonite stain; shale, medium dark-gray (N4) to dark-gray (N3).
4189-4191	2	Like 4186-4189.
4191-4194	3	Siltstone 80%, shale 20%: siltstone, medium-gray (N5), noncalcareous to calcareous; 1% very light gray (N8) soft calcareous material; shale, dark-gray (N3) to some medium dark-gray (N4), few coal fragments.
4194-4196	2	Siltstone 90%, shale 10%: siltstone, medium light gray (N6) to medium-gray (N5), noncalcareous to few calcareous, little limonitic cementing material and stain, very few pieces very light gray (N5) soft calcareous material; shale, dark-gray (N3).
4196-4206	10	Shale: medium dark-gray (N4) to some medium-gray (N5), silty to nonsilty, little limonite stain, few pieces light olive-gray (5 $\frac{1}{2}$ 6/1) siltstone.
4204-4214	10	Shale 99%, siltstone 1%: shale, medium dark-gray (N4) to few pieces medium-gray (N5), silty to nonsilty, very slightly micaceous, little limonite stain; siltstone, light-gray (N7) to medium-gray (N5), one or two pieces very light gray (N8) soft calcareous material, trace pyrite.
4214-4229	15	Shale: medium dark-gray (N4), very slightly finely micaceous, slightly silty, trace pyrite.

Depth (feet)	Thickness (feet)	
4229-4237	88	Like 4214-4229.
4237-4243	6	Like 4214-4229, no pyrite.
4243-4255	12	Like 4214-4229, no pyrite.
4255-4266	11	Like 4214-4229.
4266-4278	12	Shale: <del>dark-gray (N3)</del> to few pieces medium dark-gray (N4), slightly silty, slightly finely micaceous.
4278-4288	10	Shale: medium-gray (N5), little light-gray silty material on sample.
4288-4297	9	Like 4278-4288.
4297-4305	8	Like 4278-4288.
4305-4310	5	Shale: medium-gray (N5) to little medium dark-gray (N4), few pieces slightly silty.
4310-4317	7	Shale: medium-gray (N5) to brownish-gray (5YR 4/1). Chemung formation? - Brallier shales
4317-4324	7	Siltstone 60%, shale 40%: siltstone, very light gray (N8) to medium-gray (N5), noncalcareous to calcareous, nonmicaceous to slightly micaceous; shale, medium-gray (N5) to dark-gray (N3), nonmicaceous to slightly finely micaceous, trace pyrite.
4324-4333	9	Like 4317-4324, few pieces siltstone calcareous, less shale.
4333-4350	17	Shale 99%, siltstone 1%: shale, medium-gray (N5); siltstone, light-gray (N7) to medium-gray (N5).

Depth (feet)	Thickness (feet)	
4350-4358	8	Shale: medium-gray (N5); trace siltstone, light-gray (N7) to medium-gray (N5).
4358-4365	7	Shale: medium-gray (N5), few pieces slightly silty.
4365-4371	6	Shale, siltstone: shale, medium-gray (N5) to dark-gray (N3); silty shale to argillaceous siltstone, nonmicaceous to slightly micaceous.
4371-4375	4	Like 4365-4375, except more shale nonsilty.
4375-4387	12	Shale: medium-gray (N5) to medium dark-gray (N4), slightly micaceous, few pieces slightly silty.
4387-4397	10	Shale: medium-gray (N5) to medium dark-gray (N4), very few pieces slightly silty.
4397-4410	13	Like 4387-4397.
4410-4425	15	Like 4387-4397.
4425-4438	13	Like 4387-4397, except few more pieces silty.
4438-4453	15	Shale: medium-dark-gray (N4), few pieces medium-gray (N5), slightly finely micaceous, few pieces silty, few pieces coal.
4453-4455	2	No samples.
4455-4465	10	Shale: medium dark-gray (N4) to medium-gray (N5), trace pyrite.
4465-4478	13	Shale: medium dark-gray (N4) to medium-gray (N5).
4478-4481	3	Shale: medium dark-gray (N4) to medium-gray (N5).
4481-4489	8	Shale: medium dark-gray (N4) to medium-gray (N5), few slightly silty.
4489-4500	11	Shale, medium-gray (N5) to medium dark-gray (N4), few pieces slightly silty, little light-gray (N7) silty material covering sample.

Depth (feet)	Thickness (feet)	
4500-4508	8	Shale: medium dark-gray (N4) to medium-gray (N5), nonmicaceous to slightly micaceous, nonsilty to some slightly silty, trace pyrite.
4508-4521	13	Like 4500-4508, no pyrite.
4521-4529	8	Like 4500-4508, no pyrite, more medium dark-gray shale.
4529-4541	12	Like 4500-4508.
4541-4552	11	Shale 95%, siltstone 5%: shale, medium dark-gray (N4) to medium-gray (N5), nonsilty to silty, nonmicaceous to slightly micaceous; siltstone, light-gray (N7) to medium-gray (N5), nonargillaceous to argillaceous.
4554-4559	7	Like 4541-4552, trace coal, trace pyrite.
4559-4568	9	Shale: medium-gray (N5) to medium dark-gray (N4), nonsilty to silty, trace pyrite.
4568-4577	9	Shale: medium dark-gray (N4) to medium-gray (N5), some silty.
4577-4590	13	Shale: medium-dark-gray (N4) to medium-gray (N5), some silty.
4590-4602	12	Shale: medium dark-gray (N4) to medium-gray (N5), some silty.
4602-4617	15	Shale: medium dark-gray (N4) to medium-gray (N5), some silty.
4617-4624	7	Like 4568-4577 except fewer pieces silty.

Depth (feet)	Thickness (feet)	
4624-4634	10	Shale: medium dark-gray (N4) to medium-gray (N5), nonmicaceous to slightly finely micaceous, few pieces slightly silty.
4634-4641	7	Like 4624-4634.
4641-4649	8	Shale: medium dark-gray (N4) to medium-gray (N5), few pieces silty, nonmicaceous to slightly micaceous.
4649-4660	11	Like 4641-4649.
4660-4676	17	Like 4641-4649, few pieces coal.
4676-4686	10	Shale: medium-gray (N5) to medium dark-gray (N4), very few pieces slightly micaceous.
4686-4701	15	Shale: medium-gray (N5) to some medium dark-gray (N4).
4701-4714	13	Shale: medium-gray (N5) to medium dark-gray (N4), few pieces silty, few slightly micaceous.
4714-4728	14	Like 4701-4714, very few pieces silty.
4728-4745	17	Like 4701-4714, very few pieces silty.
4745-4759	14	Like 4701-4714, very few pieces silty.
4759-5271	512	No samples.
5271-5276	5	Shale: very carbonaceous, black (N1); soft, smutty, graphitic or coal-like, dull and bright. Fault gouge of Pine Mountain thrust fault? No slickensides present.
5276-5282	6	Like 5271-5276.
5282-5288	6	Like 5271-5276.
5288-5293	5	Shale: carbonaceous, medium dark-gray (N4), few pieces pyrite.

Depth (feet)	Thickness (feet)	
5293-5298	5	Like 5288-5293.
5297-5303	6	Shale 99%, sandstone 1%: shale, medium dark-gray (N4), trace coal-like fragments; sandstone, white (N9) to yellowish-gray (5Y 8/1), medium-grained to very coarse-grained, angular, quartz; few pieces pyrite.
5303-5310	7	Shale: medium dark-gray (N4), few pieces carbonaceous, one or two coal-like fragments; few quartz fragments, fine-grained to medium-grained, few pieces pyrite.
5310-5322	12	Shale: medium dark-gray (N4), few pieces pyrite, trace quartz fragments, few pieces light-gray (N7) soft calcareous material.
5322-5330	8	Like 5310-5322 except only trace of calcareous material.
5330-5340	10	No samples.
5340-5350	10	Shale: medium-gray (N5), trace pyrite, trace calcite(?).
5350-5357	7	Shale: medium dark-gray (N4), few pieces carbonaceous, very few pieces silty and calcareous, few pieces pyrite.
5357-5361	4	Shale 90%, limestone 10%: shale, medium dark-gray (N4), some carbonaceous; limestone, argillaceous, light-gray (N7) to medium-gray (N5), crystalline.