

LITHOLOGY

Carboniferous System, Pennsylvanian Series, Pottsville, Group,
Norton formation

Depth (feet)	Thickness (feet)	
22-34	12	Sandstone 97%, shale 3%: Sandstone, micaceous, white (N9) to light-gray (N7), very fine grained to fine-grained, few pieces medium-grained, angular to subangular, few green minerals, some iron stain; shale, carbonaceous, medium-dark-gray (N4) to black (N1).
34-40	6	Like 22-34.
40-49	9	Like 22-34 except more fine-grained to medium-grained, few pieces calcite.
49-55	6	Like 22-34 except little less shale, few pieces calcareous.

Depth (feet)	Thickness (feet)	
55-60	5	No samples.
60-63	3	Sandstone 99%, coal 1%: Sandstone, white (N9) to light gray (N7) to few yellowish-gray (5Y 8/1), very fine grained to fine-grained to very few medium-grained, slightly micaceous, very few pieces very slightly calcareous, some iron stain; few pieces medium dark-gray (N4) shale.
63-67	4	Sandstone 99%, shale 1%: Sandstone, micaceous, white (N9), to very light-gray (N8) to some yellowish-gray (5Y 8/1), very fine grained to fine-grained, few green minerals, some iron stain; shale, carbonaceous, dark-gray (N3) to coal; trace medium dark-gray (N4) shale.
67-70	3	Sandstone: white to yellowish-gray (5Y 8/1) to some light-gray (N7), very fine grained, slightly micaceous, some iron stain; trace shale, carbonaceous, dark-gray (N3).
70-85	15	No samples.
85-89	4	Sandstone 90%, shale 10: sandstone, conglomeratic, white (N9) to light-gray (N7), medium-grained to coarse-grained to fine-grained, angular to sub-angular, some argillaceous, few green minerals; shale, medium-gray (N5) to grayish-black (N2), non-micaceous to some finely micaceous, non-silty to some silty.

Depth (feet)	Thickness (feet)	
89-95	6	Shale 99%, sandstone 1%: shale, carbonaceous, medium-gray (N5), nonsilty to silty, trace coal; sandstone, white (N9) to light (N7), fine-grained to medium-grained, angular to subangular.
95-100	5	Shale 98%, siltstone 1%, sandstone 1%: shale, carbonaceous, medium dark-gray (N4) to brownish-black (5YR 2/1), some silty resinous luster, trace coal; siltstone, very light gray (N8); sandstone, very light gray (N8) to light-gray (N7), very fine grained to medium-grained.
100-105	5	No samples.
105-109	4	Sandstone 99%, shale 1%: sandstone, very light gray (N8) to medium light-gray (N6), very fine grained, noncalcareous to calcareous, some argillaceous, very slightly micaceous, few green and black minerals, trace iron stain; shale, silty, medium dark-gray, finely micaceous; trace coal.
109-114	5	Sandstone: white (N9) to very light gray (N8) to some light-gray (N7), very fine grained, non-calcareous to some calcareous, very slightly micaceous, trace iron stain; trace coal; trace shale, medium dark-gray (N4), finely micaceous, slightly silty.

Depth (feet)	Thickness (feet)	
114-120	6	Sandstone to siltstone 90%, shale 10%: Sandstone, very fine grained to siltstone, micaceous, light-gray (N7) to medium light-gray (N6), argillaceous to nonargillaceous; shale, micaceous, medium-gray (N5), nonsilty to silty.
120-124	4	Like 114-120 except no siltstone, less shale, few black minerals.
125-128	3	Sandstone 85%, shale 10%, coal 5%: sandstone, argillaceous, micaceous, very light gray (N7) to medium-gray (N5), very fine grained; shale, medium dark-gray (N4) to dark-gray (N3), non-carbonaceous, to carbonaceous, finely micaceous, nonsilty to slightly silty; coal.
128-134	6	Sandstone 98%, shale 1%, coal 1%: sandstone, micaceous, light-gray (N7) to some medium light-gray (N6), very fine grained, calcareous slightly calcareous, few black minerals; shale, medium dark-gray (N4), to some dark-gray (N4), nonsilty to silty, non-micaceous to micaceous; coal.
134-139	5	Like 128-134 except less coal.
139-146	7	Sandstone 79%, shale 20%, coal 1%: sandstone, micaceous, light-gray (N7) to medium-gray (N5), very fine grained, nonargillaceous to argillaceous, very few pieces slightly calcareous; shale, medium dark-gray (N4) to some medium-gray (N5), noncarbonaceous, to carbonaceous, nonsilty to silty, some micaceous.

Depth (feet)	Thickness (feet)	
146-152	6	Like 139-146 except less medium-grained sandstone; less shale 10%.
152-158	6	Shale 90%, sandstone 10%: shale, medium-grain (N5) to few medium dark-gray (N4), few very slightly micaceous, nonsilty to some silty; sandstone, light-gray (N7) to few medium light-gray (N6), very fine grained, nonargillaceous to some argillaceous, very few slightly calcareous.
158-163	5	Shale: medium-gray (N5), moderately calcareous; shale, carbonaceous, medium dark-gray (N4), nonmicaceous to finely micaceous, nonsilty; trace coal; trace siltstone, light-gray (N7).
163-170	7	Shale 98%, siltstone 2%: shale, medium dark-gray (N4), to some medium-gray (N5), noncarbonaceous to some carbonaceous; siltstone, light-gray (N7); sample covered with light-gray (N7) silty material.
170-175	5	Shale: medium-gray (N5) to medium dark-gray (N4), trace light-gray (N7) silty material.
175-180	5	Like 170-175 except shale, silty to nonsilty, finely micaceous to nonmicaceous.
180-185	5	Shale: medium-gray (N5) to medium dark-gray (N4), nonsilty to silty, nonmicaceous to slightly finely micaceous.
185-201	6	Shale: medium-gray (N5), nonsilty to very silty, nonmicaceous to micaceous, noncalcareous to slightly calcareous; trace siltstone, medium light-gray (N6).

Depth (feet)	Thickness (feet)	
201-206	5	Shale: medium-gray (N5), to medium dark-gray (N4), silty to nonsilty, some finely micaceous, few slightly calcareous.
206-214	8	Shale: medium-gray (N5) to medium dark-gray (N4), noncalcareous to some very calcareous, few slightly finely micaceous; few pieces siltstone, light-gray (N7), slightly calcareous, soft.
214-220	6	Shale: medium-gray (N5), nonsilty to some slightly silty, few slightly micaceous.
220-225	5	Like 214-220 except less silty.
225-230	5	Sandstone 80%, siltstone 20%: siltstone, micaceous, argillaceous, medium light-gray (N6) to medium-gray (N5), grades into sandstone, very fine grained, few pieces calcareous; trace medium dark-gray (N4) shale, carbonaceous.
230-240	10	Like 225-230.
240-245	5	Like 225-230; only trace sandstone.
245-250	6	Like 225-230; only trace sandstone, no shale.
250-255	5	Like 225-230; only trace sandstone, no shale, few pieces slightly calcareous.
255-264	9	Like 225-230; only trace sandstone, no shale, few pieces slightly calcareous.
264-270	6	Siltstone 99%, coal 1%: Siltstone, argillaceous, micaceous, medium light-gray (N6) to medium-gray (N5); coal.
270-277	7	Like 264-270.

Depth (feet)	Thickness (feet)	
277-283	6	Siltstone 65%, coal 20%, shale 15%; siltstone, argillaceous, micaceous, medium-light-gray (N6) to medium-gray (N5); coal; shale, carbonaceous, medium dark-gray (N4); trace pyrite.
283-290	7	Like 277-283 except no coal and shale 10%.
290-300	10	Sandstone 35%, shale 25%, siltstone 20%: sandstone, light-gray (N7) to medium-gray (N5), very fine grained grading into siltstone, few slightly calcareous, slightly micaceous; shale 25%, medium dark-gray (N4) to medium-gray (N5), few pieces micaceous, nonsilty to some silty; trace coal.
300-311	11	Shale: medium-gray (N5), few slightly micaceous, trace light-gray (N7) silty material.
311-324	13	Shale: medium gray (N5) to medium dark-gray (N4); trace coal; little light-gray (N7) silty material on sample.
326-328	2	Sandstone 85%, shale 15%: sandstone, white (N9) to medium light-gray (N6), fine-grained, few pieces slightly argillaceous, few green minerals, little iron stain; shale, medium dark-gray (N4); trace coal.
328-332	4	Sandstone, white (N9) to light-gray (N7), fine-grained, very slightly micaceous, few green minerals, slightly iron stained; trace pyrite.

Depth (feet)	Thickness (feet)	
332-340	8	Sandstone: white (N9) to light-gray (N7), fine-grained to little very fine grained, noncalcareous to some calcareous, some slightly argillaceous, few green and black minerals, little iron stain; few mica flakes (muscovite?), trace coal.
340-345	5	Sandstone: white (N9) to light-gray (N7), fine-grained, noncalcareous to calcareous moderately permeable, few green and black minerals, few mica flakes, little iron stain.
345-349	5	Like 340-345; more calcareous, coal 1%.
344-353	4	Sandstone: white (N9) to very light-gray (N8), fine-grained to very fine grained, calcareous to noncalcareous, few green and black minerals, trace iron stain; little very light-gray (N8) silty material on sample.
353-358	5	Sandstone 97%, shale 3%: Sandstone, white (N9), little very light gray (N8), fine-grained to very fine-grained, slightly micaceous, few green <u>minerals, little iron stain; shale, black,</u> grading into coal.
358-363	5	Like 353-358.
363-368	5	Sandstone 98%, coal 2%: sandstone, white (N9) to light-gray (N7), fine-grained to very fine grained, slightly micaceous (muscovite), some slightly argillaceous, few green and black minerals, little iron stain, trace chlorite?; coal.

Depth (feet)	Thickness (feet)	
368-372	4	Sandstone: white (N9) to pale yellowish-orange (10YR 8/6) to dark yellowish-orange (10YR 6/6), very fine grained to fine-grained noncalcareous to calcareous, few black and green minerals, moderate limonite staining.
372-377	5	Sandstone: white (N9) to very light gray (N8) to few pale yellowish-orange (10YR 8/6), very fine grained to fine-grained, calcareous cement, black and few green minerals, trace chlorite?, limonite stain.
377-383	6	Sandstone 98%, shale 2%: sandstone, white (N9) to medium light-gray (N6), very fine grained, slightly micaceous, nonargillaceous to some slightly argillaceous, some iron stain; shale, medium dark-gray (N4) to black (N1), nonsandy to sandy, black shale is carbonaceous.
383-390	7	Sandstone 60%, shale 40%: sandstone, white (N9) to light-gray (N7), very fine grained, non-calcareous, few green minerals, little iron stain; shale, silty, medium dark-gray (N4) to some medium-gray (N5), finely micaceous.
390-400	10	Shale 70%, sandstone 30%: shale, micaceous, medium dark-gray (N4) to medium-gray (N5), some slightly calcareous; sandstone, calcareous, argillaceous, light-gray (N7) to medium-gray (N5), nonmicaceous to micaceous, few black minerals.

Depth (feet)	Thickness (feet)	
400-410	10	Like 390-400 except shale more calcareous and sandstone slightly calcareous to calcareous.
410-416	6	Shale 75%, sandstone 25%: shale, medium dark-gray (N4), slightly calcareous, slightly micaceous to finely micaceous, some slightly sandy; sandstone, calcareous, argillaceous, light-gray (N7) to medium-gray (N5), slightly micaceous to micaceous, few black minerals.
416-421	5	Like 410-416; less sandstone 15%.
421-426	5	Like 410-416; less sandstone 15%.
		Lee formation
426-436	10	Sandstone 74%, shale 25%, coal 1%: sandstone, white (N9) to some light-gray (N7), fine-grained, angular to subangular, few pieces calcareous, few green and black minerals, slight iron stain; shale, medium dark-gray (N4); coal.
436-446	10	Sandstone: white (N9) to few light-gray (N7) to few yellowish-gray (5Y 8/1), fine-grained to few very fine grained to few medium-grained, angular to subangular, few calcareous, some green and few black minerals, little iron stain.
446-451	5	Like 436-446; more calcareous.
451-455	4	Like 435-446; more calcareous.
455-466	11	Like 435-446; more calcareous, very few green minerals, less very fine-grained.

Depth (feet)	Thickness (feet)	
466-469	3	Like 436-446; more calcareous, very few green minerals.
469-475	6	Like 436-466; fewer green minerals.
475-480	5	Sandstone: white (N9) to light-gray (N7), fine-grained to medium-grained, angular to subangular, few argillaceous, noncalcareous to some calcareous, some green minerals, and few black minerals, several pieces coal.
480-485	5	Sandstone 90%, shale 10%: sandstone, white (N9) to medium light-gray (N6), some argillaceous, slightly silty, some calcareous, few green and black minerals, little iron stain; shale 10%, medium-gray (N5) to medium dark-gray (N4), nonsilty to silty, slightly micaceous.
485-488	3	Sandstone: white (N9) to light-gray (N7), very fine grained to fine-grained, few green minerals, slight iron stain; several pieces bright coal.
488-500	12	Sandstone, white (N9) to few light-gray (N7), fine-grained to some very fine grained, angular to subangular, some green minerals, slight iron stain.
500-505	5	Sandstone: white (N9) to medium-gray (N5), fine-grained to some medium-grained, angular to subangular, nonargillaceous to very argillaceous, very slightly micaceous, few green and black minerals, trace iron stain; trace very carbonaceous shale.

Depth (feet)	Thickness (feet)	
505-510	10	Sandstone: white (N9) to light-gray (N7), fine-grained to some medium-grained, subangular to angular, few pieces calcareous, few pieces argillaceous, slight iron stain; little very light-gray (N8) silty material.
510-515	5	Sandstone 95%, shale 5%: sandstone, light-gray (N7), to medium light-gray (N6), very fine grained, non-argillaceous to some argillaceous, slightly micaceous, some dark and black minerals, trace iron stain.
515-519	4	Like 510-515; less shale (cavings?).
519-524	5	Sandstone: calcareous, very light gray (N8) to light-gray (N7), very fine grained, very few slightly argillaceous, trace mica.
524-529	5	Shale 60%, sandstone 40%: shale, medium dark-gray (N4), finely micaceous to some nonmicaceous, non-sandy to sandy; sandstone, very light gray (N8) to medium-gray (N5), very fine grained, argillaceous to slightly argillaceous, few green minerals.
529-534	5	Like 529-534; more sandstone.
534-544	10	Shale: medium-gray (N5), few finely micaceous.
541-548	7	Shale: medium-gray (N5), little silty material and few pieces siltstone, pale yellowish-brown (10YR 6/2).

Depth (feet)	Thickness (feet)	
548-555	7	Shale: medium-gray (N5), with light-gray (N7) silty material covering sample.
555-560	5	Shale: medium dark-gray (N4).
560-567	7	Shale: medium dark-gray (N4).
567-578	11	Shale: medium dark-gray (N4) to some medium-gray (N5) few pieces slightly silty to sandy; light- gray (N7) silty material covering sample and few pieces siltstone.
578-589	11	Like 567-578.
589-596	7	Like 567-578.
596-602	6	Shale: medium dark-gray (N4).
602-607	5	Shale 85%, siltstone 15%: Shale, medium dark-gray (N4), nonmicaceous to slightly micaceous, nonsilty to some silty; siltstone, argillaceous, medium- gray (N5) to some light-gray (N7), nonmicaceous to slightly micaceous.
607-614	7	Shale: medium-gray (N5).
614-618	4	Shale 95%, coal 5%: shale, medium dark-gray (N4); coal, bright.
618-625	7	Shale 80%, siltstone 10, coal 10%: shale medium- gray (N5) to few medium dark-gray (N4), silty to few nonsilty, slightly micaceous; siltstone, argillaceous, medium light-gray (N6), some slightly micaceous; coal, bright.

Depth (feet)	Thickness (feet)	
625-635	10	Sandstone 85%, shale 15%: sandstone, light-gray (N7) to medium-gray (N5), very fine grained, argillaceous to nonargillaceous, noncalcareous to calcareous, few pieces micaceous; shale, medium dark-gray (N4), finely micaceous to nonmicaceous, nonsilty to silty,
635-649	14	Like 624-635; little less shale; 2% coal, bright.