

Operator: Clinchfield Coal Corporation
 Farm: E. C. Smith
 Well No.: 104
 Location: Dickenson County
 8150' S. of 37° 05')
 2700' W. of 82° 20') approximate
 Elevation: 1523.94' Ground
 Total Depth: 4033'
 Drilling Commenced: May 24, 1949
 Well Completed: October 20, 1949
 Result: Gas well

Samples examined by
 E. T. Jacobsen, U. S.
 Geological Survey,
 Lexington, Kentucky
 1949-1950

GEOLOGIC LOG

<u>Depth Interval</u>	<u>Lithology</u>
103-106	Shale, medium gray (N5), trace very finely micaceous material.
106-112	Ditto.
112-115	Ditto, with some slightly larger flakes of mica.
115-125	No sample.
125-128	Ditto.
128-134	Shale, silty, medium gray (N5.5), micaceous.
134-140	Shale, as above, with about 5% graywacke, light gray (N7) to yellowish gray (5Y 8/1), medium-grained, some fine-grained, subangular to angular, poorly sorted, 85% quartzose, some dark and green inclusions, friable, possible lense in shale.
140-143	Shale, medium gray (N5), very finely micaceous, hard, chunky.
143-153	Shale, very slightly silty, medium gray (N5).
153-157	Shale, medium gray (N5), trace very finely micaceous material.
157-165	Ditto.
165-167	No sample.
167-171	Shale, very carbonaceous, dark gray (N3), micaceous, slightly fissile, (Driller's log: coal, 167-170).

- 171-175 Siltstone, very shaly, medium gray (N5), subrounded poorly sorted, micaceous; coal, part slightly fissile, part with conchoidal fracture, about 10%.
- 175- ? Graywacke, medium gray (N5.5), very fine- to fine-grained, subangular to subrounded, very poorly sorted, about 50% quartzose, many dark and some green inclusions, micaceous in large flakes (muscovite ? and chlorite), moderately to well cemented.
- 177-179 Graywacke, as above, friable to well cemented.
- 179-182 Graywacke, as above, some medium-grained size.
- 182-187 Ditto, fine-grained to medium-grained, moderately well cemented.
- 187-195 Graywacke, very light gray (N8), fine-grained, angular to subangular, poorly sorted, about 50% quartzose, considerable black (including little coal), brown and few green inclusions, large flakes of mica (muscovite?) moderately friable to very well cemented.
- 195-198 Graywacke, some approaching medium-grained.
- 198- ? Ditto, medium-grained, well cemented.
- 205-210 Ditto, slightly conglomeratic with some coarse-grained quartz fragments, very slightly calcareous, numerous green (glauconitic?) inclusions.
- 210-215 Graywacke, very light gray (N8), very fine-grained to fine-grained, subangular, poorly sorted, about 50% quartz, dark and black inclusions, very slightly calcareous, micaceous (muscovite?), friable.
- 215-216 Ditto, slightly conglomeratic, some medium-grained and coarse-grained quartz, angular.
- 216-218 Ditto, conglomeratic, numerous angular coarse-grained quartz fragments.
- 218-221 Graywacke, as above, non-conglomeratic.
- 221-223 No sample.
- 223-225 Ditto, light gray (N7), fine-grained to very fine-grained, as above.

225-232	Ditto, very poorly sorted, some medium-grained quartz grains.
231-233	Ditto, very fine-grained to fine-grained.
232-235	Shale, medium gray (N5), very finely micaceous.
235-240	Ditto, trace very finely micaceous material.
240-243	Shale, slightly silty, medium gray (N5), micaceous.
243-245	No sample.
245-248	Ditto.
248-252	Shale, medium gray (N5), trace mica.
252-255	Ditto.
255-259	No sample.
259-260	Ditto.
?-268	Ditto, trace carbonaceous (very small cut).
268-275	Graywacke, light gray (N7), very fine-grained, subangular to subrounded, very poorly sorted (very shaly), about 40% quartzose, considerable dark and black inclusions, micaceous, moderately friable.
275-277(?)	Ditto, light gray (N7.5), less shaly, very poorly sorted, some green, large flakes, mica (muscovite?).
277-278	Ditto, and some brown inclusions, friable.
278-280	Ditto, very light gray (N8).
280-289	No sample.
289-293	Shale, slightly carbonaceous, medium dark gray (N4).
293-299	Graywacke, slightly calcareous, laminated, light gray (N7.5), fine-grained, subangular to subrounded, poorly sorted about 60% quartzose, with brown, black, and greenish inclusions, micaceous, moderately friable.
299-305	Ditto, calcareous cement.
305-306	Ditto, friable, very few clusters, large flakes, muscovite (?).

- 306-309 Ditto, very slightly calcareous, very poorly sorted, numerous medium-grained quartz.
- 309-313 Ditto, more medium-grained, numerous green inclusions.
- 313-315 ?
- 315-? Same as (313-315?).
- 320-? Same as (315-320?).
- 320-? Shale, medium dark gray (N4), very finely micaceous (few pieces showing contact with sandstone above).
- 320-329 Shale, silty, medium dark gray (N4), finely micaceous.
- 329-333 Graywacke, medium light gray (N6), very fine-grained, subangular, very poorly sorted, about 35% quartzose, considerable black, dark, and little green inclusions, well cemented.
- 333-338 Coal, part very slightly shaly, part with high luster, 50%; shale, medium dark gray (N4), very finely micaceous, 50%.
- 338-343 Shale, medium dark gray (N4), as above.
- 343-347 Coal, very high luster, 50%; graywacke, medium light gray (N6), very fine-grained, subangular to subrounded, very poorly sorted, about 40% quartzose, peppered and very fine-grained, black inclusions, very micaceous (small and large flakes muscovite?), well cemented.
- 347-351 Ditto, fine-grained, friable.
- 351-354 Graywacke, light gray (N7), fine-grained, (approaching medium-grained), subangular, very poorly sorted, about 65% quartzose, inclusions medium-grained size, dark gray micaceous shale, small and very fine-grained size, red and small green (glauconite?) minerals, micaceous (chlorite, muscovite?), moderately well cemented.
- 354-360 Ditto, very light gray, fine-grained to very fine-grained, friable.
- 360-370 Ditto, very fine-grained, very friable.
- 370-371 Ditto, fine-grained, moderately friable.

- 371-374 Graywacke, calcareous, light gray (N7), fine-grained to very fine-grained, subangular to subrounded, very poorly sorted, about 50% quartzose, black shale and little green, black, and brown mineral inclusions, micaceous, moderately well cemented.
- 374-378 Ditto.
- 378-380 Ditto, very slightly calcareous, fine-grained, and some coarse-grained quartz, some broken, possible conglomeratic, chlorite and larger flakes muscovite (?) inclusions.
- 380-388 Ditto, and considerable green (glauconite?) inclusions.
- 388-389 Graywacke, light gray (N7), very fine-grained, angular to subangular, poorly sorted, about 60% quartzose, dark black, and green (part glauconite?) inclusions, micaceous, few clusters, very well cemented.
- 389-392 Shale, medium gray (N5), very finely micaceous.
- 392-398 Ditto, (N4.5).
- 398-401 Ditto, medium dark gray (N4).
- 401-405 No sample.
- 405-412 Shale, medium gray (N5), very finely micaceous.
- 412-415 No sample.
- 415-421 Shale, silty, medium gray (N5).
- 421-422 Siltstone, medium light gray (N6), coarse-grained, very poorly sorted, micaceous, very hard.
- 422-427 No sample.
- 427-430 Graywacke, light gray (N7), very fine-grained, subangular to subrounded, very poorly sorted, silt cement, about 60% quartzose, very fine-grained, dark inclusions, little fine-grained red and green mineral, micaceous, moderately friable.
- 430-437 Graywacke, as above, fine-grained, more dark gray and reddish brown inclusions, moderately well cemented.
- 437-440 Ditto, to moderately friable.
- 440-448 Ditto, about 70% quartzose.

448-464	Ditto, moderately friable to moderately well cemented, very few clusters, possibly very slightly conglomeratic.
459-461	Shale, silty, medium light gray (N6), slightly micaceous.
460-462	Ditto, very slightly silty.
462-468	No sample.
468-475	Ditto, very slightly silty, medium light gray (N5.5).
475-485	Ditto.
485-494	Shale, medium light gray (N6), non-silty, very finely micaceous.
494-502	Ditto, medium-grained.
503-510	Ditto.
510-515	Ditto.
515-525	Shale, medium gray (N5.5), very finely micaceous.
525-530	Ditto.
530-543	Graywacke, slightly calcareous, light gray (N7), very fine-grained, subrounded to subangular, moderately well sorted, about 60% quartzose, very fine-grained, dark and brown inclusions, micaceous.
543-548	Graywacke, as above, approaching siltstone.
544-556	Siltstone, slightly calcareous, sandy, light gray (N7), coarse-grained (approaching very fine-grained graywacke), subrounded, poorly sorted, slightly peppered with black, slightly micaceous.
556-564	Shale, very slightly silty, medium light gray (N6).
564-571	Shale, medium gray (N5), trace very finely micaceous material.
571-577	Ditto.
577-582	Ditto, silty.
582-590	Ditto, very silty (approaching siltstone).
590-596	Ditto, non-silty.
596-601	No sample.

- 601-611 Graywacke, very light gray (N8), very fine-grained, sub-angular to subrounded, moderately well sorted, about 80% quartzose, very fine-grained dark and black inclusions, micaceous, silt cement, well cemented.
- 611-616 Ditto, very light gray, as above, (one piece showing alignment of dark gray inclusions).
- 616-624 Shale, silty, medium gray (N5), finely micaceous.
- 624-630 Siltstone, light gray (N7), very coarse-grained, micaceous, very well cemented.
- 630-631 LN * Graywacke, very light gray (N8), fine-grained, angular to subrounded, very poorly sorted, about 85% quartzose, very fine-grained dark inclusions, micaceous, moderately friable.
- 631-634 Ditto. Same as sample 630-631.
- 634-640 * Ditto, some subrounded medium-grained quartz and some angular, broken coarse-grained quartz, possibly slightly conglomeratic, much iron staining.
- 640-644 Ditto.
- 644-648 Ditto.
- 648-653 * Graywacke, conglomeratic, white (N9), fine-grained, angular to subangular, about 90% quartzose, chlorite and muscovite (?), well cemented with few clusters, about 20% coarse-grained, angular broken quartz fragments, little bluish chert.
- 650-657 * Graywacke, conglomeratic, as above, about 80% quartzose, fine-grained black shale, green (glauconite?) inclusions, about 40% very coarse-grained broken angular quartz and some chert fragments, clustered.
- 657-660 * Graywacke, as above, about 40% coarse-grained quartz fragments.
- 660-661 No sample.
- 661-665 * Ditto, medium-grained, about 40% coarse-grained to very coarse-grained angular quartz fragments.
- 663-668 Ditto.
- 668-678 Ditto.

676-682	✓ Ditto.
682-686	✓ Graywacke, as above, non-conglomeratic.
686-690	✓ No sample.
690-695	✓ Graywacke, slightly conglomeratic, very light gray (N8), fine-grained, angular to subangular, very poorly sorted with very coarse-grained quartz fragments in clusters, in part fine-grained, few granule size, about 95% quartzose, some brown and dark gray inclusions, well cemented, with few clusters.
695-705	Shale, medium gray (N5), trace mica.
705-714	Shale, silty, medium gray (N5).
714-718	Graywacke, light gray (N7), very fine-grained, sub-angular, very poorly sorted, silt cement, about 70% quartzose, much fine-grained black inclusions, micaceous with large flakes chlorite and muscovite (?), moderately well cemented.
714-724	Same as sample 714-718, medium light gray (N6).
724-730	Ditto, light gray (N7).
730-736	Ditto, fine-grained, some siderite (?) and green glauconite (?) and chlorite (?)
736-744	Ditto, with fewer clusters.
744-750	No sample.
750-758	Ditto.
758-766	Ditto, conglomeratic, about 20% coarse to very coarse broken quartz fragments.
766-774	Ditto, about 40% broken quartz fragments.
774-784	Ditto, non-conglomeratic to very slightly conglomeratic, well cemented with very few clusters.
784-792	No sample.
792-797	No sample.
797-804	Shale, silty, medium gray (N5), micaceous.

804-807	Shale, medium dark gray (N4), finely micaceous.
807-?	Ditto.
808-	Shale, medium-grained, very finely micaceous, very hard.
808-825	No sample.
825-830	Shale, very silty, medium light gray (N6), micaceous, very hard.
830-837	Ditto, silty.
837-844	Siltstone, shaly, medium light gray (N6), coarse-grained, micaceous, very hard.
844-855	Shale, very silty, medium light gray (N6), very slightly calcareous, slightly micaceous, hard.
855-863	Shale, slightly silty, non-calcareous.
863-870	Shale, medium light gray (N6), trace very finely micaceous material.
870-875	Shale, medium gray (N5), same as above.
875-882	Shale, very silty, medium light gray (N6), very micaceous.
882-891	Graywacke, very light gray (N8), fine-grained, subangular to subrounded, very poorly sorted, about 75% quartzose, black and some green glauconite? and reddish poorly sorted inclusions, micaceous, very slightly calcareous, well cemented to moderately friable.
891-897	Ditto.
897-906	Graywacke, very calcareous, light brownish gray (5YR 6/1), very fine-grained, subangular to subrounded, very poorly sorted, 30% quartzose, brown and dark gray inclusions, large flakes of mica (muscovite?), moderately well cemented.
906-916	No sample.
916-926	Shale, very slightly silty to non-silty, medium light gray (N6), finely micaceous.
926-933	Shale, medium gray (N5), slightly micaceous.

933-940	Graywacke, medium light gray (N6.5), very fine-grained, subangular to subrounded, very poorly sorted, about 55% quartzose, black and gray inclusions, very slightly calcareous, slightly micaceous, moderately well cemented.
940-945	Ditto.
945-954	Siltstone, very slightly calcareous, medium light gray (N6), coarse-grained, subrounded to subangular, moderately well sorted, peppered with dark inclusions, slightly micaceous.
954-960	Shale, silty to very silty, medium light gray (N6), slightly micaceous.
960-968	Ditto.
968-976	Ditto, medium gray (N5).
976-984	Ditto.
984-991	Ditto.
991-999	Siltstone, medium light gray (N6), very coarse-grained, (approaching very fine-grained graywacke), slightly micaceous, very hard.
990-1000	Shale, medium light gray (N6), finely micaceous.
1000-1005	No sample.
1005-1012	Sandstone, probably light gray with extra amount of iron staining, some coarse-grained, medium-grained, angular to subangular, poorly sorted, great amount of bit fragments in sample.
1012-?	Shale, medium light gray (N6), slightly silty to non-silty, finely micaceous, considerable iron staining.
1018-1025	Ditto, non-silty, no staining.
1025-	Ditto.
1038-1040	Shale, medium gray (N5), slightly micaceous.
1040-1058	No sample.
1058-1063	Graywacke, very light gray (N8), very fine-grained, subangular to subrounded, moderately well sorted, about 90% quartzose, some very fine-grained dark and few green inclusions, moderately well cemented.

- 1063-1070 No sample.
- 1070-1080 Shale, very silty to slightly silty, medium gray (N5), finely micaceous.
- 1080-1090 Graywacke, light gray (N7), very fine-grained, subangular to subrounded, very poorly sorted, about 55% quartzose, dark and some reddish and green (possibly some glauconite) inclusions, micaceous (considerable chlorite, moderately well cemented.)
- 1090-1098 Graywacke, as above, fine-grained, subangular, considerable muscovite (?), and black inclusions, very slightly calcareous.
- 1098-1106 Ditto.
- 1106-1113 Ditto, very light gray, moderately well cemented to moderately friable.
- 1113-1124 Shale, medium light gray (N5.7), finely micaceous.
- 1124-1129 Graywacke, light gray (N7), fine-grained, subangular, poorly sorted, about 70% quartzose, dark gray, brown, black, and some green (glauconite?) inclusions, micaceous (muscovite?), well cemented, very small clusters.
- 1129-1137 Ditto.
- 1137-1147 Shale, medium gray (N5), non-silty to some silty; trace slightly shaly coal.
- 1147-1151 Siltstone, light gray, coarse-grained, subrounded to subangular, moderately well sorted, very slightly shaly, slightly micaceous, moderately well cemented.
- 1151-1160 Graywacke, as siltstone above, very fine-grained, about 60% quartzose, with brown, black, and some green inclusions, moderately friable.
- 1160-1167 Siltstone, medium gray (N5), slightly shaly, medium-grained, micaceous.
- 1161-1171 Graywacke, very light gray (N8), very fine-grained, subrounded, to subangular, moderately well sorted, about 90% quartzose with very fine-grained black, brown, and dark inclusions, very slightly micaceous, moderately friable.
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- 1171-1178 No sample.
- 1178-1180 Shale, silty, medium gray (N5), micaceous to slightly micaceous.
- 1180-1188 Shale, as above, to non-silty.
- 1188-1198 Ditto, very silty.
- 1198-1207 *ck* Graywacke, very light gray (N7.7), very fine-grained, sub-angular to subrounded, poorly sorted, about 90% quartzose, peppered to very fine-grained black and dark inclusions, porosity, moderately well cemented.
- 1207-1213 Shale, medium gray (N5), very slightly silty to non-silty, very finely micaceous.
- 1213-1222 Coal, part with very high luster and part chunky, 30%; shale, medium dark gray (N4), very finely micaceous, 40%.
- 1222-? Siltstone, medium light gray (N6), medium-grained, sub-rounded to subangular, moderately well sorted, peppered black and brown, moderately well cemented.
- 1224-? Graywacke, light gray (N7), very fine-grained, subrounded to subangular, moderately well sorted, about 80% quartzose, brown and some black, very fine-grained inclusions, slightly micaceous, moderately well cemented.
- 1234-1242 Siltstone, calcareous, medium gray (N5), coarse-grained, subrounded, moderately well sorted, micaceous, moderately well cemented.
- 1242-1250 Siltstone, light gray (N7), medium-grained, poorly sorted, slightly micaceous.
- 1250-1259 Shale, medium dark gray (N4), trace very finely micaceous material.
- 1259-1264 Ditto.
- 1264-1271 Shale, slightly silty to very silty, medium gray (N5), micaceous.
- 1264-1271 (Medium-grained graywacke--from above and following samples, probably out of place.)

- 1271-1276 Graywacke, very light gray (N8), very fine-grained, subrounded, moderately well sorted, about 70% quartzose, black and gray inclusions, micaceous, very slightly calcareous, moderately well cemented.
- 1276-1284 Graywacke, as above, very calcareous, also green inclusions, moderately well cemented, moderately friable.
- 1284-1292 Shale, medium gray (N5), very finely micaceous.
- 1292-1301 Ditto.
- 1301-1305 Graywacke, slightly calcareous, light gray (N7), very fine-grained, subangular to subrounded, very poorly sorted, about 75% quartzose, very fine-grained to fine-grained, gray, brown, and some green inclusions, slightly micaceous (large flakes muscovite?), moderately well cemented, moderately friable.
- 1305-1313 Ditto.
- 1313-1344 No sample.
- 1341-1344 Coal reported by driller.
- 1357-1364 Graywacke, very slightly calcareous to slightly calcareous, light gray (N7), fine-grained, subangular, very poorly sorted, about 65% quartzose, fine-grained black, some green (glauconite?) inclusions, micaceous (large flakes muscovite?), possibly slightly conglomeratic as some angular medium-grained quartz grains apparently broken, moderately friable.
- 1364-1372 No sample.
- 1372-1376 Graywacke, as above, very light gray (N8), with some broken coarse-grained quartz fragments, few clusters.
- 1376-1386 Ditto.
- 1386-1395 Ditto, more broken angular quartz pieces.
- 1395-1400 Ditto, conglomeratic, about 1/3 large, angular quartz pieces, fine-grained, part angular to very angular, very few clusters.
- 1400-1405 Ditto, approaching quartzose, medium-grained, some iron staining.

1405-1407	Ditto, less quartzose, fine-grained, about 20% large angular quartz pieces.
1407-1410	Ditto, medium-grained, as above, considerable iron staining.
1410-1414	Ditto, fine-grained, 15%, as above.
1414-1419	Ditto, 20%, as above.
1419-1423	Ditto, medium-grained, 25%, as above.
1423-1427	Ditto, medium-grained to fine-grained, as above.
1427-1430	Ditto.
1430-1434	Ditto, fine-grained, 20%, as above.
1434-1438	Ditto, medium-grained, 30% as above.
1438-1442	Ditto, fine-grained to medium-grained, 30% as above.
1442-1445	Ditto, 30% as above.
1445-1448	Ditto.
1448-1455	Ditto, medium-grained, 50% as above.
1455-1457	Ditto, fine-grained, non-conglomeratic.
1457-1465	Ditto.
1465-1468	Ditto, very slightly conglomeratic.
1468-1472	Ditto, medium-grained, as above.
1472-1478	Ditto.
1478-1483	Ditto.
1483-1488	Ditto, fine-grained, as above.
1487-1492	Graywacke, slightly calcareous, as above, about 80% quartzose, few clusters with black, green, (glauconite?), and red minerals, and gray shale inclusions, micaceous (muscovite? and chlorite).

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- 1492-1501 Ditto.
- 1501-1509 Graywacke, medium dark gray (N4), with carbonaceous layers, very fine-grained, very poorly sorted, subangular to subrounded, about 70% quartzose, micaceous (muscovite?), well cemented.
- 1509-1514 Graywacke, very slightly calcareous, medium gray (N5), very fine-grained, very poorly sorted, subangular to subrounded, about 65% quartzose, black and gray inclusions, silt cement, very slightly micaceous, well cemented.
- 1514-1522 Ditto, light gray (N7), fine-grained.
- 1522-1535 Graywacke, as above, very light gray (N8), very few clusters; moderately friable.
- 1535-1545 Ditto, mostly clustered, moderately well cemented.
- 1545-1552 Ditto, more green (glauconite?), mineral and muscovite (?).
- 1552-1557 Ditto, moderately friable, few clusters.
- 1557-1569 Ditto.
- 1565-1571 Siltstone, medium dark gray (N4), very slightly calcareous, fine-grained, subrounded, well cemented.
- 1571-1580 Shale, medium gray (N5), very finely micaceous to trace very finely micaceous.
- 1580-1588 Siltstone, medium light gray (N6), coarse-grained, subrounded, poorly sorted, part carbonaceous, very slightly calcareous, micaceous. (Driller reported coal from 1583-1586, none noted in sample.)
- 1588-1592 Graywacke, light gray (N7), very fine-grained, subrounded to some subangular, moderately well sorted, silt cement, about 70% quartzose, very fine-grained dark inclusions, slightly micaceous, moderately friable to moderately well cemented.
- 1592-1596 Coal, blocky, very high luster, 50%; graywacke, as above, very micaceous, 50%.
- 1596-1600 Graywacke, very slightly calcareous, brownish gray (5YR 5/1), subangular to subrounded, very poorly sorted, about 70% quartzose, fine-grained to very fine-grained, black angular to rounded inclusions, some green, slightly micaceous.

- 1600-1608 Graywacke, light gray (N7), fine-grained, subangular, very poorly sorted, silt cement, about 95% quartzose, black, and little green (glauconite?), micaceous (some chlorite and muscovite?), friable.
- 1608-1612 Ditto, very calcareous, few clusters.
- 1612-1620 Ditto, slightly calcareous.
- 1620-1636 Ditto, very light gray (N7.5), some reddish inclusions.
- 1636-1640 Ditto, approaching medium-grained, little better sorted.
- 1640-1648 Ditto, considerable glauconite (?).
- 1648-1657 No sample.
- 1657-1667 Graywacke, shaly, medium gray (N5), fine-grained, subangular, very poorly sorted, considerable brown shale and silty material, and dark gray shale inclusions, very hard.
- 1667-1674 Shale, medium light gray (N6), part silty, finely micaceous.
- 1674-1685 Ditto.
- 1685-1690 Shale, silty, medium dark gray (N4.5), very finely micaceous.
- 1690-1694 Ditto, silty to slightly silty.
- 1694-1699 No sample.
- 1699-1706 Coal, high luster, conchoidal fracture.
- 1706-1711 Graywacke, slightly calcareous, light gray (N7), very fine-grained, subrounded, some subangular, moderately well sorted, about 70% quartzose, peppered and very fine-grained dark inclusions, micaceous.
- 1711-1716 Graywacke, slightly calcareous, as above, 50%; shale, carbonaceous to very carbonaceous, medium dark gray to dark gray (N4-3); some coal.
- 1716-1721 Coal, very high luster, some blocky, some with conchoidal fracture.

- 1721-1725 Coal, as above, about 75%; graywacke, light gray (N7), very fine-grained to fine-grained, subangular, poorly sorted, about 90% quartzose, some chlorite, black inclusions, silt cement, about 25%, trace pyrite.
- 1725-1730 Graywacke, as above, very fine-grained, about 50%; coal, about 25%; shale, carbonaceous to very carbonaceous, dark gray (N3), 25%; trace pyrite.
- 1730-1734 No sample.
- 1734-1744 Coal, as above, 50%; shale, medium brownish gray (5YR 5/1), very slightly silty, 30%; graywacke, fine-grained, as 1725-1730, 20%.
- 1744-1750 Siltstone, light gray (N7), medium-grained, moderately poorly sorted, some dark inclusions, moderately well cemented.
- 1750-1755 Shale, medium dark gray (N4), very slightly silty, finely micaceous.
- 1755-1762 Shale, very silty to some non-silty, medium light gray (N6), very finely micaceous.
- 1762-1769 Shale, medium light bluish gray (5B 6/1), non-silty to very slightly silty, very finely micaceous.
- 1769-1775 Shale, as above.
- 1775-1781 Shale, red (5% 5/2), about 25%; shale, as above; sample needs washing.
- 1781-1784 Shale, red, as above; and shale, slightly silty, some greenish gray (5GY 5/1), finely micaceous; little very fine-grained graywacke, (sample needs washing).
- 1784-1788 Graywacke, calcareous, very light gray (N8), very fine-grained, subangular, poorly sorted, about 90% quartzose, few dark inclusions, slightly micaceous (muscovite and some chlorite).
- 1788-1794 Ditto, very slightly calcareous, subrounded, some small light green inclusions, more chlorite than above, silt cement, moderately well cemented, 50%; shale, red (5R 5/2), slightly micaceous, 50%.

- 1794-1798 Ditto, red shale, 60%; graywacke, 40%; and some shale, slightly calcareous, greenish gray (5GY 5/1), very finely micaceous.
- 1798-1801 Graywacke, light greenish gray (5GY 8/1), very slightly calcareous, very fine-grained, subrounded, poorly sorted, about 90% quartzose, considerable chlorite, some muscovite, silt cement, moderately poorly cemented.
- 1801-1807 Siltstone, medium greenish gray (5GY 6/1), coarse-grained, subrounded, poorly sorted, very micaceous, well cemented.
- 1807-1815 Shale, dark bluish gray (5B 5/1), and small part silty, trace very finely micaceous material.
- 1815-1820 Shale, red (5R 5/2), 50%; shale, as above, 50%.
- 1820-1830 Shale, very silty to non-silty, greenish gray (5GY 6/1), micaceous, 50%; shale, red, as above, 50%.
- 1830-1837 Shale, non-silty to silty, light medium bluish gray (5B 6/1), very finely micaceous.
- 1837-1840 Shale, red (5R 5/2), and shale, slightly silty to non-silty, as above, (sample needs washing).
- 1840-1855 Shale, medium light bluish gray, as above; some red shale, as above.
- 1855-1868 Shale, silty, medium light bluish gray (5B 6/1), finely micaceous, (sample needs washing).
- 1868-1875 Ditto, slightly silty to non-silty, (sample needs washing).
- 1875-1882 Shale, red (5R 5/2), trace very finely micaceous material, about 50%; shale, as above, about 50%; (sample needs washing).
- 1882-1888 Shale, silty to non-silty, red (5R 5/2), about 50%; shale, very silty, greenish gray (5GY 6/1), slightly micaceous, about 50%.
- 1888-1895 Shale, red (5R 5/2), trace very finely micaceous material, 30%; shale, grayish red (5R 4/2), 30%; shale, greenish gray, as above, very slightly silty, 30%; shale, mottled greenish and red 10%. (Sample needs washing).
- 1895-1900 Shale, grayish red, as above, 70%; shale, medium dark gray (N4), 30%.

- 1900-1905 Shale, silty to non-silty, grayish red, very finely micaceous, 50%; shale, mottled red, and greenish gray, 15%; shale, very silty, greenish gray (5GY 5/1), 35%.
- 1905-1908 Ditto, part of greenish gray shale slightly calcareous; trace pale red (5R 6/2) limestone.
- 1908-1914 Shale, red (5R 5/3), 50%; shale, mottled red and greenish gray 30%; shale, silty to non-silty, greenish gray (5GY 6/1), slightly micaceous, trace micaceous material, 15%; shale, medium gray (N5), 5%; trace pale red limestone, as above.
- 1914-1919 Shale, very sandy (approaching shaly graywacke), very light brownish gray (5YR 7/1), 25%; shale, medium gray (N5), very finely micaceous, about 25%; mottled gray and red shale, part nodular, about 10%; shale, very silty to non-silty, grayish red to red (5R 4/2-5/2), very finely micaceous, 40%.
- 1919-1924 Shale, medium gray (N5), part slightly silty, trace very finely micaceous material, about 50%, mottled gray and red shale, about 10%; shale, sandy, very silty to some non-silty, red (5R 5/2), trace micaceous material, 40%.
- 1924-1929 Shale, grayish red (5R 4/2), finely micaceous, about 70%; shale, greenish gray (5GY 6/1), and medium gray (N5), finely micaceous, about 30%, (sample needs washing).
- 1929-1936 Ditto, part of red shale sandy.
- 1936-1943 Shale, slightly silty to non-silty, medium gray (N5), finely micaceous, 40%; shale, silty to non-silty, with resinous luster, greenish gray (5GY 6/1), 20%; shale, red (5R 5/2), very slightly fissile, very finely micaceous, 40%.
- 1943-1946 Shale, grayish red (10R 4/2), slightly resinous luster, very finely micaceous, 60%; shale, medium gray (N5), small part silty to sandy, part with resinous luster, 40%.
- 1946-1950 Shale, sandy to non-silty, greenish gray (5GY 6/1), finely micaceous; sandstone, very light gray (N8), predominantly loose grains, fine-grained, subangular, very poorly sorted, silt cement, about 20%.
- 1940-2173 Samples missing.

2173-2181	Shale, silty to very silty, medium gray (N5), finely micaceous.
2184-2192	Shale, silty to very slightly silty, medium gray (N5), very slightly calcareous, finely micaceous.
2184-2191	Shale, very slightly to slightly calcareous, medium gray (N5), slightly micaceous, 85%; siltstone, slightly calcareous, very light gray (N8), coarse-grained, subrounded, poorly sorted, about 15%.
2191-2195	No sample.
2195-2211	Shale, medium gray (N5), very slightly silty to non-silty, finely micaceous.
2211-2227	Ditto, (sample needs washing).
2216-?	Shale, as above, 85%; siltstone, medium light gray (N6), medium-grained, 15%.
2227(?) - 2238	No sample.
2238-2240	Shale, medium dark gray (N4), very finely micaceous.
2238-?	Ditto, small part silty, very slightly fissile.
2240-2252	Ditto, non-silty, very slightly calcareous.
2252-2262	Ditto.
2262-2269	Ditto.
2269-2275	Ditto; trace shaly medium dark gray limestone.
2275-2284	Siltstone, calcareous to non-calcareous, medium light gray (N6), medium-grained, poorly sorted, slightly micaceous.
2284-2291	No sample.
2291-2312	Shale, very slightly silty to non-silty, medium gray (N5), finely micaceous.
2312-2325	Shale, very slightly calcareous, as above.

- 2325-2332 Ditto, about 80%; siltstone, slightly calcareous, medium light gray (N6), coarse-grained, poorly sorted, very slightly micaceous.
- 2332-2336 Graywacke, slightly conglomeratic (?), very light gray (N8), fine-grained to very fine-grained, subangular, very poorly sorted, (some rounded, medium-grained loose quartz grains), some angular coarse-grained fragments, about 90% quartzose, some dark inclusions, micaceous, well cemented.
- 2336-2339 Ditto, conglomeratic, loose grains.
- 2339-2340 Ditto, some medium-grained green inclusions, 50%; shale, very slightly calcareous to calcareous, medium gray (N5), very finely micaceous, 50%.
- 2340-2350 Ditto.
- 2350-2356 Graywacke, very slightly calcareous, very light gray (N8), very fine-grained, subangular, very poorly sorted (some rounded, fine-grained, and medium-grained quartz, part angular), about 90% quartzose, dark inclusions, very slightly micaceous, predominantly loose grains, moderately well to moderately poorly cemented.
- 2356-2362 Ditto, poorly sorted, predominantly clustered; some iron staining.
- 2362-2367 Ditto, predominantly loose grains.
- 2367-2374 Ditto.
- 2374-2378 Ditto, little iron staining.
- 2378-2379 No sample.
- 2379-2384 Ditto, non-calcareous.
- 2384-2388 Ditto, about 95% quartzose.
- 2388-2392 Ditto, little more iron staining.
- 2392-2396 Ditto.
- 2394-2399 Graywacke, very light gray to white (N8-9), fine-grained, angular to subangular, poorly sorted, about 95% quartzose, dark inclusions, very slightly micaceous, silt cement, few clusters, moderately well cemented, moderately friable.

2399-2402	Graywacke, as above.
2402-2410	Shale, calcareous, and limestone, very shaly, medium gray (N5), very finely clastic, slightly fossiliferous (crinoids), 50%; graywacke, as above, 50%.
2410-2419	Limestone, as above, slightly crinoidal, little slightly nodular, little light gray (N7), very coarsely crystalline; some shale, as above.
2419-2433	Ditto, (sample needs washing).
2433-2434	No sample.
2434-2445	Ditto, no fossil fragments noted.
2445-2456	Ditto; trace macrofossil fragments noted.
2456-2467	No sample (hole in bag).
2467-2477	Ditto, no fossil fragments noted (sample needs washing).
2477-2484	Shale, calcareous to slightly calcareous, medium gray (N5), some limestone, as above.
?-2498	Ditto.
2498-2509	Ditto, about 85%; shale, very silty to sandy, medium light gray (N6), micaceous, grading to shaly siltstone with green inclusions, 15%.
2509-2518	Shale, very silty, slightly calcareous, grayish purple (5RP 4/2), grading to shaly siltstone, about 40%; siltstone, medium light gray (N6), as above, about 30%; shale, slightly calcareous, medium gray (N5), about 30%.
2518-2524	Graywacke, greenish gray (5GY 6/1), very fine-grained, subangular, very poorly sorted, about 60% quartzose, green inclusions (part chlorite), some dark inclusions, some moderately well cemented, small clustered, muscovite (?), 80%; graywacke, calcareous, very light gray (N8), very fine-grained, subangular, very poorly sorted, about 60% quartzose, some green inclusions, (much chlorite), some black and reddish inclusions, much cementing material; moderately well cemented, small clusters, about 20%.

- 2524-2531 Graywacke, light greenish gray (5GY 7/1), as above, more dark inclusions, about 70%; graywacke, slightly to very slightly calcareous, very light gray (N8), as above, about 30%.
- 2531-2540 Ditto, loose grains.
- 2540-2548 Shale, grayish red purple to medium dark gray (5RP 4/2 - N4), very slightly calcareous, trace very finely micaceous material, 30%; limestone, very shaly, light brownish gray (5YR 6/1), very finely clastic, 10%; graywacke, as above, clustered, about 60%.
- 2548-2562 Shale, slightly calcareous to calcareous, medium dark gray, 40%; limestone, very shaly, medium dark gray (N4), very finely clastic, about 60%.
- 2562-2568 Shale, medium dark gray (N4), medium greenish gray (5GY 5/1), trace very finely micaceous material, about 80%; shale, grayish red (10R 4/2), very finely micaceous, about 20%.
- 2568-2582 Shale, very silty to some non-silty, grayish red (10R 4/2), very finely micaceous, about 85%; shale, slightly silty, medium gray (N5), very finely micaceous, about 15%.
- 2582-2591 Shale, grayish red, as above; some grayish red, very finely clastic to medium clastic limestone (about 10%).
- 2591-2594 No sample.
- 2594-2606 Shale, slightly calcareous, very slightly silty, medium gray (N5), slightly fissile, finely micaceous, 60%; shale, slightly silty to non-silty; dark grayish red (10R 3/2), finely micaceous, about 40%.
- 2606-2616 Shale, silty to very slightly silty, grayish red (10R 3/2), finely micaceous to very finely micaceous, about 70%; shale, silty to non-silty, medium gray (N5), very finely micaceous, 30%.
- 2611-2620 Graywacke, pale red (5R 6/3), very slightly calcareous, very fine-grained, subrounded, poorly sorted, about 70% quartzose, micaceous, dark inclusions, silt and shale cement, moderately well cemented.

- 2620-2628 Graywacke, light greenish gray (5GY 7/1), very slightly calcareous, very fine-grained, subangular, very poorly sorted, about 75%; quartzose, dark and green (part chlorite) inclusions, some muscovite, clustered, well cemented.
- 2628-2637 Shale, medium gray (N5), very finely micaceous, about 40%; graywacke, as above, slightly calcareous to calcareous, about 60%.
- 2637-2649 Graywacke, very light gray (N8), very fine-grained, sub-rounded, very poorly sorted, about 85% quartzose, black, dark and few green silt inclusions, slightly micaceous, well cemented.
- 2649-2654 Graywacke, as above, slightly calcareous.
- 2654-2669 Ditto.
- 2669-2676 Siltstone, grading to shale, very silty to non-silty, medium gray (N5), very finely micaceous, about 40%; graywacke, as above.
- 2676-2680 Shale, silty to non-silty, medium gray (N5), very finely micaceous, about 80%; graywacke, slightly calcareous to calcareous, as above, about 20%.
- 2680-2686 Shale, medium gray (N5), very finely micaceous; some (about 20%) limestone, medium brownish gray (5YR 5/1), very finely clastic to very finely crystalline, very slightly shaly, hard.
- 2686-2692 Siltstone, greenish gray (5GY 6/1), very coarse-grained, micaceous, well cemented, about 40%; shale, very silty to silty, dusky red (5R 3/4), slightly micaceous, about 20%; shale, silty to non-silty, medium gray (N5), finely micaceous, about 20%; graywacke, very light gray (N8), very fine-grained, subrounded, very poorly sorted, silt and shale cement, about 90% quartzose, dark inclusions, some chlorite, moderately well cemented, about 10%; limestone, slightly shaly, as above, about 10%.
- 2692-2700 Shale, medium dark gray (N4), trace very finely micaceous material, about 80%; siltstone, greenish gray (5GY 6/1) very coarse-grained to coarse-grained, micaceous, very hard, about 20%.

- 2700-2704 Siltstone, medium light greenish gray (5GY 7/1), coarse-grained, as above, considerable muscovite flakes, moderately well cemented, about 50%; shale, medium dark gray (N4), about 25%; graywacke, very light gray (N8), very slightly calcareous, subrounded, poorly sorted, about 93% quartzose, silt dark inclusions, about 25%.
- 2704-2711 Shale, very silty to non-silty, medium gray (N5), to some medium greenish gray (5G 5/1), finely micaceous, about 75%; graywacke, very light gray, as above, about 25%.
- 2711-2719 Shale, slightly silty to non-silty, medium gray (N5), trace very finely micaceous material, about 60%; shale, very silty (approaching siltstone), greenish gray (5GY 6/1) about 40%.
- 2719-2728 No sample.
- 2728-2735 Graywacke, light gray (N7), very slightly calcareous, very fine-grained, (approaching siltstone), subangular to subrounded, poorly sorted, about 90% quartzose, dark inclusions slightly micaceous, loose grains to very well cemented clusters, silt and shale cement, about 70%; shale, silty to non-silty, medium gray (N5), very finely micaceous, about 30%.
- 2735-2746 Graywacke, very light gray (N8), very fine-grained, subangular, very poorly sorted, non-calcareous, loose grains, as above.
- 2746-2751 Ditto, part loose grains and part clustered; numerous bit fragments, and some iron staining; trace pyrite.
- 2751-2756 Ditto, predominantly loose grains, slightly micaceous; less bit fragments, little staining.
- 2756-2760 Ditto; trace pyrite.
- 2760-2763 Ditto.
- 2763-2767 Ditto.
- ?-2772 Ditto.
- 2772-2778 Shale, non-silty to very silty, medium gray (N5), finely micaceous, about 20%; siltstone, light gray (N7), coarse-grained, very well cemented, about 20%; graywacke, as above, part clustered, about 60%; trace pyrite.

- 2778-2786 Shale, silty to sandy, medium dark gray (N4), micaceous (large flakes muscovite), about 40%; siltstone, as above, 30%; graywacke, light gray (N7), as above, 30%.
- 2786-2789 Graywacke, as above; trace pyrite.
- 2789-2792 Ditto, calcareous to very calcareous, predominantly loose grains.
- 2792-2796 Ditto, non-calcareous, loose grains, much iron staining.
- 2796-2800 Ditto, less iron staining.
- 2800-2805 Ditto, very fine-grained to fine-grained, considerable iron staining.
- 2805-2810 Ditto, very fine-grained.
- 2810-2815 Ditto, little iron staining.
- 2815-2822 Shale, medium gray to medium dark gray (N5-4), very finely micaceous, about 20%; graywacke, as above, very light gray (N8), part clustered, moderately well cemented to well cemented, about 70%; considerable pyrite.
- 2822-2827 Graywacke, as above.
- 2827-2835 Shale, very silty to sandy to non-silty, medium dark gray (N4), slightly micaceous (some very large flakes muscovite), about 50%; graywacke, as above, clustered, very well cemented, about 50%.
- 2831-2841 Graywacke, as above, loose grains.
- 2835-2837 Graywacke, very light gray (N8), very fine-grained to fine-grained, subangular, poorly sorted, about 93% quartzose, dark inclusions, predominantly loose grains, silt cement, moderately well cemented to moderately friable.
- 2841-2851 Shale, very silty to non-silty, medium gray (N5), finely micaceous, about 70% siltstone, medium gray (N5), medium-grained, well cemented, about 10%; graywacke, as above, 20%; considerable pyrite.
- 2851-2858 Graywacke, as above, loose grains to clustered, well cemented, about 60%; shale, as above, 40%.
- 2858-2865 Graywacke, as above, predominantly loose grains; little iron staining.

2865-2871	Ditto.
2871-2874	Ditto.
2874-2878	Ditto.
2878-2883	Ditto, white (N9), fine-grained, about 95% quartzose, slightly micaceous.
2883-2886	Ditto, fine-grained to very fine-grained.
2886-2888	Ditto, very fine-grained, some iron staining.
2888-2891	Ditto, fine-grained to very fine-grained.
2891-2896	Ditto, very fine-grained.
2896-2900	Ditto.
2900-2902	Ditto, fine-grained to very fine-grained.
2902-2905	Ditto, very fine-grained.
2905-2908	Ditto, very fine-grained to fine-grained.
2908-2912	Ditto, fine-grained to very fine-grained.
2912-2917	Ditto.
2917-2922	Ditto, very fine-grained to fine-grained.
2922-2929	Shale, medium gray (N5), very finely micaceous, about 15%; graywacke, as above, fine-grained to very fine-grained, little light gray (N7), very well cemented, about 85%.
2929-2932	Graywacke, white, fine-grained to very fine-grained, as above.
2932-2938	Ditto.
2938-2947	Shale, silty to non-silty, medium gray (N5), very finely micaceous.
2947-2960	Ditto; little medium light gray (N6), siltstone, very well cemented.

- 2960-2963 Shale, very silty to some non-silty, as above; about 15% graywacke, very light gray (N8), very fine-grained, subangular to subrounded, poorly sorted, about 95% quartzose, some dark inclusions, silt cement.
- 2963-2968 Graywacke, as above, about 75%; shale, very silty (approaching siltstone) to non-silty, medium gray and medium light gray (N5-6), micaceous, about 25%.
- 2968-2971 Graywacke, light gray (N7.3), very fine-grained, subangular to subrounded, poorly sorted, about 90% quartzose, dark inclusions, slightly micaceous, trace green inclusions, clustered, silt cement, moderately well cemented to moderately friable.
- 2971-2973 Ditto.
- 2973-2979 Ditto.
- 2979-2983 Ditto.
- 2983-2988 Ditto, very light gray (N8).
- 2988-2990 Ditto.
- 2990-2996 Graywacke, very light gray to light gray (N8-7), as above, to very well cemented, about 95% quartzose.
- 2996-3007 Shale, very calcareous, to limestone, very shaly, medium gray (N5), part slightly silty and very finely micaceous.
- 3007-3012 Ditto, medium dark gray (N4).
- 3012-3021 Shale, calcareous to non-calcareous, slightly silty to non-silty, medium gray (N5), trace very finely micaceous material; trace medium light gray (N6), siltstone, very well cemented.
- 3021-3024 No sample.
- 3024-3036 Shale, non-calcareous, to slightly calcareous, slightly silty to non-silty, medium gray (N5), trace very finely micaceous material.
- 3036-3044 Shale, medium gray (N5), part very slightly silty, trace very finely micaceous material.

- 3044-3050 Graywacke, light gray (N7), very fine-grained, subrounded to subangular, about 95% quartzose, poorly sorted, dark inclusions, much silt cement, well cemented to very well cemented, about 35%; shale, very silty to very slightly silty, medium gray (N5), very finely micaceous, about 65%.
- 3050-3051 Ditto, graywacke, about 25%; shale, about 75%.
- 3051-3055 Graywacke, very light gray, very poorly sorted, as above, about 50%; shale, very silty to very slightly silty, medium gray to medium bluish gray (N5-5B 6/1), very finely micaceous, about 25%; shale, carbonaceous to non-carbonaceous, medium dark gray (N4), about 25%; trace very high luster coal.
- 3055-3060 Ditto, no trace coal noted.
- 3060-3067 Shale, very silty to some very slightly silty, medium gray (N5), trace very finely micaceous material, about 50%; siltstone, medium light gray to light gray (N6-7), medium-grained, very well cemented, about 15%; graywacke, as above, 35%.
- 3067-3074 Siltstone, slightly calcareous to very slightly calcareous, medium light gray (N6), medium-grained, slightly peppered with dark inclusions, very well cemented, about 50%; shale, as above, about 50%.
- 3074-3080 Ditto; siltstone, very slightly calcareous, trace pyrite.
- 3080-3088 Shale, medium dark gray (N4), very slightly calcareous to non-calcareous, very finely micaceous, about 50%; limestone shaly, medium dark gray (N4), very finely clastic, fossiliferous, (fragments of brachiopod?), about 50%.
- 3088-3089 No sample.
- 3089-3097 Ditto, shale and limestone, medium gray (N5); shale, about 75%; limestone, about 25%.
- 3097-3105 Limestone, very shaly, dark gray (N3), very finely clastic, fossiliferous (macrofossil fragments), about 75%; shale, medium dark gray (N4), very finely micaceous, about 25%; trace pyrite.
- 3105-3110 Shale, silty to non-silty, dusky red (5R 3/4), very finely micaceous, about 75%; shale, medium dark gray (N4), as above, 25%.

- 3110-3116 Shale, medium dark gray, as above, 85%; shale, red, as above, and siltstone, medium light gray (N4), 15%.
- 3116-3119 Siltstone, very shaly, medium-grained to medium light gray, (N5-6), medium-grained, micaceous, about 50%; shale, medium dark gray (N4), trace very finely micaceous material about 50%.
- 3119-3130 Graywacke, light gray (N7), very fine-grained, subrounded to subangular, poorly sorted, about 80% quartzose, dark inclusions, micaceous to very micaceous, silt and shale cement, about 75%; shale, silty to non-silty, medium gray (N5), very finely micaceous, about 25%.
- 3130-3141 Shale, calcareous, medium gray (N5), trace very finely micaceous material; little medium gray (N5), limestone.
- 3141-3146 Limestone, slightly shaly, medium gray (N5), medium clastic to very finely clastic, about 50%; shale, medium gray (N5), very finely micaceous, about 50%.
- 3146-3155 Limestone, shaly, to slightly shaly, medium light gray (N5.7), medium clastic to very finely clastic.
- 3155-3160 Shale, very calcareous to non-calcareous, medium-grained and medium dark gray (N5-4), 70%; siltstone, slightly calcareous to non-calcareous, medium light gray to medium gray (N6-5), medium-grained, some dark peppering, slightly micaceous, well cemented, about 30%.
- 3160-3171 Shale, silty to non-silty, medium gray (N5), slight trace mica.
- 3171-3182 Ditto.
- 3182-3194 Shale, as above, about 70%; siltstone, medium gray (N5.5), medium light gray (N6), coarse-grained, dark peppering, very slightly micaceous, very well cemented; trace pyrite.
- 3194-3208 Shale, non-silty to silty, medium gray (N5), very finely micaceous.
- 3208-3219 Shale, very silty to non-silty, medium dark gray (N4), very slightly micaceous; some (about 10%), medium light gray (N6), siltstone, slightly micaceous, very well cemented; trace pyrite.

- 3219-3226 Shale, medium dark gray (N4), very slightly silty, slightly micaceous; some (about 5%) siltstone, as above.
- 3226-3235 Shale, medium dark gray (N4), non-silty to some very silty, trace very finely micaceous material.
- 3235-3240 Shale, very silty to sandy, medium gray (N5), very slightly calcareous, trace very finely micaceous material, about 50%; graywacke, calcareous to very slightly calcareous, medium light gray (N6), very fine-grained, poorly sorted, much silt cement, about 15%; shale, as above, 35%.
- 32?-3244 Shale, medium dark gray (N4), very slightly fissile, trace very finely micaceous material.
- 3244-3256 Shale, as above; about 5% siltstone, calcareous, medium light gray (N6).
- 3250-3267 Limestone, very slightly shaly, medium dark gray (N4), finely clastic to medium clastic, fossiliferous (macrofossil fragments); crinoids, brachiopods?), about 50%; shale, as above, about 50%.
- 3267-3278 Limestone, slightly shaly, coarsely clastic to finely clastic, as above, limestone, medium light gray (N6), slightly crinoidal, finely clastic matrix, about 15%; shale, as above, about 45%.
- 3278-3284 Shale, very calcareous to very slightly calcareous, medium gray (N5), very slightly micaceous, about 50%; limestone, shaly, medium gray (N5), coarsely clastic to finely clastic, some light gray inclusions, about 50%.
- 3284-3291 Ditto; shale, about 75%; limestone, about 25%; small fragments; sample needs washing.
- 3291-33? Ditto; limestone, as above, trace macrofossil fragments, part mottled with very light gray inclusions, 75%; shale, about 25%, (sample needs washing).
- 3302-3311 Ditto.
- 3311-3315 Limestone, medium dark gray (N4), medium clastic to finely clastic, fossiliferous fragments, part shaly.

- 3315-3322 Limestone, medium dark gray and light brownish gray mottled with light gray (N4 and 5YR 6/1), coarsely clastic to finely clastic, slightly fossiliferous, part nodular to angular inclusions, part very slightly shaly; about 20% sandy, quartzose, fine-grained to medium-grained, angular to subangular, loose grains.
- 3322-3329 Ditto, more nodular, part with oolitic structure; about 15% quartz grains, as above.
- 3324-3334 Ditto; limestone, about 60%; quartz sand, about 40%, one sandstone cluster noted, very calcareous cement, fine-grained green inclusion.
- 3334-3341 Ditto; limestone, part slightly shaly, about 75%; quartz sand, about 25%.
- (?)
- 3311-3348 Ditto; limestone, less nodular, part shaly, very finely clastic to medium clastic, about 60%; quartz sand, to coarse-grained size, about 40%, graywacke, more clusters with non-calcareous cement, micaceous, dark inclusions.
- 3348-3355 Ditto; limestone, predominantly very finely clastic, quartz sand and graywacke clusters, as above.
- 3355-3362 Ditto; limestone, very finely clastic to medium clastic and nodular with part oolitic; quartz sand and clusters, as above.
- 3362-3365 No sample.
- 3365-3367 Ditto, as 3355-3362; limestone, predominantly very finely clastic, little medium clastic and nodular, about 75%; quartz sand and clusters, as above, about 25%.
- 3367-3372 Limestone, dark gray (N3), very finely clastic; some (about 20%), sand, as above; (sample needs washing).
- 3372-3376 Ditto.
- 3376-3381 Limestone, medium gray to medium dark gray (N5-5), medium clastic to very finely clastic, part nodular, about 75%; shale, slightly calcareous to very slightly calcareous, medium dark greenish gray (5GY 5/1), very finely micaceous about 25%.
- 3381-3391 Shale, slightly calcareous, medium gray (N5), very finely micaceous.

- (?)
- 3371-3403 Ditto, slightly calcareous to non-calcareous, part very slightly silty.
- 3403-3407 Shale, calcareous to slightly calcareous, medium gray (N5), very finely micaceous; little limestone, medium clastic, medium gray (N5); trace pyrite in shale.
- 3407-3415 Shale, slightly calcareous, medium gray (N5), very slightly fissile, very finely micaceous; trace pyrite.
- 3415-3421 Ditto; no pyrite noted.
- 3421-3431 Ditto, very slightly calcareous, about 75%; limestone, medium gray (N5), medium clastic to finely clastic, about 25%.
- 3431-3440 Shale, slightly calcareous to non-calcareous, medium gray (N5); little limestone, as above; trace pyrite.
- 3440-3448 Shale, non-calcareous to little very calcareous, medium dark gray (N4), trace crinoids, trace micaceous material.
- 3448-3455 Limestone, shaly, medium gray (N5), medium clastic to finely clastic, fossiliferous (fragments), about 50%, shale, as above, about 50%.
- 3455-3461 Shale, slightly calcareous to very slightly calcareous, medium gray (N5), 60%; limestone, as above, coarsely clastic to finely clastic, about 40%.
- 3461-3466 Ditto, small fragments.
- 3466-3471 Limestone, slightly shaly, medium gray to medium dark gray (N5-4), most mottled with light gray, part very nodular, coarsely clastic to finely clastic, about 50%; shale, as above, about 50%.
- 3471-3472 Ditto; part of limestone light gray and very coarsely crystalline, trace crinoids; small fragments.
- 3472-3478 Ditto.
- 3478-3485 Ditto.
- 3485-3489 Ditto; limestone, slightly fossiliferous (macrofossil fragments, part bryozoan and crinoids), about 75%; shale, about 25%.

- 3489-3493 Shale, slightly calcareous to very calcareous, medium gray (N5), very finely micaceous, about 60%; limestone, slightly shaly, medium-grained, very finely clastic, about 40%.
- 3493-3499 Ditto; shale, about 70%; limestone, about 30%.
- 3499-3503 Limestone, very shaly, medium dark gray (N4), very finely clastic to little very finely crystalline, slightly fossiliferous (trace crinoids), about 50%; shale, as above, about 50%.
- 3503-3510 Limestone, as above.
- 3510-3519 Ditto, slightly more fossiliferous.
- 3519-3525 Ditto, little coarsely crystalline, more fossiliferous than above; trace pyrite.
- 3525-3530 Limestone, medium dark gray to dark gray (N4-3), very finely clastic to some very finely crystalline, very slightly shaly, fossiliferous (brachiopods (?) fragments, crinoids), little part mottled with light gray.
- 3530-3535 No sample.
- 3535-3541 Limestone, slightly shaly, medium dark gray (N4), medium clastic to coarsely clastic with very finely clastic matrix, few very coarsely crystalline inclusions, nodular (part oolitic?) and angular fragments, fossiliferous (macrofossil fragments), part mottled with light gray and little light gray finely clastic matrix, some limestone, as above.
- 3541-3547 Limestone, light brownish gray, some brownish gray (5YR 6/1 and 4/1), very finely clastic to slightly nodular (oolitic?), as above, more finely clastic light gray limestone and more very coarsely crystalline light gray limestone than above.
- 3547-3551 Limestone, light brownish gray (5YR 6/1), coarsely clastic with very finely clastic matrix, oolitic (to 1 mm. in diameter) some very coarsely crystalline light gray limestone, and some light gray very finely clastic matrix, trace crinoids.
- 3551-3559 Ditto, many of ooliths loose in sample.
- 3559-3564 Shale, slightly to very slightly calcareous, medium dark gray (N4), very finely micaceous, about 25%; limestone, as above, (ooliths to 3/4 mm. in diameter), little more light gray limestone, about 75%; trace pyrite.

- 3564-3571 Limestone, medium dark gray (N4), finely clastic to some medium clastic with very finely clastic matrix, few medium crystalline inclusions, little mottling with light gray.
- 3571-3580 Ditto, slightly oolitic to non-oolitic, predominantly very finely clastic to slightly very finely crystalline.
- 3580-3587 Limestone, medium dark gray (N4), very finely clastic to trace very finely crystalline; trace soft light gray medium clastic limestone.
- 3587-3590 Ditto.
- 3590-3595 Limestone, slightly shaly, light brownish gray (5R 6/1), very slightly crystalline, little light gray limestone as above.
- 3595-3601 Limestone, as above, light brownish gray and some brownish gray (5YR 6/1 and 4/1).
- 3601-3607 Limestone, slightly shaly, light brownish gray and medium dark gray (5YR 6/1 and N4), very finely clastic to medium clastic, slightly oolitic and nodular (ooliths 2/3 mm. in diameter), some coarsely clastic with angular inclusions, some light gray finely clastic matrix, matrix predominantly very finely clastic.
- 3607-3615 Limestone, medium dark gray (N4), finely clastic, slightly oolitic (to 1 mm. in diameter), very finely clastic to very finely crystalline matrix, trace crinoids, some ooliths with gray, soft finely clastic matrix; trace ooliths (1/2 mm. in diameter), coarsely clastic, light gray limestone.
- 3615-3620 Limestone, medium dark gray (N4), trace ooliths (1 mm. in diameter);(sample needs washing).
- 3620-3623 Limestone, slightly shaly, medium dark gray (N4), very finely clastic to part very finely crystalline to some trace part coarsely crystalline, some coarsely clastic and oolitic (1/2 mm. in diameter), nodular; little light gray soft finely clastic to medium clastic limestone.
- 3623-3631 Ditto, more coarsely clastic and nodular and oolitic (to 1 mm. more very finely crystalline limestone fragments.
- 3631-3636 Ditto, fossiliferous (macrofossil and crinoids fragments), more light gray limestone, as above.

- 3636-3643 Limestone, slightly shaly, medium dark gray (N4), little light brownish gray almost clear, very finely clastic and non-oolitic (?), some very coarsely crystalline limestone fragments, (sample needs washing).
- 3643-3650 Ditto.
- 3650-3657 Limestone, very shaly, dark gray (N3), finely clastic to small part very finely crystalline, trace coarsely crystalline limestone, trace crinoids and other macrofossil fragments; trace oil on acid.
- 3657-3663 Limestone, slightly shaly, medium dark gray (N4), very finely clastic to medium clastic, few crinoid fragments; little coarsely crystalline white to clear limestone.
- 3663-3669 Ditto, very slightly shaly; about 15% limestone, medium light gray (N6), finely clastic to medium clastic, moderately soft; little very finely crystalline light gray limestone.
- 3669-3671 Limestone, shaly, medium dark gray (N4), as above; sample needs washing.
- 3671-3675 Limestone, shaly, brownish gray (5YR 4/1), finely clastic to finely crystalline, little coarsely crystalline, slightly fossiliferous, (macrofossil fragments); some light gray limestone, finely clastic to medium clastic, soft.
- 3675-3679 Limestone, brownish gray (5YR 4/1), finely clastic to finely crystalline, some medium clastic, part slightly nodular, and slightly shaly.
- 3679-3682 Limestone, slightly shaly, medium gray (N5), finely clastic with part finely crystalline.
- 3682-3690 Limestone, slightly shaly, brownish gray (5YR 4/1), finely clastic to medium crystalline; trace pyrite.
- 3690-3693 Limestone, slightly shaly, light brownish gray (5YR 6/1), medium clastic to finely clastic, and very finely clastic matrix, some coarsely crystalline inclusions.
- 3693-3698 Limestone, slightly shaly, medium gray (N5), and light brownish gray (5YR 6/1), very finely clastic to medium clastic, slightly fossiliferous (crinoids and other macrofossil fragments), slightly nodular, part oolitic; some limestone, light gray (N7), finely clastic to medium clastic, soft.

- 3698-3706 Limestone, light brownish gray (5YR 6/1), very finely clastic with little very coarsely crystalline; about 20% light gray limestone, as above, slightly fossiliferous (macrofossil fragments).
- 3706-3710 Limestone, light brownish gray (5YR 6/1), very slightly shaly, medium clastic, nodular and angular inclusions, matrix very finely clastic, part very finely crystalline, slightly fossiliferous (crinoids); about 10% light gray limestone, as above.
- 3710-3715 Limestone, slightly to very slightly shaly, light brownish gray (5YR 6/1), very finely clastic to part very finely crystalline.
- 3715-3720 Ditto; little light gray limestone, very coarsely crystalline and some finely clastic.
- 3720-3731 Limestone, very slightly shaly, medium dark gray (N4), very finely clastic.
- 3730-3735 Limestone, dark gray (N3), coarsely clastic to finely clastic, part very oolitic (1/3 mm. in diameter), with very finely
- 3731-3736 Limestone, medium brownish gray (5YR 5/1), very finely clastic with little very finely crystalline.
- 3736-3741 Ditto, about 10% limestone, light gray (N7), finely clastic, moderately soft.
- 3741-3746 Limestone, very silty, medium gray (N5), finely clastic to finely crystalline.
- 3746-3755 Limestone, light brownish gray (5YR 6/1), very coarsely clastic, very oolitic (to 3/4 mm. in diameter), many ooliths loose, some very coarsely crystalline fragments very slightly silty with few clear quartz angular inclusions.
- 3755-3762 Ditto, ooliths to 1 mm. in diameter, trace crinoids.
- 3762-3766 Limestone, light brownish gray and medium brownish gray (5YR 6/1 and 5/1), very finely clastic with part very finely crystalline, trace very coarsely crystalline limestone; (about 5%) shale, slightly calcareous, medium dark gray (N4); trace red shaly limestone.

- 3766-3771 Ditto, considerable light gray finely clastic soft limestone, with trace of crinoids; no red limestone noted.
- 3771-3777 Limestone, medium brownish gray (5YR 5/1), very finely clastic with some part very finely crystalline.
- 3777-3781 Limestone, light brownish gray (5YR 6/1), very finely clastic, sample needs washing.
- 3781-3786 Limestone, medium brownish gray (5YR 5/1), very finely clastic with part very finely crystalline, few light gray (N7), finely clastic limestone fragments; (note on sack: "little gas").
- 3786-3791 Ditto, light and medium brownish gray.
- 3791-3795 Ditto, light brownish gray.
- 3795-3807 Limestone, light brownish gray (5YR 6/1), very coarsely clastic, very oolitic (light brownish gray ooliths to 1 mm. in diameter in light brownish gray very finely clastic matrix).
- 3807-3813 Limestone, light brownish gray (5YR 6/1), very finely clastic to some medium clastic and very slightly oolitic (to 1 mm. in diameter), trace crinoids fragments.
- 3813-3817 Limestone, light brownish gray, very finely clastic with trace ooliths, loose, as above; considerable (about 15%), light gray limestone, finely clastic, soft.
- 3817-3825 Limestone, light brownish gray (5YR 6/1), very finely clastic, very slightly shaly.
- 3825-3831 Limestone, slightly shaly, grayish red (10R 4/2), very finely clastic, about 25%; limestone, slightly shaly, medium light gray (N6), very finely clastic, some minute dark inclusions, about 80%.
- 3831-3835 Limestone, medium light gray (N6), as above.
- 3835-3842 Limestone, slightly to very slightly shaly, medium gray, very finely clastic, few minute dark inclusions.
- 3842-3843 No sample.
- 3843-3850 Limestone, as 3835-3842, very finely clastic to medium clastic, soft, trace pyrite.

- 3850-3857 Limestone, light brownish gray (5YR 6/1), very finely clastic with part very finely crystalline; trace medium dark gray (N4), shale, very slightly calcareous.
- 3857-3863 Limestone, shaly, grayish red (10R 4/2), finely clastic with part finely crystalline; small part slightly silty.
- 3863-3868 Limestone, light brownish gray (5YR 6/1), very finely clastic; some light grayish limestone; and considerable (about 20%) gray red limestone, as above, (sample needs washing).
- 3868-3875 Limestone, light brownish gray, as above; about 25% limestone slightly shaly, medium gray (N5), finely clastic; considerable light gray limestone, as above, (sample needs washing).
- 3875-3879 Limestone, light brownish gray (5YR 6/1), very finely clastic to medium clastic to part very finely crystalline and some very coarsely crystalline, about 50%; limestone, slightly shaly, medium gray (N5), finely clastic to finely crystalline, about 25%; limestone, light gray, as above, slightly crinoidal (?), about 25%; little pinkish limestone.
- 3879-3884 Ditto; some of light gray limestone very coarsely crystalline, very small fragments.
- 3884-3888 Ditto, light brownish gray limestone, very finely clastic, with part very finely crystalline.
- 3888-3892 Limestone, brownish gray (5YR 4/1), very finely clastic with part very finely crystalline.
- 3892-3897 Limestone, light and medium brownish gray (5YR 6/1 and 5/1) very finely clastic to medium clastic, slightly oolitic (to 1/2 mm. in diameter); some limestone (about 15%), slightly shaly, very light brownish gray (5YR 7/1), coarsely clastic, oolitic, (1/4 to 1/2 mm. in diameter), soft.
- 3897-3904 Limestone, very light brownish gray (5R 7/1), coarsely clastic, nodular and slightly oolitic with very finely clastic matrix, little very coarsely crystalline, about 75%; limestone, very light gray (N8), coarsely clastic, oolitic (1/5 to 1/2 mm. in diameter), and nodular, soft, about 25%.
- 3904-3913 Limestone, very light brownish gray (5YR 8/1), very finely clastic with part very finely crystalline, very slightly shaly, about 70%; limestone, very light gray (N8), as above, slightly oolitic, about 30%.

- 3913-3917 Limestone, light brownish gray (5YR 6/1), very finely clastic with part very finely crystalline.
- 3917-3925 Limestone, shaly, brownish gray (5YR 4/1), very finely clastic small part medium clastic, and nodular; (sample needs washing).
- 3925-3931 Limestone, light brownish gray (5YR 6/1), very finely clastic with part very finely crystalline.
- 3931-3935 Limestone, shaly, light gray (N7), finely clastic.
- 3935-3940 Limestone, medium light gray (N6), coarsely clastic, oolitic (1/2 to few 1 mm. in diameter), matrix medium light gray and very light gray, very finely clastic to finely clastic and soft, many of ooliths loose, dark gray to medium brownish gray, few very coarsely crystalline inclusions, and few minute quartz crystals and light inclusions noted.
- 3940-3945 Limestone, light brownish gray (5YR 6/1), very finely clastic, about 50%; limestone, as above, about 50%.
- 3945-3951 Limestone, light and medium brownish gray (5YR 6/1 to 5/1), very finely clastic, part angular, medium clastic and slightly oolitic (light brownish gray ooliths and very finely clastic matrix).
- 3951-3955 Limestone, very light gray (N8), and very light brownish gray (5YR 7/1), coarsely clastic, and nodular and oolitic, many very coarsely crystalline inclusions, matrix predominantly soft.
- 3955-3963 Limestone, medium dark gray and light brownish gray (N4 and 5YR 6/1), finely clastic; some red and light brownish gray chert fragments.
- 3963-3968 Limestone, silty, light brownish gray, (5YR 6/1), finely clastic, small part medium clastic and nodular, some mottled red and light brownish gray chert, about 15%; light brownish gray chert.
- 3968-3977 Limestone, cherty, silty, light brownish gray and very light gray (5YR 6/1 and N8), medium clastic to finely clastic, much nodular with very light gray (N8), soft, matrix, considerable light brownish gray chert and some reddish chert.

- 3977-3982 Limestone, light gray (N7), finely clastic to finely crystalline, very slightly shaly, about 75%; limestone, medium dark gray (N4), finely clastic to part finely crystalline, little medium clastic, about 25%.
- 3982-3986 Ditto; little pale red (5R 6/2) dolomitic limestone, slightly shaly.
- 3986-3989 Shale, very silty, grayish red (10R 4/2), slightly micaceous.
- 3989-3993 Shale, as above, grading to siltstone, coarse-grained, loose grains.
- 3993-3995 Shale, as above, with some, siltstone, as above, about 90%; shale, medium gray (N5), very slightly calcareous, small part very slightly silty, finely micaceous, about 10%.
- 3995-4001 Shale, silty, grayish red (10R 4/2), very finely micaceous; shale, silty to slightly silty, medium gray (N5), many pieces showing contact red and gray shale.
- 4001-4008 Shale, very silty, (approaching siltstone), grayish red (10R 4/2), slightly micaceous, about 75%; shale, medium gray (N5), as above, to little silty, slightly calcareous, about 25%.
- 4008-4010 Shale, very silty, grayish red, as above; and shale, medium gray (N5); small fragments.
- 4010-4015 Shale, grayish red, as above, about 50%; shale, very silty to non-silty, medium gray (N5), slightly micaceous, about 50%.
- 4010-4015 (two sets of sample).
- 4015-4020 Ditto.
- 4020-4025 Shale, grayish red, as above, grading to siltstone, medium-grained, loose grains.
- 4020-4024 (two sets of samples).