

A20 DK

NORA

VDMR Well No. 135

Operator: Clinchfield Coal Company
Farm: G. W. C. Smith
Well No: 106
Location: Dickenson County
8250' S. of 37°05' approximately
5600' W. of 82°20'
Elevation: 1525.3' Ground
Total Depth: 5754'
Drilling Commenced: June 21, 1949
Well Completed: January 22, 1950
Result: Gas well

Geologic sample log
prepared by E. T. Jacobsen,
U. S. Geological Survey
Lexington, Kentucky
February-March 1950

GEOLOGIC LOG

<u>Depth</u> <u>(Feet)</u>	<u>Lithology</u>
0-15	Graywacke, very light gray (N8), very fine-grained to fine-grained, slightly micaceous, subangular to subrounded, very poorly sorted, (sample needs washing).
15-26	Graywacke, very light gray (N8), fine-grained, subangular, poorly sorted, about 75% quartzose, considerable dark fine-grained inclusions, some green mineral, slightly micaceous, mostly loose grains, silt cement.
26-35	Ditto, few coarse-grained, angular, quartz fragments, less clusters.
35-44	Ditto, some silty shale, medium light gray (N6), very finely micaceous; little medium dark gray (N4) carbonaceous shale; trace coal.
44-55	Graywacke, very light gray (N8), very fine-grained to fine-grained, subrounded, very poorly sorted, about 75% quartzose, brown and dark very fine-grained inclusions, some green mineral, trace chlorite, considerable muscovite, trace phlogopite, silt cement, moderately well cemented.
55-63	Siltstone, shaly, light gray (N7), medium-grained to very coarse-grained, subrounded, moderately poorly sorted, very micaceous, dark inclusions, very slightly calcareous, moderately well cemented.

- 63-68 Graywacke, slightly calcareous, very light gray (N8), fine-grained, subangular, very poorly sorted, about 80% quartzose, very fine-grained inclusions of dark gray shale, brown and black inclusions, some phlogopite and chlorite, considerable large flakes of muscovite, green mineral, silt cement, medium well cemented.
- 68-77 Ditto, very fine-grained to fine-grained, moderately well sorted, more green mineral, loose grains.
- 77-87 Shale, silty, medium gray (N5), finely micaceous.
- 87-100 Ditto, very finely micaceous.
- 100-110 Ditto.
- 110-116 Ditto, very slightly to slightly silty, very slightly fissile.
- 116-127 Siltstone, part calcareous, medium light gray (N6), coarse-grained (approaching very fine-grained graywacke), subrounded to subangular, moderately poorly sorted, dark inclusions, very micaceous, moderately well cemented.
- 127-135 Shale, medium gray (N5), very finely micaceous. (sample needs washing).
- 135-145 Ditto, medium dark gray slightly silty (very small fragments).
- 145-150 Shale, medium dark gray and some medium gray (N4-5), very slightly fissile, trace very finely micaceous material; trace pyrite.
- 150-162 Shale, carbonaceous, dark gray (N3), slightly fissile; about 10% siltstone; shaly, medium gray (N5), finely micaceous; about 10% coal, part shaly.
- 162-169 Graywacke, very light gray (N8), subangular, very poorly sorted, about 80% quartzose, some green mineral, chlorite, dark inclusions, and phlogopite, considerable muscovite, silt cement, moderately well cemented.
- 169-175 Ditto, fine-grained.
- 175-182 Ditto, fine-grained to medium-grained, with some medium-gray and dark gray shale and green mineral inclusions.
- 182-190 Ditto, fine-grained.

- 190-197 Ditto, loose grains.
- 190-200 Ditto, clustered; some green shale inclusions; about 10% graywacke, medium light gray (N5.8), fine-grained, well cemented.
- 200-210 Ditto, fine-grained to medium-grained, loose grains.
- 210-216 Ditto, some coarse-grained, angular quartz fragments.
- 216-223 Ditto, fine-grained, clustered.
- 223-229 Shale, medium gray (N5), very finely micaceous, (sample needs washing).
- 229-241 Ditto.
- 241-243 Sample missing.
- 243-250 Shale, medium gray (N5), slightly fissile, very finely micaceous.
- 250-251 No sample.
- 251-262 Shale, medium gray (N5), very slightly fissile, very finely micaceous.
- 262-270 ✓ Graywacke, very light gray (N8), very fine-grained, subangular, poorly sorted, about 85% quartzose, small dark and brown inclusions, considerable muscovite, some chlorite and phlogopite, some green minerals, silt cement, moderately well cemented.
- 270-278 Ditto, more green mineral inclusions.
- 278-283 Ditto, (sample needs washing.)
- 283-292 Ditto, fine-grained, about 70% quartzose, more black and green inclusions, large flakes muscovite.
- 292-296 Ditto, very small clusters to loose grains.
- 296-307 Ditto, slightly calcareous; part light gray (N7), with considerable brown inclusions.
- 307-317 Shale, very silty, medium light gray (N6), very micaceous; shale, carbonaceous, grayish black (N2), slightly fissile, part very finely micaceous; trace shaly coal.

- 317-322 Shale, non-silty to very slightly silty, medium light gray (N6), slightly fissile, very finely micaceous.
- 322-329 No. sample.
- 329-335 Shale, part carbonaceous, medium dark gray (N4), slightly fissile, some coal, chunky, (sample needs washing.)
- 335-342 Graywacke, medium light gray (N6), very fine-grained, sub-rounded, moderately well sorted, very fine-grained to silt size dark inclusions, very micaceous, silt cement, moderately well cemented.
- 342-349 ^{CM} Graywacke, very light gray (N8), fine-grained, subangular, poorly sorted, about 85% quartzose, considerable black inclusions, some green and brown inclusions, some chlorite, large flakes muscovite, silt cement, part clustered, moderately well cemented.
- 349-358 Ditto, about 75% quartzose, more black (part dark gray shale) and brown fine-grained to medium-grained inclusions.
- 358-369 Ditto, more green mineral inclusions.
- 369-375 Ditto (sample needs washing).
- 375-380 Ditto, very fine-grained, moderately well sorted, loose grains.
- 380-386 Shale, silty, medium gray (N5), micaceous.
- 386-397 No sample.
- 397-406 Ditto, as 380-386.
- 406-416 Shale, silty to non-silty, medium dark gray (N4), slightly fissile, micaceous.
- 416-427 Ditto.
- 427-438 ^{CM} Graywacke, light gray (N7), very fine-grained, (approaching very coarse-grained siltstone), about 85% quartzose, dark brown and black very fine-grained inclusions, micaceous, silt cement, well cemented.
- 438-453 Graywacke, very slightly calcareous, very light gray (N8), fine-grained, subangular, very poorly sorted, black, and brown, and green inclusions, some chlorite and muscovite, silt cement, mostly loose grains, clusters with cement.

- 453-463 Ditto.
- 463-480 Shale, very silty, medium gray (N5), micaceous.
- 480-492 Shale, silty, medium gray (N5), finely micaceous.
- 492-512 Shale, non-silty to very slightly silty, medium gray (N5), slightly fissile, trace very finely micaceous material.
- 512-531 Shale, very silty, medium gray (N5), micaceous.
- 531-544 Shale, slightly silty, medium gray (N5), finely micaceous.
- 544-550 Ditto.
- 550-568 Ditto, silty to non-silty, very slightly fissile.
- 568-576 Ditto.
- 576-580 Shale, very silty, medium gray (N5), micaceous; and siltstone, shaly, medium light gray (N6), medium-grained, subrounded, moderately well sorted, slightly micaceous, moderately well cemented; trace graywacke, light gray (N7), very fine-grained.
- 580?590 Shale, medium gray (N5), non-silty to very slightly silty, very slightly fissile, fine to very finely micaceous.
- 590-602 Ditto, medium dark gray (N4).
- 602-609 Shale, very silty, medium gray (N5), very finely micaceous; siltstone, light gray (N7), very coarse-grained (approaching very fine-grained graywacke), subrounded, poorly sorted, slightly peppered with dark inclusions, slightly micaceous, well cemented to moderately well cemented.
- 609-618 * Graywacke, (approaching quartzose sandstone), very light gray (N8), very fine-grained to fine-grained, subangular, very poorly sorted, about 95% quartzose, dark inclusions with part shale, trace mica, silt cement, moderately friable to moderately well cemented, much iron staining.
- 618-624 * Ditto.
- 624-629 No sample.
- 629-631 * Ditto, mostly loose grains, less iron staining.

- 631-636 Ditto, few very angular medium-grained quartz fragments, little more iron staining.
- 636-650 Ditto, fine-grained, some green inclusions, few large flakes muscovite, few very angular coarse-grained quartz fragments, little iron staining.
- 650-662 Ditto, slightly conglomeratic, numerous very angular coarse-grained quartz fragments.
- 662-673 Ditto, few quartz fragments to granule size.
- 673-678 Shale, slightly silty to non-silty, medium gray (N5), finely micaceous, 75% conglomeratic sandstone, as above.
- 768-687 Shale, medium gray (N5), very finely micaceous.
- 687-695 Siltstone, sandy, light gray (N7), coarse-grained, sub-rounded to subangular, poorly sorted, dark inclusions, micaceous, moderately well cemented.
- 695-703 *** Graywacke, light gray (N7), very fine-grained, subangular with subrounded silt cement, very poorly sorted, about 85% quartzose, dark inclusions, micaceous, moderately well cemented.
- 703-710 *** Ditto, fine-grained, some fine-grained black shale inclusions, trace chlorite, larger flakes muscovite, some brown, reddish, and green inclusions.
- 710-716 *** Ditto, light gray to very light gray (N7.5), much loose grains,
- 716-725 *** Ditto, clustered.
- 725-735 *** Ditto, very small clusters, several angular medium-grained quartz fragments.
- 735-740 *** Ditto.
- 740-753 *** Ditto, fine-grained to medium-grained, several angular coarse-grained quartz fragments, much loose grains.
- 753-762 Shale, silty to very silty, medium light gray (N5.8), finely micaceous.

- 762-767 Siltstone, shaly, light gray (N7), medium-grained, sub-rounded moderately well sorted, dark inclusions, slightly micaceous, moderately well cemented; shale, as above, very micaceous; trace coal.
- 767-780 Siltstone, light gray and medium-grained, as above.
- 780-790 Siltstone, medium light gray (N6), as above.
- 790-801 Shale, medium gray (N5), very slightly fissile, finely micaceous.
- 801-820 Shale, very silty, medium light gray (N6), micaceous.
- 820-830 *CF* Graywacke, very light gray (N8), very fine-grained, sub-rounded, moderately well sorted, about 85% quartzose, dark inclusions, slightly micaceous, moderately well cemented.
- 830-840 Ditto.
- 840-846 Shale, dark medium gray (N4.5), non-silty to very slightly silty, very finely micaceous.
- 846-855 Shale, as above, silty, very slightly fissile.
- 855-861 Ditto, non-silty to slightly silty.
- 861-870 *CK* Graywacke, light gray (N7), very fine-grained, subrounded, poorly sorted, about 85% quartzose, dark peppering, large flakes muscovite, silt cement, moderately well cemented, several pieces of coal, very high luster.
- 870- ? *CK* Graywacke, very light gray (N8), fine-grained, subangular, poorly sorted, fine-grained to very fine-grained, black (part shale), some brown inclusions, trace green inclusions, moderately large flakes muscovite, moderately well cemented, about 10% coal, very high luster, blocky, and some shale, very carbonaceous, grayish black (N2).
- 885-896 Shale, silty, medium gray (N5), finely micaceous to very micaceous.
- 896-911 Shale, as above, very slightly fissile.
- 911-923 Ditto.
- 923-936 Graywacke, light gray (N7), very fine-grained, subrounded to subangular, moderately poorly sorted, about 80% quartzose,

- (Con't.)
- dark inclusions, micaceous, silt cement, moderately well cemented; trace coal, high luster, conchoidal fracture.
- 936-940 Siltstone, shaly, light gray (N7), medium-grained, subrounded, moderately well sorted, dark peppering, micaceous, moderately well cemented; and shale, silty, medium gray (N5), micaceous.
- 940-953 Graywacke, light gray (N7), very fine-grained, subangular to subrounded, moderately poorly sorted, about 80% quartzose, dark inclusions, micaceous, silt cement, moderately well cemented; about 20% shale, very silty, medium gray (N5), micaceous.
- 953-965 Graywacke, as above; about 25% shale, carbonaceous, part slightly silty, dark gray (N3), and coal, blocky.
- 965-977 Shale, very silty to silty, medium gray to medium light gray (N5-6) micaceous.
- 977-983 Graywacke, light gray (N7), very fine-grained, subrounded, moderately poorly sorted, about 85% quartzose, dark inclusions, micaceous, moderately well cemented, 50%; and shale, silty, medium gray (N5), very micaceous.
- 983-993 Shale, silty to non-silty, medium gray (N5), very finely micaceous.
- 993-1005 Shale, as above; about 15% graywacke, light gray (N7), very fine-grained, subrounded, poorly sorted, about 85% quartzose, well cemented.
- 1005-1015 Shale, medium dark gray (N4), slightly fissile, very finely micaceous.
- 1015-1028 Ditto, about 10% graywacke, light gray (N7), very fine-grained, possibly thin interbed.
- 1028-1042 Ditto, shale, very finely micaceous to finely micaceous; about 15% graywacke, and some very silty light gray (N7), shale.
- 1042-1053 Shale, silty, medium dark gray (N4), micaceous; about 25% graywacke, slightly calcareous, light brownish gray (5YR 6/1), very fine-grained, subrounded to subangular, moderately poorly sorted, about 85% quartzose, dark inclusions, trace slightly micaceous, well cemented.

- 1053-1067 Shale, non-silty to slightly silty, medium gray (N5), finely micaceous, slight trace pyrite.
- 1067-1076 Graywacke, very light gray (N8), fine-grained, subangular, poorly sorted, about 85% quartzose, fine-grained dark and green inclusions, large flakes, muscovite, silt cement, moderately well cemented.
- 1076-1090 Ditto, trace chlorite.
- 1090-1102 Shale, silty to very silty, medium gray (N5), part sandy, micaceous, about 50% graywacke, as above.
- 1102-1114 Graywacke, as above, few red inclusions.
- 1114-1128 Shale, very silty to silty, medium dark gray (N4), micaceous.
- 1128-1138 Shale, non-silty to silty, as above; shale, carbonaceous, grayish black (N2); and siltstone, light gray (N7), very coarse-grained (approaching fine-grained graywacke), subrounded, moderately well sorted, dark inclusions, micaceous, moderately well cemented.
- 1138-1150 *X* *✓* Graywacke, very light gray (N8), very fine-grained, subrounded, to subangular, moderately poorly sorted, about 90% quartzose, black, and some green very fine-grained and silt inclusions, micaceous, silt cement, moderately friable to moderately well cemented.
- 1150-1158 *X* Ditto, some iron staining.
- 1158-1164 *X* Ditto.
- 1164-1172 Siltstone, medium light gray (N6), medium-grained to coarse-grained, subrounded, very poorly sorted, dark inclusions, slightly micaceous, very well cemented; and shale, silty, medium gray (N5), micaceous, about 30%.
- 1172-1183 Shale, non-silty to slightly silty, medium dark gray (N4), very finely micaceous.
- 1183-1189 No. sample.
- 1189-1194 Shale, medium dark gray (N4), very finely micaceous.
- 1194-1206 Ditto, part very silty; trace coal in sample.

- 1206-1215 Coal, about 20%, blocky, very high luster; shale, medium-dark gray (N4), very finely micaceous; 55% siltstone, light brownish gray (5YR 6/1), very coarse-grained, (approaching very fine-grained graywacke), subrounded, poorly sorted, dark inclusions, micaceous, 25%.
- 1215-1223 Siltstone, as above.
- 1223-1236 Shale, silty, medium gray (N5), micaceous; (few samples show contact with siltstone above).
- 1236-1251 Shale, very silty, medium gray (N5), micaceous; and siltstone, light gray, very coarse-grained, subrounded to subangular, poorly sorted, moderately well cemented; several pieces coal.
- 1251-1262 Graywacke, calcareous, light gray (N7), very fine-grained (approaching siltstone), subrounded to subangular, poorly sorted, about 80% quartzose, dark peppering, micaceous, moderately well cemented.
- 1262-1280 Shale, non-silty, to slightly silty, medium dark gray (N4); coal, shaly, fissile, 10%; trace pyrite.
- 1280-1290 Graywacke, very light gray (N8), very fine-grained, subangular, about 75% quartzose, black and brown inclusions, some chlorite, numerous muscovite flakes, silt cement, well cemented.
- 1290-1300 Shale, medium gray (N5), part slightly carbonaceous and fissile, very finely micaceous.
- 1300-1310 Graywacke, very light gray (N8), very fine-grained, subangular, about 90% quartzose, some chlorite, dark inclusions, large flakes muscovite, some green inclusions, mostly loose grains.
- 1310-1321 Shale, medium dark gray (N4), part carbonaceous, part non-silty, to some silty, very finely micaceous; coal, fissile, very high luster, 10%.
- 1321-1330 Graywacke, very slightly calcareous, very light gray (N8), fine-grained, poorly sorted, about 85% quartzose, black and green inclusions, some inclusions, some chlorite, large flakes of muscovite, moderately friable to moderately well cemented.

- 1330-1340 Shale, silty, medium gray (N5), finely micaceous.
- 1340-1350 *X* Graywacke, calcareous, very light gray (N8), fine-grained, subangular, poorly sorted, about 90% quartzose, fine-grained black and green inclusions, considerable chlorite, some phlogopite, muscovite flakes, silt cement, moderately well cemented, many loose grains.
- 1350-1361 Ditto, very slightly calcareous, very few angular medium-grained quartz fragments.
- 1361-1373 Ditto, calcareous; about 5% coal, part laminated.
- 1373-1381 Ditto.
- 1381-1393 Ditto, very few clusters, more angular medium-grained quartz fragments, some iron staining.
- 1393-1399 Ditto, few small clusters slightly calcareous, very poorly sorted, with some medium-grained quartz fragments.
- 1399-1404 Ditto, slightly conglomeratic (?), very fine-grained to fine-grained, about 20% very angular medium-grained quartz slivers and fragments.
- 1404-1415 Ditto, non-conglomeratic, no clusters.
- 1415-1419 Ditto, fine-grained, several medium-grained quartz grains, much iron staining.
- 1419-1423 Ditto, non-calcareous, little less iron staining.
- 1423-1425 Ditto.
- 1425-1435 Ditto.
- 1435-1437 Ditto, very fine-grained to fine-grained.
- 1437-? Ditto.
- 1440-1445 Ditto.
- 1445-1449 Ditto, fine-grained, very few non-calcareous clusters, very poorly sorted.
- 1449-1455 Ditto.

- 1455-1458 *X* Ditto, conglomeratic, numerous angular coarse-grained quartz sliver and fragments; few light gray (N7), calcareous graywacke, clusters.
- 1458-1460 *LK* Graywacke, light gray (N7), very fine-grained, subrounded to subangular, poorly sorted, about 70% quartzose, dark and green inclusions, fine-grained muscovite flakes, trace pylogopite and chlorite, silt cement, part very slightly calcareous, moderately well cemented.
- 1462-1470 *LK* Graywacke, slightly calcareous, very light gray (N8), very fine-grained to fine-grained, subangular to subrounded, poorly sorted, about 75% quartzose, black and some brown and green inclusions, trace chlorite, considerable muscovite, silt cement, moderately well cemented.
- 1470-1476 Ditto, fine-grained, very poorly sorted, some green inclusions, mostly loose grains.
- 1476-1486 Shale, non-silty to part slightly silty, medium dark gray (N4), very finely micaceous.
- 1486-1496 *LK* Graywacke, very light gray (N8), part slightly calcareous, subangular, poorly sorted, about 85% quartzose, dark and green inclusions, micaceous, silt cement, moderately well cemented, predominantly loose grains.
- 1497-1507 *LK* Ditto, very poorly sorted, few angular medium-grained quartz fragments.
- 1507-1514 *LK* Ditto.
- 1514-1521 Ditto, about 80% quartzose, more clusters.
- 1521-1530 Ditto.
- 1530-1539 Ditto, very slightly calcareous.
- 1539-1547 Ditto.
- 1547-1560 Shale, very silty to silty, medium dark gray (N4), finely micaceous.
- 1560-? Shale, as above, micaceous; and graywacke, light gray (N7), very fine-grained, subrounded to subangular, moderately well sorted, about 70% quartzose, black and brown inclusions, trace chlorite, some large muscovite flakes, silt cement, moderately well cemented, 50%.

- 1568-1579 Graywacke, very light gray (N8), fine-grained to very fine-grained, subangular, very poorly sorted, about 80% quartzose, black (part shale) and brown fine-grained to very fine-grained inclusions, some green non-micaceous inclusions, large muscovite flakes, silt cement, moderately friable.
- 1579-1589 Ditto, trace biotite, phlogopite, and chlorite.
- 1589-1596 Ditto, slightly calcareous.
- 1596-1607 Ditto.
- 1607-1620 Shale, very silty, medium dark grey (N4), micaceous; some siltstone, sandy, medium light gray (N6), micaceous; about 50% graywacke, fine-grained, as above.
- 1620-1632 Graywacke, very slightly to slightly calcareous, very light gray (N8), fine-grained, subangular, very poorly sorted (silt to fine-grained), about 90% quartzose, black, gray, and some brown and green inclusions, some muscovite, mostly loose grains, moderately friable.
- 1632-1643 Ditto;
- 1643-1650 Ditto, non-calcareous, some medium-grained quartz and green inclusions.
- 1650-1659 Ditto, very fine-grained, no medium-grained particles noted, (sample needs washing).
- 1659-1666 Shale, silty to slightly silty, medium dark gray (N4), finely micaceous.
- 1666-1674 Shale, slightly carbonaceous to carbonaceous, dark gray (N3), part very finely micaceous; some coal, high luster, conchoidal fracture; about 20% siltstone, sandy, medium light gray (N6), black peppered, micaceous, very well cemented; one piece calcite interbedded with dark gray shale.
- 1674-1680 Shale, as above, to slightly carbonaceous and slight silty; about 30% graywacke, light gray (N7), very fine-grained, subangular to subrounded, moderately well sorted, about 90% quartzose, dark silt to very fine-grained inclusions, slightly micaceous, silt cement, moderately well cemented; some coal, as above; trace pyrite.

- 1680-1683 *po* Graywacke, very light gray (N8), as above, some green inclusions.
- 1683-1686 *po* Ditto, little iron staining.
- 1686-1692 *po* *ms* Ditto, slightly calcareous to some calcareous, some moderately large muscovite flakes, loose grains to very small clusters.
- 1692-1701 *ms* Ditto, slightly to very slightly calcareous, more iron staining.
- 1701-1705 Ditto, calcareous to slightly calcareous, poorly sorted, very small clusters.
- 1705-1714 Ditto, very slightly calcareous, predominantly loose grains.
- 1714-1726 Shale, medium light gray (N6), trace very finely micaceous material; little silty to very slightly silty; few pieces noted with brownish nodules.
- 1726-1735 Siltstone, shaly, medium light gray (N6), subrounded, poorly sorted, micaceous; shale, medium gray (N5), very finely micaceous, about 30%; shale, light brownish gray (5YR 6/1), very finely micaceous, about 5%.
- 1725-1742 Shale, dark medium gray (N4.5), trace mica (sample needs washing):
- 1742-1754 Shale, medium gray (N5), very finely micaceous (sample needs washing).
- 1754-1764 Shale, grayish red, trace very finely micaceous material, 30%; shale, greenish gray (5G 6/1), very slightly calcareous, trace very finely micaceous material, 70% (sample needs washing).
- 1764-1775 Shale, silty, greenish gray (5C 6/1), very finely micaceous, (sample needs washing).
- 1775-1780 Graywacke, greenish gray (5CY 6/1), very fine-grained, sub-angular, very poorly sorted, about 75% quartzose, much green inclusions, part chlorite, some muscovite, silt cement, well cemented; shale, grayish red (5R 4/2), very finely micaceous, about 10% trace medium-gray very finely micaceous shale.

- 1780-1790 Graywacke, as above, part slightly calcareous, predominantly loose grains.
- 1790-1795 Shale, dark medium gray (N4.5), trace very finely micaceous material.
- 1795-1807 Shale, dusky red (5R 3/4), very finely micaceous, about 1% very sandy; shale, medium dark greenish gray (5GY 5/1), very finely micaceous, 10%; shale, very silty, medium dark greenish gray, green inclusions, micaceous, 10%.
- 1807-1812 Ditto, shale, very silty, greenish gray, 30%; shale, grayish red (5B 4/2), very finely micaceous, 50%; shale, greenish gray, 20%.
- 1812-1822 Shale, medium gray (N5), very finely micaceous (sample needs washing).
- 1822-1830 Shale, slightly to very slightly calcareous, medium greenish gray (5CY 5/1), very finely micaceous, part silty, 60% shale, grayish red (5R 4/2), 40%.
- 1830-1836 Shale, medium gray (N5), very finely micaceous, part slightly silty (sample needs washing).
- 1836-1845 Shale, grayish red (5R 4/2), very finely micaceous, slightly resinous luster.
- 1845-1853 Ditto.
- 1853-1861 Ditto, part very calcareous, probably interbedded with medium dark greenish gray (5GY 5/1), shale, very finely micaceous about 10% (sample needs washing).
- 1861-1870 Shale, grayish red (10R 4/2), very finely micaceous, few pieces showing very small calcite stringers, little silty several pieces with greenish gray nodules, about 70%; shale, medium light gray (N6), very finely micaceous, about 30%.
- 1870-1882 Shale, non-silty to siltstone, medium dark greenish gray (5GY 5/1), very finely micaceous, 70%; shale, grayish red (5R 4/2), very finely micaceous, 30%.
- 1882-1892 Ditto, grayish red, 70%; siltstone, and shale, grayish green, 30%.

- 1892-1896 Ditto, grayish red 50%; greenish gray shale, and siltstone, part approaching graywacke, 50%; trace light brownish gray (5YR 6/1), very finely crystalline to very finely clastic limestone.
- 1896-1909 Shale, grayish red, as above, 60%; shale, part slightly carbonaceous, greenish gray, as above, very finely micaceous 40%; more limestone, as above.
- 1909-1916 Shale, grayish red (5R 4/2), very finely micaceous; 80%; siltstone, shaly, greenish gray, as above, coarse-grained, black inclusions, micaceous, moderately friable, 20%.
- 1916-1924 Graywacke, calcareous, medium greenish gray (5GY 5/1), very fine-grained, poorly sorted (much silt), about 90% quartzose, green and black inclusions, micaceous, moderately friable.
- 1924-1950 No sample.
- 1950-1957 Graywacke, as 1916-1924, about 60%; shale, grayish red (5R 4/2), very finely micaceous, 40%.
- 1957-1960 Shale, medium dark gray (N4), and dusky red (5R 3/4), very finely micaceous, (sample needs washing).
- 1960-1964 Graywacke, light gray (N7), very fine-grained, subrounded to subangular, about 90%, quartzose, green and dark inclusions, micaceous, silt cement, moderately friable.
- 1964-1969 Ditto, predominantly loose grains.
- 1969-1973 Ditto.
- 1973-1977 Shale, very silty (approaching siltstone), medium light gray (N6), micaceous, slight trace calcareous material; some siltstone, light gray (N7), slightly calcareous, medium-grained, subrounded, moderately well sorted.
- 1977-1983 Graywacke, very light gray (N8), very slightly calcareous, very fine-grained, subrounded to subangular, moderately poorly sorted, about 80% quartzose, green and dark inclusions, slightly micaceous, mostly loose grains.
- 1983-1991 Siltstone, light gray (N7), coarse-grained, subrounded, moderately well sorted, about 90% quartzose, dark inclusions micaceous, about 80%; shale, silty to non-silty, medium gray (N5), very finely micaceous, 20% (sample needs washing).

- 1991-1994 Ditto, shale, about 50% (?), siltstone, 50% (?), (sample needs washing).
- 1994-2000 Ditto, siltstone, slightly calcareous, about 70%; shale, about 30%. (sample needs washing).
- 2000-2005 Graywacke, very light gray (N8), very fine-grained, sub-rounded to subangular, moderately well sorted, about 90% quartzose, very small dark inclusions, slightly micaceous, moderately friable to moderately well cemented.
- 2005-2012 Ditto, calcareous, well cemented.
- 2012-2017 Ditto, very slightly calcareous.
- 2017-2028 Ditto, calcareous to very slightly calcareous, predominantly loose grains.
- 2028-2033 Ditto.
- 2033-2040 Graywacke, medium dark gray and light gray (N4-7), very fine-grained (approaching siltstone), subrounded, moderately poorly sorted, about 90% quartzose, dark inclusions, slightly micaceous to micaceous, well cemented, some with very thin carbonaceous lenses.
- 2040-2045 Graywacke, very light gray (N8), very fine-grained, subrounded, moderately well sorted, about 90% quartzose, dark inclusions, slightly micaceous, considerable silt cement, moderately well cemented.
- 2045-2051 Ditto, mostly loose grains.
- 2051-2055 Graywacke, as above, calcareous to slightly calcareous, very small clusters.
- 2055-2060 Ditto, loose grains, covered with dust.
- 2060-2068 Ditto.
- 2068-2071 Ditto.
- 2071-2075 Graywacke, very light gray (N8), very fine-grained, sub-rounded, to subangular, moderately well sorted, about 90% quartzose, dark inclusions, slightly micaceous, silt cement, moderately well cemented, many loose grains.

- 2075-2085 *fine* Shale, very silty to non-silty, medium gray (N5), very finely micaceous to micaceous.
- 2085-2094 Ditto, (sample very dirty).
- 2094-2107 Siltstone, slightly calcareous, light gray (N7), very coarse-grained (approaching very fine-grained graywacke), subrounded, poorly sorted, moderately well cemented.
- 2107-2114 Siltstone, as above, very slightly calcareous, well cemented; shale, very slightly silty to silty, medium gray (N5), about 30%, probably interbedded.
- 2114-2122 Ditto.
- 2122-2130 Shale, medium gray (N5), very finely micaceous, trace calcareous material (sample dirty).
- 2130-2139 Shale, medium dark gray (N4), slightly fissile, very finely micaceous.
- 2139-2152 Ditto, part very slightly silty.
- 2152-2165 Ditto, non-silty.
- 2165-2180 Shale, slightly silty to some silty, very slightly calcareous, medium gray (N5), very slightly fissile, micaceous; some (about 15%) siltstone, calcareous, medium light gray (N6), medium-grained, moderately poorly sorted, finely micaceous, well cemented.
- 2180-2186 Siltstone, slightly calcareous, as above, and shale, silty to non-silty, medium gray (N5), very slightly fissile, very micaceous.
- 2186-2198 Shale, medium gray (N5), slightly fissile, very finely micaceous, trace calcareous material, (sample needs washing).
- 2198-2208 Shale, as above.
- 2208-2220 Ditto.
- 2220-2231 Ditto.
- 2231-2242 Shale, medium dark gray (N4), part slightly silty, slightly fissile, very micaceous; some shale, dark gray (N3), fissile, very finely micaceous.

- 2242-2255 Shale, dark gray (N3), as above, slightly fissile.
- 2255-2260 Shale, non-silty to some very silty, medium dark gray (N4), slightly fissile, micaceous, trace calcareous material; about 30% siltstone, slightly calcareous to calcareous, light gray (N7), very dark coarse-grained, subrounded, moderately poorly sorted, some dark inclusions, slightly micaceous, moderately well cemented.
- 2260 - ? Siltstone, as above, approaching very fine-grained graywacke.
- 2269-2277 Siltstone, as above, 75%; shale, silty, medium dark gray (N4), slightly micaceous, 25%.
- 2277-2290 Graywacke, very fine-grained, as siltstone, above, loose grains.
- 2290-2302 Siltstone, medium-grained, as graywacke above.
- 2302-2312 Ditto.
- 2312-2317 Shale, silty to very silty, medium gray (N5), slight trace calcareous material, finely micaceous; several pieces showing contact of very coarse-grained siltstone, as above.
- 2317-2320 *Prm 2317-2320* Graywacke, slightly calcareous, very light gray (N8), very fine-grained, subangular to subrounded, moderately poorly sorted, about 85% quartzose, black and green inclusions, silt cement, few medium-grained angular quartz slivers and fragments, well cemented.
- 2320-2330 Conglomerate, angular quartz fragments to granule size, few medium-grained pieces showing original rounded and frosted, some rose quartz, green inclusions, about 70%; limestone, light brownish gray (5YR 6/1), very finely crystalline to little very coarsely crystalline, 30%.
- 2330-2335 Conglomerate, as above, fragments to coarse sand size (sample needs washing).
- 2335-2337 Ditto, fragments to very coarse sandy size.
- 2337-2340 Sandstone, conglomeratic (?), very fine-grained, sub-angular, poorly sorted, numerous medium-grained to coarse-grained, angular quartz fragments, mostly loose grains, few clusters moderately friable, much iron staining.

- 2340-2342 No sample.
- 2342-2345 Sandstone, as above, non-conglomeratic, trace mica, (sample needs washing).
- 2345-2349 Sandstone, as above, loose grains.
- 2349-2352 Ditto.
- 2352-2357 Ditto.
- 2357-2365 Ditto.
- 2365-2369 Ditto, trace mica.
- 2369-2373 Ditto, little iron staining.
- 2373-2377 Ditto.
- 2377-2380 Shale, silty to very slightly silty, medium gray (N5), finely micaceous; sandstone, as above, small clusters, 50%.
- 2380-2386 Shale, slightly calcareous to calcareous, medium gray (N5), very finely micaceous; sandstone, as above, 30%; little light brownish gray limestone (sample needs washing).
- 2386-2393 Sandstone, as above, very poorly sorted, part fine-grained, much silt, loose grains, some calcareous cement (?).
- 2393-2402 Shale, calcareous to some very calcareous, medium gray (N5), 80%; limestone, medium gray (N5), very finely clastic, and light gray (N7-8), part very coarsely crystalline, slightly fissiliferous (macrofossil fragments), 20%; (sample needs washing).
- 2402-2411 Ditto, about 25% limestone, as above; trace crinoid.
- 2411-2420 Limestone, very shaly, medium dark gray (N4), very finely clastic to some part very finely crystalline, little brownish gray (5YR 4/1), very coarsely crystalline.
- 2420-2430 Limestone, shaly, medium gray (N5), very finely clastic to part very finely crystalline; trace very light gray very coarsely crystalline limestone; trace fossils.
- 2430-2441 Ditto, no fossils noted.

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- 2441-2448 Limestone, as above, (sample needs washing).
- 2448-2455 Ditto.
- 2455-2466 Ditto.
- 2466-2474 Shale, calcareous to slightly calcareous, medium gray (N5), very finely micaceous; and siltstone, shaly, slightly calcareous, medium greenish gray (5GY 5/1), coarse-grained, subangular, poorly sorted, dark and green inclusions, micaceous, trace fossils.
- 2474-2485 Shale, non-silty to very silty, (approaching greenish gray siltstone above), medium gray (N5), very finely micaceous to micaceous, non-silty, part very slightly calcareous to very silty part calcareous.
- 2485-2494 Graywacke, very slightly calcareous, very light gray (N8), very fine-grained, subangular, poorly sorted, about 80% quartzose, dark and green inclusions, micaceous, much silt cement, moderately well cemented.
- 2494-2499 Ditto.
- 2499-2507 Ditto, small clusters (sample rather dirty).
- 2507-2512 Ditto, to many loose grains.
- 2512-2518 Shale, medium dark gray (N4), very finely micaceous, 50%; graywacke, as above, 50% (sample needs washing).
- 2518-2524 Graywacke, greenish gray (5GYN 6/1), very fine-grained subangular to subrounded, moderately poorly sorted, about 80% quartzose, black, green, and some red inclusions, moderately large flakes muscovite, silt cement, moderately well cemented.
- 2524-2529 Shale, slightly calcareous to very calcareous, medium gray (N5), approaching shaly limestone.
- 2529-2535 Limestone, shaly, very finely clastic to little very finely crystalline, medium dark gray (N4).
- 2535-2542 Shale, dusky red (5R 3/4), slightly micaceous, 25%; shale calcareous, medium gray (N5), very finely micaceous, 35%; shale, calcareous, medium dark greenish gray (5GY 5/1), trace very finely micaceous material, 40%.
- 2542-2550 Ditto, red shale, 50%; greenish gray shale, slightly calcareous, 40%; medium-grained shale, 10%.

- 2550-2557 Ditto, medium-grained shale, 40%; greenish gray shale, 35% and red shale, 25%.
- 2557-2562 Shale, grayish red (5R 4/2), very finely micaceous 30%; limestone, grayish red, very finely crystalline, 20%; limestone, light brownish gray, very finely crystalline, 20%; shale, greenish gray (5GY 6/1), 30%— all very small fragments.
- 2562-2567 No sample.
- 2567-2571 Shale, very calcareous to non-calcareous, very slightly silty, grayish red (1OR 4/2), very micaceous.
- 2571-2583 Shale, slightly calcareous, medium dark gray (N4), finely micaceous.
- 2583-2592 Shale, very silty, dusky red (5R 3/4), very micaceous, 50%; siltstone, shaly, slightly calcareous, medium gray (N5), medium-grained, well cemented 50%, dark peppering.
- 2592-2597 Siltstone, medium dark greenish gray (5GY 5/1), some green inclusions, as siltstone above.
- 2593-2596 Siltstone, very light gray (N8), as above, few loose sand grains in sample; considerable iron staining.
- 2597-2602 Graywacke, calcareous, light gray (N7), very fine-grained (approaching siltstone), about 80% quartzose, dark inclusions, slightly micaceous, predominantly loose grains, much silt cement, moderately friable.
- 2602-2609 Ditto.
- 2609-2615 Graywacke, very light gray (N8), very fine-grained, sub-rounded, poorly sorted, about 93% quartzose, black inclusions, slightly micaceous, silt cement, moderately well cemented.
- 2615-2623 Ditto, trace chlorite; some iron staining.
- 2620-2624 Ditto.
- 2623-2628 Ditto, about 90% quartzose, more chlorite noted, part loose grains.
- 2628-2633 Ditto.

- 2633-2639 Ditto, predominantly loose grains.
- 2639-2647 Ditto, slightly calcareous, about 93% quartzose.
- 2644-2651 Ditto, very slightly calcareous, predominantly moderately well to well cemented clusters.
- 2651-2661 Limestone, shaly, medium light gray (N6), very finely clastic, 50%; shale, medium gray (N5), very finely micaceous, 25%; shale, grayish red purple (5P 4/2), very finely micaceous, 25%.
- 2661-2668 Ditto; shale, medium gray (N5); shale, grayish red purple, 20%; limestone, 10%; graywacke, very light gray (N8), very fine-grained, subrounded, poorly sorted, about 95% quartzose, dark inclusions, very slightly micaceous, 20%.
- 2668-2676 Ditto; shale, medium gray (N5), 60%; graywacke, calcareous, 30%; shale, grayish red purple, 10%. (small fragments).
- 2676-2678 Ditto.
- 2678-2684 Graywacke, calcareous, pinkish gray (5YR 8/1), very fine-grained (approaching siltstone), subrounded to subangular, moderately poorly sorted, about 90% quartzose, dark inclusions, very slightly micaceous, moderately well cemented, very small clusters.
- 2684-2688 Graywacke, slightly calcareous, very light gray (N8), as above, also some red and green inclusions.
- 2688-2692 Shale, very silty, (approaching siltstone), slightly calcareous, medium dark greenish gray (5GY 5/1), very finely micaceous.
- 2692-2698 No sample.
- 2698-2707 Shale, slightly silty, medium gray (N5), very finely micaceous.
- 2701?-2711 Shale, calcareous, medium gray (N5), trace very finely micaceous material.
- 2711-2714 Graywacke, very light gray (N8), very fine-grained to fine-grained, subrounded to subangular, moderately well sorted, about 95% quartzose, slightly micaceous, loose grains.
- 2714[?]-2716 Ditto.

- 2716-2720 Ditto, few very small clusters with some silt size dark inclusions.
- 2720-2724 No sample.
- 2724-2727 Ditto, calcareous to slightly calcareous, large clusters, moderately well cemented to some iron staining.
- 2727-2732 Ditto, very slightly calcareous.
- 2732-2735 Ditto, non-calcareous, larger muscovite flakes; about 20% shale, medium dark gray (N4), very slightly fissile, micaceous.
- 2735-2737 Graywacke, very slight gray (N8); very fine-grained, subangular, moderately poorly sorted, about 93% quartzose, dark silt sized inclusions, slightly micaceous, silt cement, moderately well cemented.
- 2737-2740 Ditto, trace green inclusions, same iron staining.
- 2740-2745 Ditto, becoming slightly coarser-grained.
- 2745-2751 Ditto, very small clusters.
- 2751-2754 Ditto, part slightly calcareous, small clusters.
- 2754-2758 Graywacke, white (N9), very fine-grained, subangular to subrounded, poorly sorted, about 95% quartzose, very small inclusions, slightly micaceous, silt cement, moderately well to poorly cemented.
- 2758-2761 Ditto, slight trace calcareous.
- 2761-2764 Ditto.
- 2764-2767 Ditto, some iron staining.
- 2767-2770 Ditto.
- 2770-2775 Ditto, predominantly very small clusters.
- 2775-2777 No samples.
- 2777-2784 Shale, medium gray (N5), micaceous, 20%; several pieces showing contact with graywacke, light gray (N7), as white graywacke above, very well cemented 20%; graywacke, white, as above, 60%.

- 2784-2789 Graywacke, very light gray (N8), very fine-grained, (approaching fine-grained), subangular, poorly sorted, about 95% quartzose, few dark inclusions, slightly micaceous, silt cement, moderately well cemented to moderately friable, many loose grains.
- 2785-2793 Ditto, white (N8.8), about 93% quartzose, small to moderately large clusters.
- 2792-2798 Shale, very slightly silty to little silty, part very very slightly calcareous to calcareous, medium gray (N5), to very medium dark gray (N4), part slightly fissile, very finely micaceous.
- 2793-2797 Graywacke, as 2785-2793, few greenish gray shale inclusions noted, some iron staining.
- 2797-2800 Graywacke, as above.
- 2800-2802 Ditto, predominantly loose grains.
- 2802-2805 Ditto.
- 2804-2808 Graywacke, light gray (N7), very fine-grained, subrounded to subangular, poorly sorted, about 93% quartzose, dark inclusions, much silt cement, well cemented; few pieces with streaks of dark gray (N3), very carbonaceous shale.
- 2808-2813 Ditto, about 10% shale, as above, part silty.
- 2813-2814 No sample.
- 2814-2820 Ditto, shale, medium dark gray (N4), non-silty to some silty, very finely micaceous, 10%.
- 2820-2822 Ditto, very slightly calcareous; shale, slightly carbonaceous, medium dark gray (N4), 10%; iron staining.
- 2822-2825 Graywacke, as above, well cemented to moderately well cemented.
- 2825-2829 Ditto, non-calcareous, very well cemented.
- 2827-2832 Shale, non-silty to silty, medium dark gray (N4), very slightly micaceous.
- 2832-2837 Ditto, part very silty, little very micaceous.

- 2837-2841 Graywacke, very light gray (N8), very fine-grained to fine-grained, subangular, very poorly sorted, (some angular medium-grained quartz), very slightly calcareous, slightly micaceous, silt cement, mostly loose grains; some iron staining.
- 2841-2845 Ditto.
- 2845-2847 Ditto, non-calcareous.
- 2847-2850 Ditto, more iron staining.
- 2850-2855 Ditto; more clusters, white (N8.8), very fine-grained, about 93% quartzose, dark inclusions.
- 2855-2858 Ditto, few clusters.
- 2858-2861 Ditto, mostly loose grains, few large muscovite flakes not ed.
- 2861-2865 Ditto, white, (N8.8) moderately friable, small clusters, little less iron staining.
- 2865-2870 Ditto, loose grains and very small clusters.
- 2870-2875 Ditto, loose grains, few clusters approaching quartzose sandstone, little iron staining.
- 2875-2877 Ditto, fine-grained, small clusters and loose grains, about 95% quartzose.
- 2877-2879 Ditto, loose grains, more iron staining.
- 2879-2881 No sample.
- 2881-2886 Ditto, fine-grained to very fine-grained.
- 2886-2888 Ditto.
- 2888-2890 Ditto, very fine-grained, less iron staining.
- 2890-2892 Ditto, few large flakes of muscovite.
- 2892-2894 Ditto, very fine-grained to fine-grained.
- 2894-2901 Ditto, fine-grained.
- 2901-2906 Shale, very carbonaceous, grayish black (N2), several pieces showing contact with graywacke, as above; considerable pyrite in sample; about 50% graywacke, as above.

- 2906-2913 Shale, silty to very silty, medium gray (N5), part very finely micaceous, 50%; some light gray (N7) graywacke, very fine-grained, very well cemented, about 30%; graywacke, as above, very fine-grained, 20%.
- 2913-2920 Graywacke, light gray (N7), medium light gray (N6), very fine-grained, subrounded moderately well sorted, about 90% quartzose, dark inclusions, very slightly micaceous, well cemented; several pieces showing contact with shale, as above.
- 2920-2923 Ditto.
- 2923-2938 Graywacke, white (N8.8), fine-grained, subangular, poorly sorted, about 95% quartzose, dark inclusions, very well cemented.
- 2928-2930 Ditto, very fine-grained, many loose grains.
- 2930-2933 Shale, grayish red (1OR 4/2), trace very finely micaceous material, 25% shale, medium gray (N5), part slightly fissile, very finely micaceous, part with resinous luster, 35%; graywacke, fine-grained, as above, several medium-grained, quartz grains, iron staining, 40%.
- 2933-2935 Graywacke, white (N8.8), fine-grained, subangular, poorly sorted, about 95% quartzose, very fine-grained, silt sized dark inclusions, predominantly loose grains, well cemented, iron staining.
- 2935-2936 Graywacke, as above, 50%; shale, dark gray (N3), slightly fissile, very finely micaceous, part with resinous luster, 50%.
- 2936-2938 Graywacke, as above, approaching very fine-grained, loose grains.
- 2938-2939 Ditto.
- 2939-2941 No sample.
- 2941-2942 Ditto.
- 2942-2946 No sample.
- 2946-2948 Ditto, very fine-grained.
- 2948-2949 Ditto, very fine-grained to fine-grained.
- 2949-2957 Ditto, very fine-grained.

2951-2953	Ditto.
2953-2956	Ditto.
2956-2958	Ditto.
2958-2961	Ditto, much iron staining.
2961-2963	Ditto.
2963-2966	Ditto, much less iron staining.
2966-2968	Ditto.
2968-2970	Ditto.
2970-2973	Ditto.
2973-2976	Ditto, very fine-grained to little fine-grained, more iron staining.
2975-2977	Graywacke, very light gray (N8), very fine-grained, sub-angular, moderately well sorted, about 93% quartzose, silt-size, dark inclusions, slightly micaceous, some silt cement, moderately well cemented, part clustered, iron staining.
2976-2979	Ditto, very fine-grained, approaching fine-grained, loose grains.
2979-2980	Ditto.
2980-2981	Ditto.
2981-2990	Shale, non-calcareous to part very calcareous, medium dark gray (N4), very slightly micaceous, 50%; shale, calcareous, medium gray (N5), trace very finely micaceous material, 50%.
2981-2986	Graywacke, as 2980-2981, 50%; shale, medium dark gray (N4), as in 2981-2990, 50%.
2990-2995	Shale, calcareous, medium gray (N5), trace very finely micaceous material.
2995-3004	Shale, slightly calcareous to calcareous, medium dark gray (N4), trace very finely micaceous material (sample needs washing).
3004-3008	Ditto.

- 3008-3010 Ditto, (sample needs washing).
- 3010-3015 Ditto.
- 3015-3018 Shale, non-calcareous to slightly calcareous, medium dark gray (N4), trace very finely micaceous material; some (about 10%) shale, silty, medium gray (N5), micaceous, (sample needs washing).
- 3018-3024 Shale, medium dark gray, as above.
- 3024-3033 Graywacke, slightly calcareous, light gray (N7), very fine-grained (approaching fine-grained), subangular, poorly sorted, about 85% quartzose, dark inclusions, slightly micaceous, silt cement, well cemented, 50%; shale, very silty to non-silty, medium dark gray (N4), very finely micaceous, 50%.
- 3033-3039 Shale, as above, 75%; graywacke, as above, very slightly calcareous, 25%.
- 3039-3045 Graywacke, very calcareous to non-calcareous, very light gray (N8), very fine-grained, subangular to subrounded, very poorly sorted, (part fine-grained), about 95% quartzose, silt-size to very fine-grained dark inclusions, very well cemented, 60%; shale, as above, 40%.
- 3045-3050 Shale, as above, 70%; graywacke, 30%; trace pyrite.
- 3050-3052 Graywacke, as above, approaching siltstone, about 93% quartzose, few green inclusions, moderately well cemented, 80%; shale, dark gray (N3), very finely micaceous, 30%; considerable pyrite.
- 3052-3059 Siltstone, as graywacke above, coarse-grained, 50%; shale, very silty to non-silty, medium gray (N5), part very finely micaceous.
- 3059-3064 Shale, medium gray (N5), slightly fissile, non-silty to little very silty, very finely micaceous.
- 3064-3070 Shale, non-calcareous to little calcareous, medium dark gray (N4), very finely micaceous (sample needs washing).
- 3070-3074 Limestone, slightly shaly, medium dark gray (N4), finely clastic to very finely clastic, probably thin interbeds of shale, non-calcareous, medium dark gray (N4); about 10% shale, silty, medium light gray (N6); about 10% graywacke, light gray (N7), very fine-grained.

- 3074-3077 Shale, medium dark gray (N4), as above; probably with interbeds of limestone, as above, and some limestone shaly, light gray (N7), finely clastic.
- 3077-3080 Ditto, about 10% light gray (N7) limestone, trace fossil
- 3080-3085 Shale, as above; trace fossil, light gray (N7), limestone, and very light gray siltstone.
- 3085-3090 Ditto.
- 3090-3095 Shale, grayish red (5R 4/2), trace very finely micaceous material, slightly resinous luster, 50%; shale, medium dark gray, as above, 50%.
- 3095-3103 Ditto, shale, grayish red, 40%; shale, medium dark gray (N4), 40% graywacke, very light gray (N8), very fine-grained, subrounded to subangular, very poorly sorted, about 80% quartzose, dark inclusions, part chlorite, large muscovite flakes, silt cement, moderately well cemented, 20%.
- 3103-3106 Shale, medium gray medium light gray (N5-6), non-calcareous, to little slightly calcareous; shale, grayish red (5R 4/2), trace very finely micaceous material, 20%; graywacke, light gray (N7), very fine-grained, about 87% quartzose, dark inclusions, micaceous, about 5%.
- 3106-3111 Ditto, shale, medium gray (N5), 50%; shale, grayish red, about 25%; graywacke, about 25%.
- 3111-3113 Shale, non-calcareous to calcareous, medium dark gray (N4), trace very finely micaceous material, (sample needs washing).
- 3113-3116 Limestone, slightly shaly, medium dark gray (N4), very finely clastic, 35%; shale, medium dark gray (N4), as above, 60%; shale, grayish red, 5%.
- 3116-3128 Limestone, slightly shaly, medium dark gray (N4), very finely clastic, part mottled with medium light gray (N6); some light gray (N7), finely clastic limestone.
- 3128-3134 Shale, dark gray (N3), very finely micaceous, 50%; limestone, light gray (N7), very finely clastic to some very coarsely crystalline, somewhat nodular, 50%. (very small fragments).
- 3134-3139 Limestone, medium light gray (N6), very finely clastic to very finely crystalline, and limestone, as above, (very small fragments).

- 3139-3144 Sandstone, light gray (N7), very fine-grained to fine-grained, subangular, poorly sorted, loose grains.
- 3144-3143(48?) Siltstone, light gray (N7), coarse-grained, some minute dark peppering, slightly micaceous, 50%; limestone, slightly shaly, medium dark gray (N4), finely clastic, 50%.
- 3148-3151 Siltstone, as above, 60%; shale, medium dark gray (N4), part very silty, very finely micaceous, 40%.
- 3151-3156 Siltstone, as above, 50%; limestone, slightly shaly, medium dark gray (N4), very finely clastic, considerable shale, as above, 50%.
- 3156-3164 Shale, dark medium gray (N4.5), slight trace very finely micaceous material, 65%; siltstone, as above, very coarse-grained to medium-grained, part moderately poorly cemented to part very well cemented, 35%.
- 3164-3168 Ditto; shale, 80%; siltstone, 20%.
- 3168-3174 Shale, very silty to non-silty, dark medium gray (N4.5), very finely micaceous.
- 3174-3183 Ditto.
- 3183-3192 Graywacke, light gray (N7), very fine-grained, subangular to angular, poorly sorted, about 93% quartzose, dark inclusions, much silt cement, very well cemented.
- 3192-3202 Shale, medium gray (N5), part slightly silty, trace very finely micaceous material.
- 3202-3212 Ditto.
- 3212-3222 Shale, very silty to very slightly silty, medium dark gray (N4), finely micaceous; about 10% siltstone, slightly calcareous, medium gray (N5), very coarse-grained to medium grained, micaceous.
- 3222-3230 Graywacke, light gray (N7), (approaching quartzose sandstone), very fine-grained, subrounded, poorly sorted, about 95% quartzose, few dark inclusions, very slightly micaceous, silt cement, mostly loose grains, about 60%; shale, as above, 40%.
- 3230-3241 Shale, medium dark gray (N4), slightly fissile, very finely micaceous.

- 3241-3253 Shale, as above, 80%; shale, silty to non-silty, dark reddish brown (10R 3/4), trace very finely micaceous material, 20%.
- 3253-3259 Limestone, shaly, medium dark gray (N4), finely clastic, fossiliferous (bryozoan, crinoid, macrofossil fragments), little medium gray (N5), and very coarsely crystalline, some light gray (N7), finely clastic to very coarsely crystalline, 50%; shale, medium gray, as above, 50%.
- 3259-3265 Ditto; shale, 60%; limestone, 40%.
- 3265-3271 Ditto, shale 70; limestone, 30%, no fossil fragments noted, (sample needs washing).
- 3271-3283 Shale, as above; about 10% limestone, medium dark gray (N4), very finely clastic to very finely crystalline to some very coarsely crystalline, and light gray (N7), very finely clastic to coarsely crystalline; trace pyrite.
- 3283-3290 Shale, slightly calcareous, non-calcareous, medium dark gray (N4), about 15% limestone, as above.
- 3290-3294 Ditto, trace fossils.
- 3294-3297 Shale, as above, micaceous; about 20% limestone, as above, slightly fossiliferous (crinoids and megafossils).
- 3297-3301 Shale, as above, 70%; limestone, light gray (N7), finely clastic, and brownish gray (5YR 4/1), very finely clastic, 30%.
- 3301-3306 Limestone, as above, and limestone, shaly, medium dark gray (N4), very finely clastic.
- 3306-3312 Limestone, medium dark gray (N4), as above; about 20% light gray and brownish gray limestone, as above.
- 3312-3317 Ditto, part of medium dark gray limestone medium clastic mottled with light gray and nodular.
- 3317-3325 Ditto, more light gray and mottled limestone; trace megafossils.
- 3323-3327 Limestone, light brownish gray (5YR 6/1), slightly nodular (about 1/2) mm. in diameter with very finely clastic matrix) about 20% limestone, very light gray (N8), finely clastic to coarsely crystalline, very slightly crinoidal.

- 3327-3331 Limestone, slightly shaly, medium dark gray (N4), medium clastic.
- 3331-3334 Limestone, medium dark gray (N4), medium clastic to coarsely clastic, nodular (diameter to 1mm. no evidence of oolitic structure), with much finely clastic very light gray (N8) matrix.
- 3334-3338 Limestone, medium dark gray, very finely clastic.
- 3338-3342 Ditto.
- 3342-3347 Limestone, medium dark gray (N4), very slightly shaly, medium clastic, nodular (to 1/2 mm. in diameter, no evidence of oolitic structure), some very light gray (N8), finely clastic matrix; about 10% limestone, very light gray (N8), very finely clastic part slightly nodular.
- 3347-3357 Ditto.
- 3357-3365 Shale, calcareous to slightly calcareous, medium gray (N5), very slightly micaceous, 50%; limestone, as above, slightly fossiliferous, 50%.
- 3365-3371 Ditto.
- 3371-3380 Shale, non-calcareous to calcareous, medium gray (N5), trace very finely micaceous material.
- 3380-3392 Ditto, non-calcareous to slightly calcareous.
- 3392-3403 Ditto.
- 3403-3408 Ditto, slightly calcareous to calcareous.
- 3408-3412 Shale, as above, medium dark gray (N4), non-calcareous to slightly calcareous; limestone, medium dark gray, very slightly crinoidal, slightly mottled with light gray, 20%; sandstone, light gray (N7), medium-grained subangular to angular, loose grains, 10%; trace pyrite.
- 3412-3415 Limestone, as above, little coarsely crystalline, 50%; shale, slightly calcareous, as above, 50%.
- 3415-3420 Ditto, slightly crinoidal.
- 3420-3422 Ditto, no crinoid fragments noted.

- 3422-3424 Shale, medium gray (N5), as above, 50%; limestone, part silty to sandy, light gray (N7), medium clastic, nodular, slightly fossiliferous, sand from rounded to angular silt to medium grained fragments, part of limestone medium dark gray, medium clastic, nodular and very coarsely crystalline with very finely clastic matrix; trace pyrite.
- 3424-3426 Ditto, part of light gray (N7) limestone, very coarsely crystalline.
- 3426-3429 Shale, as above, 60%; limestone, as above, 40%.
- 3429-3432 Ditto, as above, 70%; limestone, as above, 30%.
- 3432-3439 Ditto, as above, 60%; limestone, as above, 40%.
- 3439-3442 Limestone, light brownish gray and medium dark gray (5 YR 6/1), and (N4), finely clastic, part mottled with light gray, some light gray very finely clastic limestone pieces; about 20% angular quartz fragments, medium-grained to some coarse-grained.
- 3442-3450 Limestone, brownish gray (5 YR 4/1), very finely clastic to part very finely crystalline, very slightly shaly; light gray limestone, finely clastic with trace very coarsely crystalline, slightly crinoidal, soft, about 10%.
- 3450-3458 Limestone, slightly shaly, medium gray (N5), very finely clastic.
- 3458-3468 Shale, slightly calcareous to very calcareous, medium dark gray (N4).
- 3468-3476 Ditto, (sample needs washing).
- 3476-3486 Limestone, shaly, medium dark gray (N4), finely clastic to part very finely crystalline, small part slightly mottled with light gray, trace fossils.
- 3486-3493 Limestone, medium dark gray, very finely clastic, very slightly shaly; some light gray limestone, finely clastic, soft, about 15%.

- 3493-3500 Ditto, trace fossil fragments.
- 3500-3504 Limestone, brownish gray (5YR 4/1), very finely clastic; about 25% limestone, light gray (N7), and light brownish gray (5YR 6/1); light brownish gray, very finely clastic and very coarsely crystalline; light gray, coarsely crystalline, oolitic (brownish gray ooliths with finely clastic soft matrix), few light gray ooliths):
- 3504-3511 Ditto, brownish gray, very finely clastic, 50%; light gray and light brownish gray, 50%; few angular medium grained to very coarse-grained quartz fragments.
- 3511-3519 Limestone, very light gray and light brownish gray (N8 and 5YR), coarsely crystalline, oolitic (ooliths to 2/3 mm. in diameter, few elliptical shaped), much very finely clastic matrix, slightly crinoidal.
- 3519-3524 Limestone, brownish gray (5YR 4/1), very finely clastic, 50%; limestone, as above, 50%.
- 3524-3528 Limestone, brownish gray, as above, 75%; limestone, very light gray and light brownish gray, as above, 25%.
- 3528-3532 Ditto, very light gray limestone, very slightly oolitic.
- 3532-3537 Limestone, brownish gray (5YR 4/1), and medium brownish gray (5YR 5/1), very finely clastic, part slightly mottled with light gray.
- 3537-3542 Ditto, part slightly nodular; about 20% limestone, very light gray (N8), finely clastic, slightly oolitic (1/4 mm in diameter), soft.
- 3542-3547 Ditto, about 15% very light gray limestone.
- 3547-3551 Ditto; about 20% very light gray limestone, no ooliths noted.
- 3551-3556 Limestone, light brownish gray (5YR 6/1), very finely clastic to very finely crystalline, 60%; limestone, very light gray (N8), medium clastic with finely clastic matrix, slightly oolitic to oolitic (ooliths to 1/3 mm.) soft, 40%.
- 3556-3562 Ditto.

- 3562-3570 Shale, calcareous to very calcareous, medium dark gray (N4); considerable (about 10%) angular quartz fragments to coarse-grained size.
- 3570-3575 Limestone, shaly, medium dark gray (N4), very finely clastic; some light gray (N7), finely clastic limestone and light brownish gray very finely clastic limestone; considerable quartz fragments to medium-grained size, as above. (sample needs washing).
- 3575-3587 Limestone, medium dark gray (N4), and light brownish gray (5YR 6/1), very finely clastic; about 20% light gray limestone, slightly oolitic (to 1/2 mm. in diameter, medium dark gray and light gray), soft.
- 3581-3587 Limestone, medium dark gray (N4), medium clastic to very finely clastic, part oolitic (1/4 mm. in diameter, medium dark gray (N4), with very finely clastic matrix), part slightly mottled, with light gray, few pieces with clear limestone inclusions.
- 3584-3591 Ditto, non-oolitic.
- 3591-3596 Limestone, medium dark gray (N4), finely clastic, very slightly shaly, limestone, light gray (N7), finely clastic, slightly fossiliferous (crinoids and macrofossil fragments), soft about 20%.
- 3596-3604 Limestone, shaly, medium dark gray (N4), finely clastic, 50%; limestone, light brownish gray (5YR 6/1), very finely clastic, 25%; limestone, light gray, as above, 25%.
- 3604-3610 Limestone, very shaly, medium dark gray, as above.
- 3610-3617 Limestone, medium dark gray (N4), finely clastic to medium clastic, slightly nodular and oolitic, slightly fossiliferous (ostracods and crinoids), (small fragments).
- 3617-3625 Limestone, medium dark gray (N4), very finely clastic, very slightly shaly, 80%; limestone, light gray (N7), finely clastic, part medium clastic, soft, 20%.
- 3625-3631 Ditto.
- 3631-3638 Ditto, very finely clastic to part very finely crystalline; part of light gray (N7), limestone, coarsely clastic, oolitic (to 1 mm. in diameter light gray and medium dark gray).

- 3638-3642 Ditto, medium gray (N5); about 15% light gray soft limestone, no oolites noted; some clear very coarsely crystalline calcite.
- 3642-3647 Limestone, light brownish gray (5 YR 6/1), very finely clastic.
- 3647-3648 Limestone, as above, slightly crinoidal, slightly mottled with light gray; considerable (about 20%), light gray (N7), finely clastic, slightly crinoidal soft; some clear very coarsely crystalline calcite.
- 3648-3649 No sample.
- 3649-3653 Ditto, light brownish gray limestone, 60%; light gray limestone, 40%.
- 3653-3660 Ditto.
- 3660-3667 Ditto, light brownish gray and medium brownish gray (5 YR 6/1 and 5 YR 5/1), 60%; light gray, 40%.
- 3667-3674 Ditto.
- 3674-3681 Ditto, 70%; Ditto, 30%.
- 3681-3684 Limestone, light brownish gray and medium brownish gray (5 YR 6/1 and 5 YR 5/1), very finely clastic; about 20% oolitic (3/4 mm. in diameter), with finely clastic light gray matrix.
- 3684-3691 Ditto, oolitic, as above.
- 3691-3696 Ditto.
- 3696-3699 Limestone, light brownish gray and medium brownish gray (5 YR 6/1 to 5/1), very finely clastic; about 20% limestone, very light gray (N8), finely clastic, slightly nodular, slightly crinoidal, soft.
- 3699-3706 Limestone, light brownish gray and medium brownish gray, as above, very slightly oolitic (1/2 mm. in diameter).
- 3706-3712 Limestone, as above, medium clastic to finely clastic, nodular, part oolitic (?), about 20% very light gray (N8), finely clastic, soft.

- 3712-3718 Ditto, oolitic, about 40% very light gray limestone.
- 3718-3723 Limestone, very light gray (N8), finely clastic to medium clastic, slightly oolitic (to 1/2 mm. in diameter), soft to some moderately hard, 50%; limestone, light brownish gray and medium brownish gray (5YR 6/1 to 5/1), very finely clastic, very slightly oolitic (to 1 mm. in diameter), 50%.
- 3723-3726 Ditto; light brownish gray, non-oolitic, 65%; limestone, very light gray, 35%.
- 3726-3730 Ditto, light brownish gray, non-oolitic, 85%; limestone, very light gray, 15%.
- 3730-3735 Ditto, light brownish gray, non-oolitic, 90%; limestone, very light gray, 10%.
- 3735-3740 Ditto, light brownish gray, non-oolitic, 85%; limestone, very light gray, 15%.
- 3740-3744 Ditto, light brownish gray, non-oolitic, 80%; limestone, very light gray, 20%.
- 3744-3751 Limestone, medium brownish gray (5YR 5/1), finely clastic to very finely clastic.
- 3751-3756 Limestone, medium brownish gray (5YR 5/1), very finely clastic to medium clastic, slightly oolitic, (ooliths brownish gray and 1/4 mm. in diameter), very finely clastic matrix.
- 3756-3761 Limestone, light brownish gray (5YR 6/1), very finely clastic; some (about 10%) white (N7), soft, finely clastic limestone.
- 3761-3766 Ditto.
- 3766-3771 Ditto.
- 3771-3775 Limestone, light brownish gray, as above, part very finely crystalline; more (about 20%) white soft limestone.
- 3775-3784 Ditto; part of white limestone, slightly oolitic (?), trace crinoids.
- 3781-3790 Ditto, part of light brownish gray limestone, medium clastic, slightly nodular; no crinoids noted.

- 3790-3796 Limestone, light brownish gray (5YR 6/1), very finely clastic to medium clastic, slightly oolitic (brownish gray, 1/2 mm. in diameter), slightly mottled with very light gray limestone, some ooliths with finely clastic very light gray soft matrix).
- 3796-3801 Limestone, light brownish gray, very finely clastic.
- 3801-3805 Limestone, light brownish gray, medium clastic to very finely clastic, slightly nodular, part oolitic (1/2 to 3/4 mm. in diameter), very finely clastic matrix.
- 3805-3812 Limestone, slightly shaly, light brownish gray, very finely clastic, part slightly oolitic; some (about 10%) very light gray (N8), finely clastic soft limestone.
- 3812-3818 Limestone, as above, no ooliths noted; some (about 5%) grayish red (5R 4/2), very calcareous shale, (sample needs washing).
- 3818-3826 Limestone, shaly, and shale, calcareous, grayish red (5R 4/2), finely clastic, 50%; limestone, light brownish gray, very finely clastic, and limestone, very light gray (N8), finely clastic, soft, little very coarsely crystalline, 50%.
- 3826-3835 Limestone, light brownish gray and medium brownish gray (5YR 6/1 and 5/1), very finely clastic, very slightly shaly; some very light gray limestone, as above.
- 3835-3844 Limestone, brownish gray, as above, part slightly oolitic and coarsely crystalline (oolithe 1 mm. in diameter), about 30% limestone, very light gray (N8), finely clastic to medium clastic, part oolitic, soft to moderately hard.
- 3844-3852 Limestone, light to medium brownish gray (5YR 6/1 to 5/1), medium clastic, slightly oolitic (1mm. in diameter, brownish gray ooliths), very finely clastic matrix.
- 3852-3855 Limestone, very light gray (N8), finely clastic, soft to moderately hard, 50%; limestone, as above, 50%.
- 3855-3860 Limestone, very light gray (N8), very finely clastic to medium clastic, slightly oolitic (to 1/2 mm. in diameter), most soft, 60%; limestone, very light brownish gray (5YR 7/1), very finely clastic, 40%.

- 3860-3865 Limestone, very light brownish gray, as above, 50%; limestone, very light gray, as above, 50%.
- 3865-3870 Ditto, trace ooliths (1/2 mm.); trace crinoids.
- 3870-3876 Ditto, slightly oolitic; no crinoids noted.
- 3876-3885 Limestone, very light brownish gray (5YR 7/1), coarsely clastic, oolitic (ooliths to 1 mm. diameter, very light brownish gray), 50%; limestone, very light gray (N8), finely clastic to coarsely clastic, part oolitic (diameter to 1mm.), few coarsely crystalline fragments, 50%.
- 3885-3895 Ditto, very coarsely clastic, mostly very oolitic, moderately soft.
- 3895-3900 Ditto, and part light brownish gray, oolitic.
- 3900-3918 Ditto, very slightly silty; light brownish gray limestone, very finely clastic, very slightly oolitic, 35%, some clear very coarsely crystalline limestone fragments.
- 3918-3923 Limestone, cherty; light brownish gray (5YR 6/1), very finely clastic with about 20% light brownish gray chert fragments to very coarse-grained size.
- 3923-3930 Limestone, medium brownish gray (5YR 5/1), medium clastic to finely clastic, slightly oolitic (brownish gray ooliths with 1 mm. in diameter), 30%; limestone, cherty, light brownish gray, as above, 50%; limestone, very light gray, finely clastic, soft, 15%; chert, moderately red (5R 5/4), clear, 5%.
- 3930-3937 Ditto; limestone, medium brownish gray, 40%; limestone, very light gray, 30%; limestone, cherty, light brownish gray, 20%; limestone, cherty, pale reddish brown (10R 5/4), finely clastic, with much reddish chert, 10%.
- 3937-3942 Limestone, very light gray (N8), finely clastic to medium clastic, slightly oolitic (?), moderately soft, about 60%; limestone, slightly cherty, light brownish gray (5YR 6/1), very finely clastic, 40%.
- 3942-3946 Limestone, very light gray, as above, part very finely clastic to very finely crystalline, 70%; light brownish gray limestone, as above, part very finely clastic to very finely crystalline, 30%.

- 3946-3950 Limestone, light brownish gray (5YR 6/1), part slightly oolitic (1/6 mm. in diameter) and medium clastic, part finely clastic to very finely crystalline.
- 3950-3956 Shale, silty, grayish red (5R 4/2), micaceous, 25%; shale, very silty to slightly silty, light brownish gray (5YR 6/1), finely micaceous, 50%; siltstone, light gray (N7), medium-grained, subrounded, poorly sorted, 25%.
- 3956-3964 Shale, very silty (part approaching siltstone) and some non-silty, grayish red (1OR 4/2), micaceous, 40%; siltstone, light gray (N7), coarse-grained to fine-grained, subrounded, poorly sorted, 50%; shale, slightly silty to silty, medium gray (N5), micaceous, 10%.
- 3964-3971 Shale, silty to very silty, medium light gray (N6), micaceous, 35%; shale, grayish red, as above, 50%; shale, silty to non-silty, medium gray (N5), finely micaceous, 15%.
- 3971-3980 Shale, very slightly silty to silty, medium gray (N5), finely micaceous, 50%; shale, slightly silty to silty, grayish red (1OR 4/2), finely micaceous, 50%.
- 3980-3990 Ditto.
- 3990-3996 Shale, non-silty to slightly silty, medium gray (N5), finely micaceous, 60%; shale, silty to slightly silty, grayish red, (1OR 4/2), finely micaceous, 40%.
- 3996-3997 Sandstone, light gray (N7), loose grains, very fine-grained to medium-grained, one very coarse-grained, angular quartz fragment noted, subrounded to angular, very poorly sorted, about 30%; shale, as above, 70%; (sample needs washing; numerous bit fragments present.
- 3997-3999 Sandstone, as above, some very fine-grained clusters with few dark inclusions, few rounded, medium-grained quartz, no very coarse-grained quartz noted, 50%; shale, grayish red (5R 4/2), non-silty to slightly silty, finely micaceous, 25%; shale, silty, medium gray (N5), finely micaceous, 25%.
- 3999-4001 Sandstone, as above, loose grains, predominantly very fine-grained and subrounded, 60%; shales as above, 40%.
- 4001-4005 Shale, non-silty to slightly silty, medium gray (N5), finely micaceous, 70%; shale, non-silty to silty, grayish red (5R 4/2), finely micaceous, 10%; siltstone, medium light gray (N6), medium grained, moderately poorly sorted, 20%.

- 4005-4007 Shale, medium gray (N5), as above, 50%; shale, silty, medium light gray (N6), 40%; shale, very silty, grayish red (5R 4/2), 10%.
- 4007-4012 Shale, medium gray (N5), as above, 70%; sandstone, light gray, fine-grained, subangular to subrounded, moderately poorly sorted, loose grains, 30%. (sample needs washing).
- 4012-4019 Ditto; shale, 60%; sandstone, 40%.
- 4019-4022 Shale, very silty, light gray (N7), very slightly micaceous, 60%; sandstone, very fine-grained to fine-grained, as above, 40%.
- 4022-4026 Shale, light gray, as above, 70%; shale, silty to non-silty, medium gray (N5), micaceous, 30%.
- 4026-4030 Siltstone, light gray (N7), fine-grained, well sorted, slightly micaceous 60%; shale, medium-gray, as above, 40%.
- 4030-4036 Siltstone, greenish gray (5GY 6/1), fine-grained, some dark inclusions, slightly micaceous, moderately well cemented.
- 4036-4041 Ditto, many loose grains. (sample needs washing).
- 4041-4045 Ditto, 80%; shale, medium gray (N5), slightly silty to non-silty, slightly micaceous, 20%.
- 4045-4046 Sandstone, light gray (N7), very fine-grained, (approaching siltstone, subrounded, moderately well sorted, loose grains, many bit fragments.
- 4046-4050 Siltstone, grayish red (5R 4/2), pale reddish brown (1OR 5/4), fine-grained, micaceous to very finely micaceous, 60%; siltstone, medium light gray (N6), fine-grained, micaceous, 40%.
- 4050-4056 Siltstone, medium light gray (N6), as above, 80%; shale, non-silty to silty, medium gray (N5), finely micaceous, 20%.
- 4056-4058 Siltstone, as above, moderately well cemented to very well cemented, 60%; shale, as above, some very silty, 40%.
- 4058-4063 Ditto, part siltstone, medium-grained, considerable pyrite in sample.

- 4063-4068 Siltstone, slightly calcareous, as above, grading to silty shale,
- 4068-4071 Siltstone, as above, some dark inclusions, 60%; shale, slightly silty, medium gray (N5), very finely micaceous, 40%.
- 4071-4073 Siltstone, as above, and siltstone, light grayish red (10R 5/2), as above, 80%; shale, part silty, medium gray (N5), as above, 20%.
- 4073-4077 Sandstone, light gray (N7), loose grains, very fine-grained, subrounded to subangular, very poorly sorted (to medium-grained size, 50%; siltstone, medium light gray (N6), as above, very slightly calcareous, 50%.
- 4077-4080 Sandstone, as above, numerous angular to subangular fine-grained quartz, some medium large flakes muscovite.
- 4080-4085 Ditto.
- 4085-4090 Siltstone, light gray (N7), coarse-grained, subrounded, dark inclusions, slightly micaceous, 40%; sandstone, as above, 50%; shale, silty, medium gray (N5), slightly micaceous, 10%.
- 4090-4096 Siltstone, shaly, pale red (5R 6/2), fine-grained, moderately well sorted, 50%; siltstone, light gray (N7), as above.
- 4096-4100 Siltstone, light gray (N7), as above, 80%; siltstone, as above, grading to sandy shale, micaceous.
- 4100-4105 Sandstone, light gray (N7), loose grains, very fine-grained numerous fine-grained and few medium-grained quartz, very poorly sorted, 50%; shale, silty to very silty, light gray (N7), very slightly micaceous, part grading into siltstone, as above, 30%; shale, non-silty to very silty, medium gray (N5), very finely micaceous, 20%.
- 4105-4107 Ditto, sandstone, as above, very fine-grained to fine-grained, angular to subangular, fine-grained quartz, 50%; shale, light gray and medium-grained as above, 50%.

Samples examined by Eloise T. Jacobsen
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Lexington, Kentucky
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