

Lithologic characteristics and palynology of Upper
Cretaceous and Tertiary rocks in the Deep Creek Unit well,
Kenai Peninsula, Alaska

by

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Introduction

This report describes a reference section for Tertiary rocks drilled in the Standard Oil Co. of Cal. 1 Deep Creek Unit well located about 25 miles north of Homer, Kenai Peninsula, southern Alaska (pl. 1). The work is part of a study of the petroleum geology of the Cook Inlet basin and is intended to aid in the continuing search for oil and gas in the basin. A previous report (Carter and Adkison, 1972) presented preliminary electrical-log correlations of Tertiary rocks along two intersecting cross sections in the basin, and one of the cross sections included the Deep Creek well.

The work was done under a cooperative agreement between the U.S. Geological Survey and the Division of Geological and Geophysical Surveys, Department of Natural Resources, State of Alaska. The writers gratefully acknowledge the assistance of W. C. Fackler, State Geologist, and T. R. Marshall, Jr., Chief Petroleum Geologist, Division of Oil and Gas. The Standard Oil Co. of Cal. gave the conventional cores from the Deep Creek well to the State, and T. R. Marshall, Jr. made the cores available for study.

Drilling data

The Standard Oil Co. of Cal. 1 Deep Creek Unit well is located 830 feet south and 1,007 feet west of the northeast corner of sec. 15, T. 2 S., R. 13 W., Seward base and meridian. Drilling started on March 19, 1958, and the total depth of 14,222 feet was reached on July 10. The well was plugged back to 11,755 feet, where a whipstock was set, and the well was redrilled to a depth of 12,253 feet. On August 6, 1958 the well was abandoned. Elevation of the kelly bushing, from which depth measurements were made, was 637 feet above mean sea level.

Methods of investigation

Rotary samples and conventional cores from the Deep Creek well were examined under a binocular microscope by Adkison with concurrent reference to the electrical log, using the procedure described by Maher (1959). In addition, the drilling-time log, the drilling summary, and the log prepared by the mud loggers were consulted. As the rotary samples were studied, an interpretive sample log was plotted on a paper log strip, using colored pencils to designate different rock types. Details of lithology and coal beds were indicated by inked symbols, and rock descriptions were lettered along the side of the log at appropriate depths. The colored strip log was plotted at a scale of 1 inch equals 100 feet, which permits the showing of beds as thin as 1 to 2 feet. Conversion to single-color lithologic symbols (pl. 1) required some exaggeration of bed thicknesses or generalization of lithology.

The cored intervals (termed cores) in the well are numbered and subdivided in the detailed log according to the system used by the operator. The cores were numbered in order of drilling, and the subdivisions of each core were termed trays and numbered in downward order. Depths to the top and bottom of each cored interval and the length of cored rock recovered are given in the drilling summary, but depths for the individual trays are not given. The original length of cored rock in each tray is unknown; an average length was calculated by dividing the reported recovery (feet) for a given core by the number of trays in that core. This average length was used in calculating the depths given for the trays in the detailed log. These depths are most accurate for cores that were completely recovered.

1 Most cores were sawed parallel to the core axes, but some were
2 badly broken and could not be sawed. Half of the core material was re-
3 turned to the State. Bedding features, fractures, and apparent dips
4 were described from the sawed cores, and the lithology was described
5- from small rock chips chiseled from the cores.

6 A magnification of 10.5X was used to examine mass character of the
7 samples, and magnifications as much as 45X were used to see minute
8 features. Bedding, except laminations, is generally not determinable
9 from rotary samples. Many of the Tertiary rocks are rather poorly in-
10- durated, and in rotary drilling or later sample washing, these rocks
11 are partly disaggregated into loose sand, silt, and clay. The clay
12 and silt commonly are lost, and as a result, the rotary samples include
13 a disproportionate amount of sand. Some Tertiary rocks, especially
14 coal beds, cave into the hole during drilling, and the proportion of
15- cavings is large in many rotary samples.

16 The Rock Color Chart (Goddard and others, 1948) was used to
17 describe rock colors. The grain-size terminology is mainly in accord-
18- ance with the Wentworth grade scale. The term "siltstone" is used for
19 clastic rocks composed of coarse-silt particles, and the term "shale"
20- is used for clastic rocks composed chiefly of particles smaller than
21 coarse silt without regard to bedding.
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1 The palynology study, by Newman, was based on 58 samples from the
2 cores. The samples, mostly fine-grained clastics (shale and siltstone),
3 were treated with acids to remove minerals and concentrate acid-re-
4 sistant organic-walled microfossils (palynomorphs). Palynomorphs were
5- found in 52 samples; their preservation was mostly poor to fair.
6 Slides of organic residue from each rock sample were examined quali-
7 tatively to determine the stratigraphic succession of palynomorphs in
8 the cores. The palynomorphs included pollen, spores, marine micro-
9 plankton, and unknown forms. Significant taxa are listed on plate 1.
10- Age determinations for the Tertiary rocks are preliminary and are based
11 on published and unpublished palynologic data from western North
12 America. Published stratigraphic palynology for Alaska is very limited.

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Stratigraphic sequence

Cretaceous rocks

The Deep Creek well was drilled 464 feet into rocks of Late Cretaceous age. Apparent dips, measured on the sawed surfaces of cores, generally range from 20 to 35 degrees. Many cores exhibit a coarsely "wavy" fracture that approximately parallels the core axes. Slickensides are fairly common, and a fault may cut the rocks at a depth of about 13,795 feet.

The Cretaceous rocks consist of medium-dark-gray silty hard shale and some siltstone. A few small pyritic coal stringers are present in the upper part. Fossils include pelecypod fragments, Foraminifera, spores, pollen, and probable plant fragments. The Foraminifera were studied by H. R. Bergquist (written commun. to G. D. Eberlein, 1959) who noted that the small fauna consisted mostly of long-ranging species common to the Matanuska Formation of Late Cretaceous age. Bergquist suggested the Cretaceous rocks in the Deep Creek well are equivalent to the lower part of the Matanuska Formation. The late Cretaceous age of the rocks is confirmed by the palynomorph assemblages which suggest a Campanian age.

A major angular unconformity marks the top of the Cretaceous rocks in the Deep Creek well. Apparent dips in the basal Tertiary rocks, though difficult to determine, are considerably less than those in the upper part of the Cretaceous rocks. The contact, not seen in the core, is marked by upward changes in texture, color, and flora. Changes in electrical properties are relatively small (pl. 1).

Tertiary rocks

Exposed sedimentary rocks of Tertiary age in the Cook Inlet basin were first termed "Kenai group" or "Kenai Series" by Dall and Harris (1892, p. 234), although they apparently used the terms "group" and "Series" in a formational sense. A few years later, Dall (1896, p. 787-789) applied the term "Kenai formation" to coal-bearing Tertiary rocks on the northwest side of Kachemak Bay, and later writers generally adopted this usage for the Cook Inlet basin.

Exploration for oil and gas, beginning with discovery of the Swanson River oil field in 1957, has greatly increased the knowledge of the Tertiary rocks, and in 1972 a major revision of the stratigraphic nomenclature for these rocks in the basin was formally proposed and defined by Calderwood and Fackler (1972, p. 739-754). The name "Kenai" was elevated to group rank and applied to the entire Tertiary sequence in the basin. The Kenai Group was divided into five new formations named, in upward order, the West Foreland Formation, Hemlock Conglomerate, Tyonek Formation, Beluga Formation, and Sterling Formation (Calderwood and Fackler, 1972, p. 741). This nomenclature is used in the present report.

Kenai Group

The formations of the Kenai Group were identified in the Deep Creek well by the Alaska Geological Society (1969) and by Carter and Adkison (1972). In this well the group has a drilled thickness of 13,758 feet. Samples were missing for the uppermost 22 feet, and part or all of this interval probably consists of unconsolidated deposits of Quaternary age as indicated by mapping of Barnes and Cobb (1959, pl. 17). The formations of the group are briefly described below, and detailed descriptions of samples and cores are given in the following part of this report.

West Foreland Formation.--The type section for this formation is in the Pan American Petroleum Corp. and others 1 West Foreland well in sec. 21, T 8 N., R. 14 W. (Calderwood and Fackler, 1972, p. 742). This location, on the west side of Cook Inlet, lies about 53 miles north of the Deep Creek well.

The West Foreland Formation is 1,062 feet thick in the Deep Creek well where it consists of sandstone, some interbedded shale and siltstone, and several thin coal beds. Varicolored conglomeratic shale, about 50 feet thick, marks the base of the formation. This shale includes many shale clasts of mostly granule and small pebble size and, in the upper part, many distinctive color-banded clayey grains possibly of volcanic origin. Sandstone in the West Foreland is commonly olive gray, conglomeratic, silty, and clayey.

1 Palynologic study of the cores definitely indicates an early
2 Tertiary age for the West Forland Formation. The age is probably
3 Eocene, but it might be partly Paleocene. Cores from the basal conglomeratic shale contained a few Foraminifera (H. R. Bergquist, written
4 commun. to G. D. Eberlein, 1959), but these microfossils probably were
5 in reworked Cretaceous shale clasts.
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7 The upper contact of the West Forland Formation in the Deep Creek
8 well lies at the top of an interbedded sequence of siltstone, shale,
9 and sandstone. The contact is well defined by changes in electrical
10 properties of the rocks (pl. 1). According to Calderwood and Fackler
11 (1972, p. 742), the contact with the overlying Hemlock Conglomerate
12 appears to be an unconformity in the type section.

13 Hemlock Conglomerate.--The type section for this formation is in the
14 Richfield Oil Corp. 1 Swanson River Unit well in sec. 10, T. 8 N., R.
15 9 W. (Calderwood and Fackler, 1972, p. 744). This well, located about
16 59 miles north-northeast of the Deep Creek well, was the discovery well
17 for the Swanson River oil field. The formation name is derived from
18 the term "Hemlock zone" which was an informal oil-field name applied
19 to the oil-productive Tertiary rocks in the field by the Standard Oil
20 Co. of California (Mann, 1959, p. 1430).
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1 The Hemlock Conglomerate, 536 feet thick in the Deep Creek well,
2 consists mainly of sandstone, some interbedded shale and siltstone, and
3 a few coal beds. The sandstone is silty, mostly conglomeratic, and
4 partly limy. Beds of conglomerate, with rounded pebbles as much as
5- 1-1/2 inches long, are present in cores from the upper part of the
6 formation. Other parts of the Hemlock probably include conglomerate
7 that, in rotary samples, could not be distinguished from conglomeratic
8 sandstone. Sandstone beds are well defined by the electrical log, in
9 sharp contrast to those in the underlying West Foreland Formation.
10- Coal beds and stringers, found chiefly in the lower and middle parts
11 of the Hemlock, are generally thin and interbedded with black carbo-
12 naceous shale.

13 The age of the Hemlock Conglomerate is uncertain in the Deep Creek
14 well. The palynologic assemblages in cores from the upper part of the
15- formation lack distinctive taxa, but they appear to be younger than
16 Eocene. Therefore, the Hemlock is tentatively assigned an Oligocene
17 or Miocene age.

1 The contact between the Hemlock and the overlying Tyonek Formation,
2 readily determined from the electrical log (pl. 1), lies in an interval
3 of missing core. The electrical log, especially the spontaneous-
4 potential curve, suggests the uppermost sandstone of the Hemlock is
5 overlain by shale or siltstone a few feet thick. Based on available
6 cores, sandstone in the uppermost Hemlock appears somewhat lighter
7 colored, better sorted, and probably less clayey and more porous than
8 sandstone near the base of the Tyonek. Calderwood and Fackler (1972,
9 p. 745) believe the Hemlock in the type section is conformably overlain
10 by the Tyonek.

11 Tyonek Formation.--The type section for the Tyonek Formation is in the
12 Pan American Petroleum Corp. and others 2 Tyonek State 17,587 well,
13 located in sec 30, T. 11 N., R. 11 W. (Calderwood and Fackler, 1972,
14 p. 745). This location, in Cook Inlet, lies about 70 miles north of
15 the Deep Creek well. Spurr (1900, p. 171, 184) applied the name
16 "Tyonek beds" to lignite-bearing strata along the shore of Cook Inlet
17 a few miles southwest of Tyonek, but later workers did not use the
18 name. As noted by Calderwood and Fackler (1972, p. 745), the term
19 "Tyonek beds" became obsolete through lack of use; hence they proposed
20 the name "Tyonek Formation" for the middle part of the Kenai Group.

1 The Tyonek Formation is 6,198 feet thick in the Deep Creek well
2 where it consists of interbedded siltstone, shale, sandstone, and coal.
3 The formation also includes, mostly in the lower third, several thin
4 beds of very argillaceous limestone. Much of the siltstone and sand-
5 stone is at least slightly limy. The lower part of the Tyonek, nearly
6 250 feet thick, is dominantly sandstone similar to that in the under-
7 lying Hemlock, although the electrical characteristics are notably
8 different (pl. 1). The remainder of the Tyonek includes considerable
9 sandstone in beds or units commonly about 10 to 50 feet thick. Beds of
10 coal and associated black carbonaceous shale are generally thicker and
11 much more numerous than in older formations of the Kenai Group.

12 The age of the Tyonek Formation is probably Miocene for the most
13 part but is difficult to determine. The lower-middle part (9,262-
14 10,291 ft.) includes some pollen suggestive of a Seldovian age. As
15 described by Wolfe, Hopkins, and Leopold (1966, p. A14-A17), the Sel-
16 dovian Stage is of early and middle Miocene age but may be partly
17 latest Oligocene in age. Therefore, the lower part of the Tyonek may
18 be Oligocene. The age of the upper part of the Tyonek and the over-
19 lying formations is uncertain because of the lack of distinctive taxa.

20 The top of the Tyonek Formation is marked by an upward change in
21 dominant lithology from dark-colored shale to sandstone and interbedded
22 shale. This contact is well delineated on the electrical log (pl. 1).
23 According to Calderwood and Packler (1972, p. 745, 748), the contact
24 between the Tyonek and the overlying Beluga Formation is an unconform-
25 ity.

1 Beluga Formation.--The type section for this formation is in the
2 Standard Oil Co. of Cal. and others 1 Beluga River Unit well, sec. 35,
3 T. 13 N., R. 10 W. (Calderwood and Fackler, 1972, p. 748-751). This
4 well, the discovery well for the Beluga River gas field, lies about 82
5 miles north-northeast of the Deep Creek well.

6 The Beluga Formation, 3,520 feet thick in the Deep Creek well,
7 consists of sandstone and interbedded shale, siltstone, and coal. The
8 sandstone is less conglomeratic but mostly similar to that in the
9 Tyonek. Although the Beluga includes many coal beds, they are generally
10 thinner than coal beds of the Tyonek.

11 The age of the Beluga Formation is very difficult to interpret
12 from the palynological data because no biostratigraphic boundaries are
13 evident. Part of the Beluga is exposed in the Homer area, according
14 to Calderwood and Fackler (1972, p. 748), who wrote that these ex-
15 posures were assigned to the Homeric Stage by Wolfe, Hopkins, and
16 Leopold (1966). Strata of the Homeric Stage are assigned to at least
17 part of the upper half of the Miocene Series, but some rocks of early
18 Pliocene age may be included (Wolfe and others, 1966, p. A20).

19 A sharp upward change from sandstone to shale marks the top of the
20 Beluga Formation in the Deep Creek well. The contact is well defined
21 on the electrical log (pl. 1). As noted by Calderwood and Fackler
22 (1972, p. 748), the top of the Beluga may be an unconformity, but is
23 difficult to determine in some areas of the Cook Inlet basin.
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1 Sterling Formation.--The type section designated for the Sterling
2 Formation is in the Union Oil Co. of Cal. 23-15 Sterling Unit well
3 located in sec. 15, T. 5 N., R. 10 W. (Calderwood and Fackler, 1972,
4 p. 751-753). This well was the discovery well for the Sterling gas
5- field, and it lies about 38 miles north-northeast of the Deep Creek
6 well.

7 The Sterling Formation is 2,442 feet thick in the Deep Creek well
8 where it consists of sandstone, shale, siltstone, coal, and lignite.
9 The clastic rocks are interbedded to a large extent in the lower and
10- upper parts. The middle part includes several units of sandstone,
11 partly conglomeratic, commonly more than 50 feet thick. The coal and
12 lignite beds are generally thin.

13 The age of the Sterling Formation could not be accurately deter-
14 mined from the palynologic study. According to Calderwood and Fackler
15- (1972, p. 751), the Sterling is partly exposed along the east shore of
16 Cook Inlet several miles west and north of the Deep Creek well. These
17 exposures were assigned to the Clangulchian Stage by Wolfe, Hopkins,
18 and Leopold (1966, p. A21), who emphasized the difficulties in deter-
19 mining the age of the rocks from the depauperate flora. These writers
20- believed the Clangulchian Stage is mainly Pliocene in age but may be
21 partly of late Miocene age.

22 Pleistocene gravels unconformably overlie the Sterling Formation
23 in the type section (Calderwood and Fackler, 1972, p. 751). Samples
24 were missing for the upper 22 feet in the Deep Creek well, but this
25 interval probably includes some Quaternary deposits as indicated by
mapping of Barnes and Cobb (1959, pl. 17).

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2 U.S. Geol. Survey 20th Ann. Rept., pt. 7, p. 31-264.

3 Wolfe, J. A., Hopkins, D. M., and Leopold, E. B., 1966, Tertiary stra-

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5- Geol. Survey Prof. Paper 398-A, p. A1-A29.

Detailed description of lithology

Standard Oil Company of California 1 Deep Creek Unit

NE NE Sec. 15, T. 2 S., R. 13 W., Seward Base and Meridian, Alaska

Commenced March 19, 1958; completed August 6, 1958

Altitude 622 ft. ground; 637 ft. K.B.

Depth in feetSample description

0-22

No samples

Tertiary System

Miocene and Pliocene Series

Kenai Group

Sterling Formation

22

22-in casing

10-ft. samples

22-30

Siltstone, light-gray, finely sandy, slightly
 micaceous, scattered carbonaceous fragments;
 stringers of light-gray very fine to fine-grained
 sandstone; includes at base 1-ft bed of medium-
 light-gray shale with carbonaceous fragments

30-32

Lignite

32-35

Siltstone and sandstone as above, carbonaceous
 fragments

35-38

Lignite

38-43

Shale, medium-light-gray, carbonaceous fragments

1	43-52	Sandstone, light-gray, very fine grained, scattered
2		fine grains and dark-gray grains, silty, clayey,
3		few carbonaceous fragments; interbedded dark-gray
4		carbonaceous shale with lignite stringers
5	52-68	Sandstone, light-gray, very fine to fine-grained,
6		scattered medium grains, brown clay grains and
7		fillings(?), silty, slightly micaceous, carbo-
8		naceous fragments
9	68-70	Lignite
10	70-75	Shale, medium-light-gray to light-brownish-gray,
11		carbonaceous fragments
12	75-77	Siltstone, medium-light-gray
13	77-80	Shale, as above; brownish-gray dense ironstone
14	80-86	Shale, brownish-gray, silty, abundant carbonaceous
15		fragments
16	86-94	Shale, dark-gray to black, very carbonaceous; lig-
17		nite stringers
18	94-104	Siltstone, medium-light-gray, fine carbonaceous
19		material; interbedded with light-gray very fine
20		grained silty sandstone and medium-light-gray
21		shale with carbonaceous fragments
22	104-108	Sandstone, medium-light-gray, fine-grained, scat-
23		tered medium grains, very clayey, slightly limy,
24		carbonaceous fragments
25		

1	108-112	Siltstone, light-gray, very finely sandy, slightly
2		micaceous, scattered carbonaceous fragments
3	112-117	Shale, black, very carbonaceous; medium-light-gray
4		shale, carbonaceous fragments
5	117-130	Sandstone, light-gray, mottled with yellowish-brown,
6		fine- to medium-grained, many dark-gray grains,
7		silty, clayey, slightly limy, carbonaceous fragments
8	130-135	Sandstone, medium-light-gray, fine- to medium-
9		grained, scattered coarse grains, dark-gray
10		grains and feldspar, angular to subangular, silty,
11		clayey, mostly friable, carbonaceous fragments
12	135-140	Sandstone, light-gray, very fine grained, very
13		silty
14	140-145	Sandstone, similar to above, fine- to medium-
15		grained, friable
16	145-147	Lignite
17	147-152	Shale, dark-gray to black, very carbonaceous
18	152-159	Sandstone, medium-light-gray, very fine grained,
19		very silty, slightly micaceous, carbonaceous
20		fragments
21	159-163	Shale, medium-light-gray, poorly bedded(?),
22		carbonaceous fragments
23	163-168	Siltstone, medium-light-gray, very finely sandy,
24		carbonaceous fragments

1	168-170	Shale, brownish-gray, abundant carbonaceous frag-
2		ments
3	170-172	Lignite
4	172-180	Shale, medium-light-gray, silty, poorly bedded(?),
5		very fine white tubes, carbonaceous fragments;
6		interbedded with siltstone as above
7	180-190	Shale, medium-light-gray, poorly bedded(?), carbo-
8		naceous fragments
9	190-191	Lignite
10	191-202	Shale, as above; interbedded with medium-light-gray
11		slightly micaceous siltstone with carbonaceous
12		fragments
13	202-206	Siltstone, medium-light-gray, very finely sandy,
14		slightly micaceous, scattered carbonaceous
15		material
16	206-209	Sandstone, medium-light-gray, very fine to fine-
17		grained, silty, clayey, friable
18	209-211	Shale, medium-light-gray, carbonaceous fragments
19	211-217	Siltstone, as above, yellowish-brown in part
20	217-228	Shale, medium-light-gray, silty in part, poorly
21		bedded, carbonaceous fragments
22	228-236	Siltstone, as above
23	236-246	Shale, as above; some brownish-gray dense ironstone

1	246-248	Sandstone, medium-light-gray, fine- to medium-
2		grained, dark-gray grains, feldspar, yellowish-
3		brown clay in part, angular to subangular, very
4		silty, carbonaceous material
5	248-266	Siltstone, as above; interbedded very friable sand-
6		stone as above
7	266-276	Shale, medium-light-gray, silty, carbonaceous frag-
8		ments
9	276-278	Siltstone, medium-light-gray, slightly yellowish-
10		brown
11	278-285	Shale, as above
12	285-290	Shale, dark-gray to black, slightly brownish in
13		part, very carbonaceous, abundant carbonaceous
14		fragments
15	290	Estimated sample lag 10 ft.
16	290-292	Lignite; shale, as above
17	292-299	Sandstone, medium-light-gray, very fine grained,
18		very silty, slightly micaceous, carbonaceous
19		fragments
20	299-303	Shale, brownish-gray, carbonaceous fragments
21	303-310	Shale, medium-gray, plant fossils and carbonaceous
22		fragments
23	310-330	Electrical-log interpretation; no samples from 320 to 340; estimated sample lag 10 ft.
24	310-312	Lignite
	312-315	Sandstone
25	315-320	Shale

1	320-321	Lignite
2	321-330	Sandstone; some shale in middle
3	330-337	Shale, medium- to dark-gray, abundant carbonaceous
4		fragments
5	337-339	Lignite
6	339-341	Shale, black, very carbonaceous
7	341-344	Siltstone, medium-light-gray, carbonaceous frag-
8		ments
9	344-355	Shale, medium-light- to medium-gray, scattered to
10		abundant carbonaceous fragments
11	355-357	Siltstone, as above
12	357-361	Shale, as above
13	361-365	Siltstone, medium-light-gray, very finely sandy,
14		fine carbonaceous material
15	365-369	Sandstone, medium-light-gray, very fine grained,
16		some dark-gray grains and feldspar, silty,
17		slightly micaceous, scattered fine carbonaceous
18		material, fairly porous?
19	369-371	Shale, pale-yellowish-brown, silty, slightly limy,
20		carbonaceous fragments and films
21	371-373	Shale, brownish-gray, hard, dolomitic (ironstone?),
22		looks like dolomite
23	373-383	Shale, medium-light-gray, carbonaceous fragments
24	383-387	Sandstone, light-gray, fine- to medium-grained,
25		some coarse grains, subangular to angular, prob-
26		ably silty, driller logs

1	387-409	Shale, medium-gray, silty, carbonaceous fragments;
2		includes several thin beds of lignite
3	409-421	Shale, dark-gray, very carbonaceous, fissile(?);
4		some interbedded lignite
5	421-422	Lignite
6	422-432	Shale, medium-gray, silty, abundant carbonaceous
7		fragments
8	432-440	Shale, medium-light-gray, very silty; interbedded
9		with medium-light-gray slightly micaceous silt-
10		stone with fine carbonaceous fragments
11	440-447	Sandstone, light-gray to light-olive-gray, very
12		fine to medium-grained, angular to subangular,
13		probably silty, mostly loose
14	447-449	Shale, medium-gray, nonbedded(?), carbonaceous
15		fragments
16	449-458	Sandstone, as above
17	458-466	Shale, brownish-gray, abundant carbonaceous frag-
18		ments
19	466-475	Shale, medium-light-gray, carbonaceous fragments;
20		few thin lignite beds
21	475-490	Shale, as above; interbedded with light-gray very
22		fine to medium-grained loose sand
23	490-501	Shale, dark-gray to black, very carbonaceous;
24		lignite in thin beds and stringers
25	501-505	Lignite

1	505-508	Shale, medium-light-gray, silty, carbonaceous frag-
2		ments
3	508-510	Sandstone, light-gray, very fine grained, silty,
4		limy in part, scattered carbonaceous fragments
5-	510-513	Siltstone, medium-light-gray, scattered carbonaceous
6		material
7	513-518	Sandstone, as above
8	518-520	Siltstone, brownish-gray, very finely sandy, limy,
9		hard
10-	520-525	Shale, brownish-black, partly limy, moderate-
11		yellow crystalline calcite in fractures
12	525-530	Shale, greenish-gray, poorly bedded?
13	530-540	Siltstone, medium-light-gray; interbedded medium-
14		light-gray very fine grained silty slightly
15-		micaceous sandstone with scattered carbonaceous
16		material and blobs of yellowish-brown clay?
17	540-552	Shale, medium-light-gray, slight greenish tint, silty,
18		very finely to medium sandy in lower part, scat-
19		tered carbonaceous fragments
20-	552-555	Siltstone, medium-light-gray
21	555	Estimated sample lag 10 ft.
22	555-565	Sand, gray, fine to medium, angular to subangular,
23		some coarse grains, feldspar, green, red, and dark-
24		gray grains, probably silty, drills loose; trace
25-		brownish-gray tight hard sandstone in lower part

1	565-585	Sand, as above, much yellowish-brown clay matrix
2		in part; probably includes lignite stringers
3	585-595	Sandstone, medium-gray, fine- to medium-grained,
4		angular to subangular, accessory grains as above,
5		very silty, clayey, low porosity?
6	595-612	Sandstone, medium-gray, very fine to fine-grained,
7		scattered medium to coarse grains, very silty,
8		slightly micaceous, carbonaceous fragments; prob-
9		ably interbedded with medium-gray siltstone
10	612-625	Shale, medium-light to medium-gray, silty
11	625-632	Siltstone, medium-light-gray, very finely sandy in
12		part, carbonaceous fragments; brownish-gray very
13		fine grained hard limy ironstone nodules?
14	632-633	Lignite
15	633-637	Shale, dark-gray to black, scattered fine to coarse
16		sand grains, very carbonaceous
17	637-646	Siltstone, medium-light-gray, very finely to finely
18		sandy and micaceous in part, fine carbonaceous
19		material
20	646-650	Shale, medium-gray, silty, poorly bedded(?),
21		carbonaceous fragments
22	650-653	Shale, yellowish-brown, slightly limy(?), earthy;
23		brownish-gray very fine grained to dense iron-
24		stone?
25	653-656	Lignite

1	656-674	Shale, medium-gray, silty, limy in upper part,
2		carbonaceous fragments; ironstone as above
3	674-678	Sandstone, medium-light-gray, very fine to fine-
4		grained, many dark-gray grains, very silty,
5		slightly micaceous, drills loose in part
6	678-680	Shale, dark-gray, very carbonaceous; lignite
7	680-687	Shale, medium-gray, silty, poorly bedded(?), abun-
8		dant carbonaceous fragments
9	687-690	Siltstone, medium-light-gray, slightly micaceous,
10		finely carbonaceous
11	690-698	Shale, as above
12	698-703	Sandstone, medium-light-gray, very fine to fine-
13		grained, some medium grains, very silty, scat-
14		tered mica, fine carbonaceous material, low
15		porosity?
16	703-707	Shale, as above
17	707-720	Sandstone, medium-light-gray, fine- to medium-
18		grained, angular to subangular, red, green, and
19		gray grains, probably very silty, micaceous,
20		lignite fragments and stringers, mostly drills
21		loose; some limy tight sandstone
22	720-748	Sandstone, as above, scattered coarse grains and
23		few gray shale fragments; lower part includes
24		some rounded granite granules caving(?) from
25		surface

1	748-762	Shale, medium-light- to medium-gray, brown tint in
2		part, silty, carbonaceous fragments
3	762	Estimated sample lag less than 10 ft.?
4	762-765	Lignite
5	765-767	Shale, medium-gray, carbonaceous fragments
6	767-770	Sandstone, medium-light-gray, very fine to medium-
7		grained, scattered coarse grains, angular to
8		subangular, probably silty, drills loose
9	770-772	Lignite
10	772-776	Shale, dark-gray, very carbonaceous; medium-gray
11		silty shale
12	776-780	Siltstone, medium-light-gray, slight yellowish-
13		brown tint, limy
14	780-787	Sandstone, as above
15	787-794	Shale, medium-gray, no carbonaceous fragments
16	794-796	Siltstone, medium-light-gray
17	796-800	Shale, brownish-gray, very carbonaceous
18	800-808	Shale, dark-gray, very carbonaceous; 2-ft. lignite
19		bed near middle
20	808-815	Sandstone, medium-light-gray, fine-grained, some
21		medium and coarse grains, angular to subangular,
22		probably silty, drills loose
23		
24		
25		

1	815-830	Sandstone, medium-light-gray, medium- to very
2		coarse grained, many granules and few pebbles,
3		subangular to subrounded, many light-colored
4		granite fragments, few dark-gray igneous grains,
5		much clear quartz, trace of doubly-terminated
6		quartz crystals, feldspar, loose
7	830-840	Sandstone, similar to above but somewhat finer
8		grained
9	840-855	Sandstone, medium-light-gray, fine- to coarse-
10		grained, some very coarse grains and granules
11		similar to above, trace quartz crystals
12	855-885	Sandstone, as above, partly cemented with yellowish-
13		brown clay, more dark-gray and green grains than
14		above
15	885-895	Sandstone, medium-light-gray, fine- to medium-
16		grained, feldspar, abundant dark-gray, light-
17		green, and reddish-brown grains, limy, mottled
18		with brownish-gray limy clay, low porosity?
19	895-903	Sandstone, as above, very clayey
20	903-918	Sand, medium-light-gray, fine to medium, accessory
21		grains as above, drills loose
22	918-922	Siltstone, brownish-gray to olive-gray, limy, hard,
23		few carbonaceous fragments, looks like limestone
24	922-945	Sand, as above
25	929	13-3/8-in. casing

1	945-949	Shale, medium-light- to medium-gray, abundant carbonaceous fragments in part
2		
3	949-950	Lignite
4	950-955	Siltstone, medium-light-gray, very finely sandy, micaceous, some fine carbonaceous material
5-		
6	955-958	Shale, as above
7	958-960	Lignite
8	960-968	Sandstone, medium-light-gray, very fine to fine-grained, very silty, clayey
9		
10	968-972	Shale, as above; medium-light-gray siltstone
11	972-974	Lignite
12	974-979	Siltstone, as above
13	979-981	Shale, as above
14	981-983	Siltstone, as above
15-	983-993	Shale, medium-gray, carbonaceous fragments
16	993-998	Shale, dark-gray, very carbonaceous
17	998-999	Lignite
18	999-1000	Shale, as above
19	1000-1020	Core 1; reported recovery 20 ft. (7 trays)
20-	Tray 1	(2 ft. \pm core)
21	1000-1001	Shale, medium-gray, silty, not limy, bedding obscure
22		but greater than 0.1 in., scattered carbonaceous
23		fragments mostly subparallel to bedding; some silt-
24		stone as below

1	1001-1002	Siltstone, medium-light-gray, fissile to platy
2		bedded, not limy, very finely sandy in part, abun-
3		dant dark-gray grains, many yellowish-gray clay
4		grains, many paper-thin carbonaceous shaly lami-
5-		nations
6	1002-1003	Missing
7	Tray 2	(2 ft. \pm core)
8	1003-1003.3	Shale, medium-gray, very silty, bedding obscure,
9		many fine carbonaceous fragments
10-	1003.3-1003.6	Sandstone, medium-light-gray, very fine grained,
11		many dark-gray grains, very silty, clayey,
12		fissile to platy bedded, paper-thin shale and
13		siltstone laminac with abundant carbonaceous
14		material
15-	1003.6-1005	Shale, medium-gray, very silty, platy to thin
16		bedded, many fine carbonaceous fragments, few
17		siltstone laminae
18	1005-1006	Missing
19	Tray 3	(2.3 ft. \pm core)
20-	1006-1007	Siltstone, medium-light-gray, obscure thin bedding,
21		many fine carbonaceous fragments
22	1007-1008.3	Shale, medium-gray, silty in upper part, platy to
23		very thin bedded, poorly bedded in part, some fine
24		carbonaceous fragments, few large carbonaceous
25-		fragments

1	1008.3-1009	Missing
2	Tray 4	(1.5 ft. \pm core, rubbly in part)
3	1009-1009.8	Shale, medium-light- to medium-gray, poorly bedded,
4		common carbonaceous films and fragments in part,
5-		scattered lignite fragments, slickensides in
6		lower part; few thin beds (less than 1 in.) of
7		medium-dark-gray carbonaceous shale; lignite beds
8		few inches thick at base, middle, and top?
9	1009.8-1010.5	Siltstone, grades downward into silty shale, medium-
10-		light- to medium-gray, poorly to obscurely bedded,
11		abundant small carbonaceous films mostly subpar-
12		allel to bedding(?), few large carbonaceous frag-
13		ments
14	1010.5-1012	Missing
15-	Tray 5	(0.7 ft. core)
16	1012-1012.7	Sandstone, light-gray, medium-grained, thin to
17		medium(?) bedded, very silty, subangular, abun-
18		dant dark-gray to black grains, slightly
19		micaceous, not limy, abundant pebbles (less than
20-		1/2 in., quartz, dark-gray to black basalt, sub-
21		rounded) in 1-in. bed 2 in. below top, fairly
22		friable
23	1012.7-1015	Lost
24	Tray 6	(1.7 ft. \pm core)
25		

1	1015-1015.2	Shale, medium-light- to medium-gray, poorly bedded,
2		slickensides common, abundant carbonaceous frag-
3		ments and plant impressions, few lignite frag-
4		ments, resembles underclay
5	1015.2-1016.4	Lignite and very carbonaceous shale; includes a 2-
6		in. bed of medium-grained silty friable sandstone
7		with lignite stringers 6 in. above base
8	1016.4-1016.7	Shale, medium-gray, slight olive-gray tint, poorly
9		bedded, slickensides common, abundant small to
10		large carbonaceous films and fragments, few lig-
11		nite fragments, resembles underclay
12	1016.7-1018	Missing
13	Tray 7	(1.3 ft. + core, rubble in part)
14	1018-1018.5	Shale, similar to above, becomes medium-dark-gray at
15		base
16	1018.5-1019.3	Lignite and medium-dark- to dark-gray carbonaceous
17		shale, slight brown tint, weathers fissile to
18		platy
19	1019.3-1020	Missing
20	1020-1026	Shale, medium-gray, scattered carbonaceous frag-
21		ments
22	1026-1033	Sandstone, light-gray, fine-grained, silty, limy,
23		many dark-gray to black grains, scattered reddish-
24		brown grains; some brownish-gray limy hard shale
25		with many plant impressions in upper part

1	1038-1044	Shale, medium-gray and brownish-gray, many plant
2		impressions; interbedded lignite
3	1044-1052	Shale, medium-gray, silty, carbonaceous fragments
4	1052-1058	Lignite; interbedded brownish-gray shale with abun-
5		dant carbonaceous fragments
6	1058-1070	Shale, medium-dark-gray, abundant carbonaceous frag-
7		ments; interbedded lignite
8	1070-1079	Shale, as above; some medium-light-gray siltstone
9		near base, scattered carbonaceous fragments
10	1079-1092	Sandstone, light- to medium-light-gray, fine-grain-
11		ed, scattered medium grains, mostly loose, limy
12		in part, many dark-gray grains, some reddish-
13		brown grains, slightly micaceous, probably silty;
14		interbedded with siltstone as above; some shale
15		as above in upper part
16	1092-1108	Sandstone, as above, few coarse grains; some inter-
17		bedded siltstone as above
18	1108-1120	Sand, medium-light-gray, fine to coarse, some very
19		coarse grains, many black grains, some feldspar(?),
20		angular to subrounded, loose, slightly micaceous,
21		probably silty
22	1120-1133	Sand, as above, few granules; some interbedded very
23		fine to fine-grained silty sandstone and thin(?)
24		lignite beds

1	1133-1137	Sandstone, yellowish-gray, fine- to medium-grained,
2		subangular, very limy, many black grains, some
3		light-green, pink, and reddish-brown grains
4	1137-1143	Shale, medium-light- to medium-gray
5	1143-1146	Siltstone, medium-light- to medium-gray
6	1146-1153	Sandstone, medium-light-gray, very fine grained,
7		silty; interbedded with siltstone as above
8	1153-1157	Shale, medium-gray, carbonaceous fragments
9	1157-1158	Lignite
10	1158-1160	Shale, brownish-gray, carbonaceous fragments
11	1160-1161	Lignite
12	1161-1164	Siltstone, medium-light-gray
13	1164-1170	Shale, medium-gray and brownish-gray
14	1170-1173	Siltstone, as above
15	1173-1177	Shale, medium-gray, silty, carbonaceous fragments,
16		moderate yellowish-brown ironstone concretions?
17	1177-1178	Lignite
18	1178-1180	Siltstone, medium-light-gray, some carbonaceous
19		fragments
20	1180-1182	Shale, as above
21	1182-1183	Lignite
22	1183-1200	Shale, medium-gray, silty, scattered carbonaceous
23		fragments
24	1200-1215	Shale, medium-gray, poorly bedded(?), carbonaceous
25		fragments

1	1215-1217	Sandstone, light-greenish-gray, very fine to fine-
2		grained, some black grains, very silty, limy, low
3		porosity
4	1217-1218	Shale, brownish-gray, carbonaceous fragments
5	1218-1235	Sandstone, light- to medium-light-gray, fine- to
6		medium-grained, many black grains, scattered
7		reddish-brown grains, silty, angular to sub-
8		angular, mostly drills loose
9	1235-1237	Shale, dark-gray to brownish-gray, abundant carbo-
10		naceous fragments
11	1237-1247	Sandstone, medium-light-gray, fine- to coarse-
12		grained, scattered very coarse grains and granules,
13		black grains, larger grains are subangular to sub-
14		rounded, silty, micaceous, feldspar
15	1247-1250	Sandstone, light-olive-gray, fine- to medium-
16		grained, silty, limy, hard
17	1250-1253	Shale, medium-gray, carbonaceous fragments
18	1253-1257	Sandstone, light-gray, fine- to medium-grained,
19		many black grains, some reddish-brown grains and
20		mica, silty, subangular, mostly loose
21	1257-1264	Shale, medium-gray, carbonaceous fragments
22	1264-1267	Sandstone, as above
23	1267-1273	Shale, medium-gray, very carbonaceous; lignite
24		stringers

- 1 1273-1285 Sandstone, light-gray, fine- to medium-grained,
2 some coarse and very coarse grains, subangular,
3 many black grains, scattered reddish-brown grains,
4 silty, much brownish-gray clayey matrix in part,
5 drills loose
- 6 1285-1320 Sandstone, as above, coarser, some granules, feld-
7 spar, several subangular doubly-terminated quartz
8 crystals
- 9 1320-1325 Sandstone, light-olive-gray, fine- to medium-
10 grained, silty, limy, hard
- 11 1325-1340 Sandstone, light-gray, fine- to coarse-grained,
12 some very coarse grains and granules, silty,
13 drills loose, similar to above
- 14 1340-1349 Sandstone, light-gray, fine- to medium-grained,
15 black grains as above, silty, drills loose
- 16 1349-1357 Shale, medium-light- to medium-gray, scattered
17 plant impressions and fragments; interbedded with
18 medium-light-gray siltstone
- 19 1357-1367 Sandstone, light-gray, fine- to medium-grained,
20 some coarse grains, silty, subangular, many black
21 grains, scattered reddish-brown and green grains,
22 drills loose
- 23 1367-1380 Sandstone, as above, some very coarse grains and
24 granules, caving?
- 25

1	1380-1420	Electrical-log interpretation; samples from 1390 to
2		1440 mislabeled or out of place(?); estimated
3		sample lag 10 ft.
4	1380-1406	Sandstone
5	1406-1410	Shale
6	1410-1420	Sandstone
7	1420-1424	Sandstone, light-gray, fine- to medium-grained,
8		silty, drills loose
9	1424-1427	Shale, medium-gray, few carbonaceous fragments
10	1427-1430	Sandstone, as above
11	1430-1432	lignite
12	1432-1442	Shale, dark-gray, carbonaceous; interbedded lignite
13	1442-1450	Shale, medium-dark-gray and dark-brownish-gray;
14		interbedded fine- to medium-grained sandstone
15	1450	Estimated sample lag less than 10 ft.?
16	1450-1490	Sandstone, light-gray, fine- to medium-grained,
17		silty, some coarse grains, subangular, many black
18		and some reddish-brown and green grains, drills
19		loose, probably includes lignite stringers in
20		upper part
21	1490-1493	Siltstone, medium-light-gray, many carbonaceous
22		films
23	1493-1501	Sandstone, as above
24	1501-1504	Lignite and dark-gray carbonaceous shale

1	1504-1506	Sandstone, light-gray, very fine to fine-grained,
2		silty, drills loose
3	1506-1508	Lignite
4	1508-1518	Shale, medium- to dark-gray, carbonaceous in part
5	1518-1560	Sandstone, light-gray, fine- to medium-grained, some
6		coarse grains, silty, abundant black and some
7		reddish-brown grains, drills loose; middle part
8		includes interbedded gray shale
9	1560-1564	Shale, medium-gray, carbonaceous fragments
10	1564-1570	Lignite and dark-gray carbonaceous shale
11	1570-1582	Shale, medium-gray, carbonaceous fragments
12	1582-1586	Siltstone, medium-light-gray
13	1586-1595	Shale, medium-gray and brownish-gray, carbonaceous
14		fragments
15	1595-1597	Lignite
16	1597-1600	Shale, dark-gray, carbonaceous
17	1600-1608	Shale, medium-gray, carbonaceous fragments
18	1608-1610	Lignite
19	1610-1617	Sandstone, yellowish-gray to light-olive-gray, fine-
20		to medium-grained, very limy, many dark-gray to
21		black grains, some reddish-brown and greenish-
22		gray grains, scattered coarse grains, angular to
23		subangular, well indurated
24	1617-1622	Shale, as above; interbedded with sandstone as
25		above

1	1622-1647	Sandstone, light-gray, fine- to coarse-grained, sub-
2		angular, many dark-gray to black grains, some red-
3		dish-brown and greenish-gray grains, probably
4		silty, drills loose
5	1647-1650	Shale, brownish-gray, many carbonaceous fragments
6	1650-1670	Sandstone, as above
7	1670-1690	Sandstone, similar to above, probably medium- to
8		very coarse grained in part, drills loose
9	1690-1730	Sandstone, light-gray, fine- to medium-grained,
10		scattered coarse grains, subangular, probably
11		silty, accessory grains as above, drills loose
12	1730-1734	Shale, medium-gray, very finely sandy, scattered
13		carbonaceous fragments
14	1734-1737	Sandstone, olive-gray, very fine to fine-grained,
15		limy, silty, well indurated, dark-gray to black
16		grains, carbonaceous fragments on bedding
17	1737-1740	Shale, as above
18	1740-1759	Sandstone, light-gray, fine- to medium-grained, sub-
19		angular, probably silty, many dark-gray to black
20		grains, drills loose, some reddish-brown and
21		greenish-gray grains
22	1759-1763	Shale, brownish-gray, abundant carbonaceous frag-
23		ments
24	1763-1766	Sandstone, as above
25	1766-1774	Shale, medium-gray, some carbonaceous fragments

1	1774-1776	Sandstone, as above
2	1776-1780	Shale, dark-gray; carbonaceous, lignite stringers
3	1780-1796	Sandstone, light-gray, fine- to coarse-grained, sub-
4		angular, some very coarse grains, few granules of
5		light-gray granite(?), probably silty, many dark-
6		gray to black grains, some reddish-brown and
7		greenish-gray grains, drills loose
8	1796-1823	Sandstone, light-gray, fine- to medium-grained, sub-
9		angular; interbedded medium-gray shale with
10		carbonaceous fragments; several thin lignite beds
11		in lower part
12	1823-1833	Shale, medium-gray, some carbonaceous fragments
13	1833-1854	Sandstone, light-gray, fine- to medium-grained, sub-
14		angular, dark-gray to black and reddish-brown and
15		greenish-gray grains as above, probably silty,
16		drills loose; interbedded with medium-gray shale
17		as above
18	1854-1858	Shale, medium-dark- to dark-gray, abundant carbo-
19		naceous fragments
20	1858-1867	Sandstone and interbedded shale, as above
21	1867-1868	Lignite
22	1868-1913	Sandstone, as above; interbedded medium- to medium-
23		dark-gray shale with some carbonaceous fragments;
24		probably some lignite stringers

1	1913-1923	Shale, medium-gray, scattered carbonaceous fragments;
2		dark-gray carbonaceous shale
3	1923-1940	Sandstone, light-gray, fine- to medium-grained,
4		similar to above, loose; interbedded with medium-
5		to medium-dark-gray shale with some carbonaceous
6		fragments
7	1940-1947	Shale, as above
8	1947-1965	Sandstone and shale, as above
9	1965-1969	Siltstone, dark-gray, very limy, fairly hard, few
10		carbonaceous fragments
11	1969-1990	Sandstone, as above; interbedded with shale as above
12	1990-1996	Shale, medium-dark-gray, many carbonaceous plant
13		fragments
14	1996-2000	Sandstone and shale, as above
15	2000-2015	Core 2; reported recovery 13 ft. (5 trays)
16	Tray 1	Missing
17	2000-2003	
18	Tray 2	(2 ft. core)
19	2003-2005	Shale, medium-gray, fairly obscure platy bedding,
20		fairly soft, scarce carbonaceous plant fragments
21		subparallel to bedding
22	2005-2006	Missing
23	Tray 3	(1.7 ft. core)
24	2006-2007	Sandstone, medium-gray, very fine grained, very
25		silty and clayey, scattered mica, not limy, bedding
26		obscure, few fine carbonaceous fragments

1	2007-2007.7	Siltstone, medium-gray, very finely sandy, slightly
2		micaceous, thin to medium bedded?
3	2007.7-2009	Missing
4	Tray 4	(2 ft. \pm core)
5-	2009-2009.5	Shale, medium-gray, bedding obscure, fairly soft,
6		many carbonaceous plant fragments mostly sub-
7		parallel to bedding
8	2009.5-2010	Sandstone, medium-gray, very fine to fine-grained,
9		very silty and clayey, many dark-gray to black
10-		grains, slightly micaceous, fairly friable, not
11		limy, one bed(?), few large and many small carbo-
12		naceous fragments
13	2010-2011	Shale, medium-gray, partly silty and finely sandy,
14		obscure bedding, fairly soft, scattered carbo-
15-		naceous plant fragments; includes a few beds (less
16		than 1 in.) of sandstone, similar to above
17	2011-2012	Missing
18	Tray 5	(1.8 ft. core)
19	2012-2013.8	Shale, medium-gray, silty, platy obscurely bedded,
20-		fairly soft, sparse to common carbonaceous frag-
21		ments; several thin beds (1 in. \pm) of medium-gray
22		micaceous partly sandy siltstone with many carbo-
23		naceous plant fragments
24	2013.3-2015	Missing
25	2015-2017	Shale, medium-gray, carbonaceous fragments

1	2017-2019	Lignite
2	2019-2023	Shale, as above
3	2023-2026	Sandstone, medium-gray, very fine grained, silty,
4		limy, hard, many dark-gray to black grains
5	2026-2036	Shale, as above; interbedded with gray very fine to
6		medium-grained silty sandstone, drills loose
7	2036-2050	Sandstone, medium-light- to medium-gray, fine- to
8		medium-grained, probably silty and clayey, drills
9		loose, many dark-gray to black and greenish-gray
10		grains, subangular, slightly micaceous; scattered
11		fragments of olive-gray clayey dolomitic sand-
12		stone, probably some coarse grains
13	2050-2056	Shale, medium-gray, few carbonaceous fragments
14	2056-2068	Sandstone, as above
15	2068-2070	Shale, medium-gray, few carbonaceous fragments
16	2070-2090	Sandstone, as above, loose, probably very clayey
17		and silty; may include soft shale beds that are
18		lost in sample washing?
19	2090-2092	Lignite
20	2092-2097	Shale, dark-gray, very carbonaceous, abundant plant
21		fragments
22	2097-2100	Siltstone, yellowish-gray to light-gray, very clay-
23		ey, "ashy", scattered dark grains, micaceous
24	2100-2107	Shale, light-gray, nonbedded(?), volcanic ash?
25	2107-2113	Siltstone, "ashy" as above

1	2113-2122	Sandstone, gray, medium- to very coarse grained,
2		some granules, probably silty, loose, subangular
3		to subrounded, many black and dark-gray grains,
4		some greenish-gray grains; some light-olive-gray
5		fine- to medium-grained limy silty sandstone at
6		top
7	2122-2123	Lignite
8	2123-2128	Sandstone, gray to olive-gray, fine- to medium-
9		grained, silty, limy, lignite fragments
10	2128-2137	Sandstone, gray, fine- to coarse-grained, probably
11		silty, loose, many dark-gray grains
12	2137-2140	Shale, medium-gray, many carbonaceous fragments
13	2140-2144	Sandstone, olive-gray, very fine to fine-grained,
14		silty, limy, hard
15	2144-2147	Shale, medium-gray, many carbonaceous plant frag-
16		ments
17	2147-2158	Sandstone, gray, fine- to medium-grained, probably
18		silty, many dark grains, loose; interbedded with
19		dark-gray carbonaceous shale
20	2158-2162	Lignite and dark-gray to black very carbonaceous
21		shale; brownish-gray dense ironstone
22	2162-2178	Shale, medium-dark-gray, carbonaceous fragments,
23		several thin lignite beds
24	2178-2180	Sandstone, as above
25	2180-2182	Shale, as above

1	2182-2184	Lignite
2	2184-2185	Shale, as above
3	2185-2194	Sandstone, medium-dark-gray, fine- to medium-
4		grained, slightly silty, very limy, angular, few
5		coarse grains, micaceous, abundant dark-gray to
6		black grains, very little porosity?
7	2194-2206	Shale, medium-dark- to dark-gray, many carbonaceous
8		fragments, several lignite stringers
9	2206-2208	Lignite
10	2208-2212	Shale, as above
11	2212-2234	Sandstone, gray, fine- to medium-grained, some
12		coarse grains, probably silty, loose, subangular,
13		many dark-gray to black grains; interbedded with
14		medium-gray shale with many carbonaceous plant
15		fragments
16	2234-2238	Shale, medium- to medium-dark-gray, carbonaceous
17		fragments
18	2238-2242	Sandstone, as above
19	2242-2246	Shale, as above
20	2246-2252	Sandstone, as above; interbedded with shale as above
21	2252-2256	Shale, medium- to medium-dark-gray, moderately limy,
22		silty, fairly hard, no carbonaceous fragments,
23		"chunky," looks like "dirty" limestone

1	2256-2269	Shale, dark-gray to black, very carbonaceous, scattered very fine sand grains in part, fissile(?),
2		lignite stringers in lower part
3		
4	2269-2297	Sandstone, gray, fine- to medium-grained, some
5		coarse grains, probably silty, loose, many dark-
6		gray grains; interbedded with medium-gray shale
7		with some carbonaceous fragments
8	2297-2300	Siltstone, medium-dark-gray, limy
9	2300-2303	Sandstone, medium-dark-gray, very fine grained,
10		silty, limy, fairly hard
11	2303-2310	Shale, medium-gray, slightly limy; interbedded silt-
12		stone as above, no plant fossils
13	2310-2316	Shale, dark-gray to black, very carbonaceous
14	2316-2317	Lignite
15	2317-2319	Sandstone, brownish-gray, very fine to fine-grained,
16		silty, limy
17	2319-2323	Shale, as above
18	2323-2330	Sandstone, gray, fine- to coarse-grained, probably
19		silty, loose, many dark-gray grains
20	2330-2332	Lignite
21	2332-2335	Shale, brownish-gray, abundant carbonaceous frag-
22		ments
23	2335-2350	Shale, medium-dark-gray, very poor samples
24	2350-2367	Shale, as above; upper part includes stringers of
25		gray very fine to fine-grained sandstone, very poor samples

1	2367-2370	Sandstone, gray, fine- to coarse-grained, probably
2		silty, loose, many dark-gray grains
3	2370-2385	Shale as above with sandstone stringers as above
4	2385-2390	Sandstone, as above
5	2390-2400	Shale, as above; some sandstone as above in lower
6		part
7	2400-2404	Shale, medium-gray, carbonaceous fragments
8	2404-2425	Shale, dark-gray, many carbonaceous fragments and
9		lignite films, better samples
10	2425-2435	Shale, light-olive-gray, nonbedded(?), brownish-
11		gray plant fossils
12	2435-2442	Shale, medium-light-gray, no plant fossils?
13		Beluga Formation
14	2442-2468	Sandstone, gray, fine- to medium-grained, probably
15		silty, loose, many dark-gray grains; interbedded
16		with medium-gray finely sandy shale
17	2468-2473	Shale, medium-dark-gray and brownish-gray, abundant
18		carbonaceous plant fragments
19	2473-2476	Sandstone, as above
20	2476-2478	Shale, dark-gray to black, very carbonaceous
21	2478-2480	Lignite
22	2480-2485	Sandstone, as above
23	2485-2490	Shale, brownish-gray to dark-gray, very carbonaceous,
24		scattered selenite(?) crystals
25	2490-2493	Lignite
26	2493-2498	Shale, dark-gray to black, very carbonaceous

1	2499-2500	Lignite
2	2500-2503	Sandstone, as above
3	2503-2505	Shale, as above
4	2505-2506	Lignite
5	2506-2508	Shale, as above
6	2508-2510	Siltstone, light-olive-gray to medium-light-gray,
7		"ashy" in part
8	2510-2512	Shale, medium-light- to medium-gray, "chunky"
9	2512-2517	Shale, dark-gray, very carbonaceous, lignite
10		stringers
11	2517-2521	Sandstone, gray, fine- to medium-grained, probably
12		silty, dark-gray grains, loose, some coarse grains
13	2521-2526	Shale, medium-light-gray and light-olive-gray, silty
14	2526-2540	Sandstone, as above
15	2540-2544	Shale, dark-brownish-gray, very carbonaceous
16	2544-2550	Sandstone, as above
17	2550-2560	Sandstone, medium-dark-gray, fine- to medium-grained,
18		silty, clay, micaceous, few coarse grains, sub-
19		angular, very dark-gray grains, large mica flakes,
20		very dark gray shale grains
21	2560-2587	Bedrock; no interpretation; no samples from
22		2560 to 2587
23	2560-2571	Sandstone
24	2578-2587	Sandstone

1	2580-2590	Shale, dark-gray to black, carbonaceous, brown spots
2		and fragments, lignite stringers
3	2590-2592	Lignite
4	2592-2606	Sandstone, gray, fine- to medium-grained, probably
5-		silty, loose; interbedded shale as above
6	2606-2609	Shale, medium-dark-gray, fissile(?), scattered
7		carbonaceous fragments
8	2609-2625	Sandstone, medium-dark-gray, fine- to medium-grained,
9		silty, limy, micaceous (looks like sandstone at
10-		2550 to 2560)
11	2625-2632	Shale, medium-gray, scattered fine carbonaceous
12		plant fragments; some gray fine- to medium-grained
13		loose silty sandstone with many dark-gray grains
14	2632-2636	Sandstone, as above
15-	2636-2657	Shale, medium-dark- to dark-gray, many carbonaceous
16		fragments; some sandstone similar to above in
17		lower part
18	2657-2660	Sandstone, similar to above, probably coarse-grained
19		in part
20-	2660-3050	Electrolite-log interpretation; no samples from 2660
21		to 3050
22	2660-2677	Sandstone; some interbedded shale
23	2677-2678	Lignite
24	2678-2703	Shale, medium-dark-gray, shale near top and base
25	2703-2717	Sandstone, medium-gray, silty, some shale

1	2717-2738	Sandstone
2	2738-2739	Lignite
3	2739-2760	Sandstone; some shale near middle
4	2760-2770	Shale; interbedded sandstone
5	2770-2782	Siltstone; interbedded shale
6	2782-2788	Sandstone
7	2788-2789	Lignite
8	2789-2798	Shale; interbedded sandstone
9	2798-2815	Sandstone
10	2815-2836	Shale; interbedded siltstone; some sandstone near
11		base
12	2836-2842	Lignite and shale
13	2842-2845	Shale
14	2845-2855	Sandstone; some siltstone near middle and shale at
15		base
16	2855-2856	Lignite
17	2856-2860	Sandstone
18	2860-2865	Siltstone
19	2865-2866	Lignite
20	2866-2886	Sandstone; interbedded shale and siltstone
21	2886-2888	Lignite
22	2888-2912	Sandstone; interbedded siltstone and shale
23	2912-2940	Shale; some siltstone
24	2940-2943	Sandstone; interbedded shale in upper half
25	2943-2944	Shale and lignite

1	2944-2980	Sandstone; interbedded shale
2	2980-2985	Lignite and shale
3	2985-2995	Sandstone
4	2995-3007	Siltstone; shale at top and bottom
5	3007-3050	Sandstone; interbedded shale
6	3050-3065	Core 3; reported recovery 15 ft. (6 trays)
7	Tray 1	(1.3 ft. core)
8	3050-3051.3	Shale and interbedded sandstone in nearly equal
9		amounts, one 3-in. bed of siltstone near middle,
10		beds up to 4 in. thick: shale, medium-gray to
11		medium-dark-gray in lower part, silty, scattered
12		fine sand grains, bedding obscure in upper part
13		and fissile to platy in lower part, carbonaceous
14		fragments mostly subparallel to bedding and more
15		abundant in lower part; sandstone, medium-gray,
16		very fine to fine-grained, very silty and clayey,
17		slightly micaceous, many dark-gray grains and
18		small carbonaceous fragments, friable, obscure
19		bedding; siltstone, medium-light-gray, very finely
20		sandy, slightly micaceous, obscure bedding, scat-
21		tered carbonaceous fragments partly subparallel
22		to bedding
23	3051.3-3052.5	Missing
24	Tray 2	(1.7 ft. core)

1	3052.5-3053.5	Siltstone and shale: siltstone, similar to above,
2		medium-gray in part; shale, medium-gray, silty,
3		obscure bedding, two 0.2-ft. beds, scattered
4		carbonaceous fragments and lignite stringers
5		poorly oriented in upper bed, abundant small
6		carbonaceous fragments in lower bed
7	3053.5-3054.2	Sandstone, similar to above
8	3054.2-3055	Missing
9	Tray 3	(1.3 ft. core)
10	3055-3056.3	Shale, medium- to medium-dark-gray, silty, poor
11		fissile to platy bedding, scattered carbonaceous
12		plant fragments in part randomly oriented to bed-
13		ding in medium-gray shale, few lignite stringers
14		(<1/16 in. thick) and abundant carbonaceous frag-
15		ments in darker shale
16	3056.3-3057.5	Missing
17	Tray 4	Missing
18	3057.5-3060	
19	Tray 5	(1.7 ft. core)
20	3060-3061.7	Shale, medium-gray, silty, mostly obscure bedding
21		but poor platy bedding in lower part, carbonaceous
22		fragments mostly very sparse but abundant in lower
23		part, few grains of ironstone and amber and some
24		carbonaceous fragments near base; grades
25		downward into sandstone, 0.2 ft. thick, medium-
26		gray, fine to fine-grained, very silty and
27		clayey, silty, carbonaceous, many dark-gray grains,
28		abundant carbonaceous fragments and films, friable

1	3061.7-3062.5	Missing
2	Tray 6	(1.3 ft. \pm core, partly rubble)
3	3062.5-3063.8	Sandstone, medium-gray, very fine grained, very
4		silty and clayey, slightly micaceous, many dark-
5		gray grains, includes several thin beds (<1/2 in.)
6		of medium-gray siltstone, platy to very thin
7		bedded, abundant carbonaceous fragments and films
8		mostly along bedding, includes one bed (<1/2 in.)
9		of very fine to medium-grained very silty sand-
10		stone near base
11	3063.8-3065	Missing
12	3065-3090	Electrical-log interpretation; no samples from 3065
13		to 3100; assumed 10-ft. sample lag
14	3065-3068	Shale
15	3068-3070	Lignite
16	3070-3085	Sandstone; interbedded shale in upper half
17	3085-3090	Shale and siltstone
18	3090-3092	Sandstone, gray, fine- to medium-grained, probably
19		silty, loose
20	3092-3094	Shale, medium-dark-gray
21	3094-3096	Shale, dark-gray, carbonaceous; lignite
22	3096-3098	Siltstone, medium-dark-gray, limy
23	3098-3100	Sandstone, as above
24	3100-3102	Shale, medium-gray
25	3102-3110	Sandstone, as above

1	3110-3113	Shale, light-olive-gray, caving?
2	3113-3115	Siltstone, olive-gray
3	3115-3120	Shale, dark-gray to black, carbonaceous; some lignite in lower part
4		
5	3120-3125	Sandstone, as above
6	3125-3129	Shale, medium-dark-gray, carbonaceous fragments
7	3129-3130	Lignite
8	3130-3137	Shale, as above
9	3137-3138	Sandstone, gray, fine-grained, probably silty, loose
10	3138-3140	Shale, light-olive-gray, many carbonaceous fragments
11	3140-3141	Lignite
12	3141-3143	Shale, as above
13	3143-3146	Sandstone, as above
14	3146-3150	Shale, medium-dark-gray, carbonaceous fragments
15	3150-3170	Sandstone, medium- to medium-dark-gray, very fine
16		grained, very silty, limy, hard, slightly micaceous;
17		interbedded medium-dark-gray limy hard siltstone
18	3170-3172	Lignite
19	3172-3176	Shale, medium-dark-gray, carbonaceous fragments
20	3176-3183	Sandstone, gray, fine-grained, some medium grains, probably silty, loose
21		
22	3183-3186	Shale, medium-dark-gray, carbonaceous fragments
23	3186-3188	Sandstone, olive-gray, very fine to fine-grained, silty, dolomitic, much yellowish-brown matrix
24		
25	3188-3192	Shale, as above

1	3192-3198	Sandstone, gray, fine-grained, some medium grains,
2		probably silty, loose
3	3198-3200	Shale, as above
4	3200-3204	Sandstone, as above
5-	3204-3206	Siltstone, medium-dark-gray, limy, hard
6	3206-3208	Shale, as above
7	3208-3212	Sandstone, medium-gray, very fine grained, silty,
8		limy, few fine grains, slightly micaceous
9	3212-3213	Lignite, caving?
10-	3213-3219	Shale, medium-dark-gray, carbonaceous fragments
11	3219-3225	Sandstone, as above; interbedded medium- to medium-
12		dark-gray limy hard siltstone
13	3225-3228	Shale, as above
14	3228-3232	Sandstone, gray, fine-grained, some medium grains,
15-		probably silty, loose; some interbedded shale as
16		above
17	3232-3237	Shale, as above
18	3237-3240	Sandstone, as above
19	3240-3243	Shale, as above
20-	3243-3248	Sandstone, as above
21	3248-3250	Shale, as above
22	3250-3257	Sandstone, as above; interbedded with shale as above
23	3257-3260	Shale, light-olive-gray, silty, "chony"
24	3260-3266	Sandstone, as above
25	3266-3268	Shale, dark-gray to black, carbonaceous

1	3268-3272	Lignite
2	3272-3275	Shale, light-olive-gray, silty, conchoidal fracture
3	3275-3278	Sandstone, gray, fine-grained, some medium grains,
4		probably silty, loose
5	3278-3280	Shale, medium-dark-gray
6	3280-3284	Siltstone, light-olive-gray, may be fissile or platy
7		bedded
8	3284-3287	Shale, as above
9	3287-3292	Sandstone, as above
10	3292-3299	Shale, dark-gray to black, carbonaceous, lignite
11		stringers
12	3299-3303	Sandstone, as above
13	3303-3306	Shale, light-olive-gray, silty, few very small
14		carbonaceous fragments
15	3306-3308	Sandstone, as above
16	3308-3312	Shale, dark-gray, carbonaceous
17	3312-3314	Lignite
18	3314-3317	Shale, dark-gray, carbonaceous
19	3317-3322	Shale, medium-gray, many carbonaceous fragments on
20		bedding, fissile?
21	3322-3326	Sandstone, as above
22	3326-3330	Shale, black, carbonaceous
23	3330-3333	Lignite
24	3333-3337	Shale, medium-light-gray (underclay?)

1	3337-3356	Sandstone, as above; interbedded medium- to dark-
2		gray shale with carbonaceous fragments
3	3356-3357	Lignite
4	3357-3359	Siltstone, medium-dark-gray, limy, hard
5	3359-3367	Sandstone, medium- to medium-dark-gray, fine- to
6		coarse-grained, very silty, limy, subangular to
7		subrounded, slightly micaceous, many dark-gray
8		grains
9	3367	Estimated sample lag 10 ft.
10	3367-3369	Lignite
11	3369-3382	Sandstone, as above
12	3382-3384	Lignite
13	3384-3390	Sandstone, as above, yellow calcite in fractures
14	3390-3396	Shale, medium-dark-gray, few carbonaceous fragments,
15		limy in part
16	3396-3405	Sandstone, medium-dark-gray, fine- to medium-grained,
17		very silty, limy, subangular to subrounded, few
18		coarse grains, slightly micaceous, many dark-gray
19		grains
20	3405-3410	Shale, medium-dark-gray, limy, silty; dusky yellow-
21		ish-brown ironstone
22	3410-3412	Siltstone, medium-dark-gray, limy, hard
23	3412-3414	Shale, as above
24	3414-3420	Sandstone, as above

1	3420-3429	Shale, dark-gray, carbonaceous, lignite stringers;
2		some siltstone as above near middle
3	3429-3441	Sandstone, medium-gray, fine- to medium-grained,
4		silty, limy, some coarse grains, slightly micaceous,
5		probably more friable and less limy than sandstone
6		above
7	3441-3450	Shale, dark-gray, carbonaceous, lignite stringers;
8		1-ft. sandstone bed similar to above near base
9	3450-3459	Sandstone, as above
10	3459-3461	Lignite
11	3461-3468	Sandstone, as above, few very coarse grains and
12		granules
13	3468-3470	Shale, medium-dark-gray, fissile, many carbonaceous
14		fragments
15	3470-3473	Sandstone, gray, fine- to medium-grained, silty,
16		loose
17	3473-3476	Shale, medium-gray, few carbonaceous fragments
18	3476-3477	Lignite
19	3477-3490	Sandstone, as above; interbedded dark-gray carbo-
20		naceous shale and lignite
21	3490-3492	Lignite
22	3492-3496	Sandstone, as above; interbedded brownish-gray shale
23		with carbonaceous fragments and lignite stringers
24	3496-3500	Shale, dark-gray to black, carbonaceous
25	3500-3502	Lignite

1	3502-3505	Shale, medium-gray
2	3505-3524	Sandstone, gray, fine- to medium-grained, some
3		coarse grains, probably silty, loose, many dark-
4		gray grains
5	3524-3528	Shale, medium-gray, some carbonaceous fragments
6	3528-3540	Sandstone, gray, fine-grained, some medium grains,
7		probably silty, loose; includes near middle some
8		light-olive-gray silty shale with few carbonaceous
9		fragments
10	3540-3546	Shale, medium-gray, few carbonaceous fragments;
11		1-ft. lignite bed near middle
12	3546-3550	Sandstone, gray, fine- to coarse-grained, probably
13		silty, partly limy, loose, caving?
14	3550-3555	Shale, medium-dark-gray, few carbonaceous fragments
15	3555-3560	Sandstone, gray, fine- to medium-grained, probably
16		silty, loose
17	3560-3564	Shale, light-olive-gray, silty, conchoidal fracture
18	3564-3570	Shale, medium-dark- to dark-gray, many carbonaceous
19		fragments
20	3570-3573	Lignite
21	3573-3576	Shale, medium-gray, fissile(?), many carbonaceous
22		fragments on bedding
23	3576-3578	Siltstone, medium-dark-gray, limy, hard
24	3578-3592	Sandstone, medium-dark-gray, fine- to medium-
25		grained, some coarse and very coarse grains, many
		dark-gray grains, silty, limy, slightly micaceous

1	3592-3595	Lignite
2	3595-3596	Shale, medium- to medium-dark-gray, few carbonaceous
3		fragments
4	3596-3599	Sandstone, as above
5	3599-3600	Shale, as above
6	3600-3618	Sandstone, gray, fine- to medium-grained, probably
7		silty, loose; interbedded medium-gray shale with
8		some carbonaceous fragments
9	3618-3620	Shale, as above
10	3620-3622	Lignite
11	3622-3624	Sandstone, medium-dark-gray, very fine to fine-
12		grained, silty, limy; medium-gray shale
13	3624-3630	Sandstone, medium- to medium-dark-gray, fine- to
14		medium-grained, many dark-gray grains, silty,
15		limy, slightly micaceous
16	3630-3632	Shale, medium-gray, few carbonaceous fragments
17	3632-3638	Sandstone, gray, fine- to medium-grained, silty,
18		loose
19	3638-3643	Shale, dark-gray to black, carbonaceous, lignite
20		stringers
21	3643-3650	Sandstone, as above
22	3650-3660	Shale, dark-gray, carbonaceous; brownish-gray iron-
23		stone; interbedded sandstone as above
24	3660-3664	Shale, medium-gray, carbonaceous fragments
25	3664-3668	Sandstone, gray, fine-grained, probably silty, loose

1	3668-3670	Shale, as above
2	3670-3672	Lignite
3	3672-3677	Sandstone, as above
4	3677-3679	Lignite
5	3679-3683	Shale, medium-light-gray, partly silty
6	3683-3693	Sandstone, gray, fine-grained, probably some medium
7		grains, silty, loose; interbedded medium-gray shale
8	3693-3698	Sandstone, as above
9	3698-3700	Shale, olive-gray, silty, common diatom-shaped
10		fossils, micaceous, few very fine carbonaceous
11		fragments
12	3700-3704	Shale, dark-gray to black, carbonaceous; lignite
13	3704-3715	Sandstone, medium- to medium-dark-gray, fine- to
14		medium-grained, scattered coarse grains, many
15		dark-gray grains, subangular to subrounded, silty,
16		limy, slightly micaceous
17	3715-3722	Shale, greenish-gray to medium-gray, smooth
18	3722-3730	Sandstone, as above
19	3730-3740	Shale, medium-dark to dark-gray, many carbonaceous
20		fragments; several thin lignite beds
21	3740-3750	Sandstone, gray, fine-grained, probably some medium
22		grains, silty, loose
23	3750-3754	Shale, as above
24	3754-3758	Sandstone, as above

1	3758-3764	Shale, dark-gray to dusky-brown, many carbonaceous fragments; few thin lignite beds
2		
3	3764-3766	Sandstone, as above
4	3766-3774	Shale, as above; lignite near middle
5	3774-3778	Sandstone, as above
6	3778-3782	Shale, as above
7	3782-3786	Siltstone, light-olive-gray, very finely sandy, slightly limy, very fine carbonaceous material
8		
9	3786-3790	Shale, light-olive-gray, silty, nonbedded(?), carbonaceous fragments and films randomly oriented
10		
11	3790-3792	Lignite
12	3792-3798	Shale, dark-gray to black, very carbonaceous
13	3798-3801	Sandstone, gray, fine-grained, probably silty, loose
14	3801-3804	Lignite
15	3804-3807	Siltstone, olive-gray, slightly dolomitic?
16	3807-3810	Sandstone, gray, fine to medium-grained, probably some coarse grains, silty, loose
17		
18	3810-3812	Shale, light-olive-gray, silty
19	3812-3833	Sandstone, medium-gray, fine to medium-grained, some coarse and very coarse grains, many dark-colored, very silty, slightly micaceous
20		
21		
22	3812-3836	Lignite
23	3836-3839	Sandstone, fine to medium-grained, silty, loose
24	3839-3842	Sandstone, medium-gray, many carbonaceous fragments
25	3842-3850	Sandstone, medium-gray, may be coarse-grained

1	3850-3854	Shale, as above
2	3854-3863	Sandstone, as above
3	3863-3873	Shale, medium- to dark-gray, carbonaceous fragments;
4		some sandstone as above in upper part
5	3873-3887	Sandstone, as above
6	3887-3895	Shale, medium-light-gray, very finely to finely
7		sandy, few carbonaceous fragments
8	3895-3899	Shale, medium-dark-gray, some carbonaceous fragments
9	3899-3904	Sandstone, as above
10	3904-3905	Shale, medium-gray
11	3905-3907	Lignite
12	3907-3908	Shale, light-olive-gray
13	3908-3910	Sandstone, medium-gray, fine- to medium-grained,
14		some coarse grains, dark-gray grains as above,
15		limy, silty
16	3910-3912	Shale, medium-gray
17	3912-3917	Sandstone, gray, fine- to medium-grained, silty,
18		loose
19	3917-3919	Shale, greenish-gray, smooth
20	3919-3920	Sandstone, as above
21	3920-3924	Shale, light-olive-gray, silty
22	3924-3925	Lignite
23	3925-3930	Shale, medium-gray
24	3930-3933	Lignite
25	3933-3935	Shale, dark-gray to black, very carbonaceous

1	3935-3938	Sandstone, as above
2	3938-3944	Shale, dark-gray, very carbonaceous, some sandstone
3		as above near middle
4	3944-3952	Siltstone, medium- to medium-dark-gray, limy, very
5-		finely sandy in part
6	3952-3964	Core 4; reported recovery 9 ft. (3 trays)
7	Tray 1	(1.7 ft. core)
8	3952-3953.7	Sandstone, medium-gray, very fine to fine-grained,
9		scattered medium grains, very silty and clayey,
10-		slightly micaceous, not limy, many dark-gray
11		grains, some small carbonaceous fragments, few
12		lignite stringers (1/16 in. thick), friable, ob-
13		scure platy to thin bedded, grades into sandy
14		siltstone in upper 0.3 ft.
15-	3953.7-3955	Missing
16	Tray 2	(0.8 ft. core)
17	3955-3955.5	Shale, medium-gray, silty, not limy, scattered to
18		abundant carbonaceous fragments and films, few
19		lignite stringers (<1/8 in. thick), mostly obscure
20-		platy to thin bedded; includes near middle a 1/2-
21		in. bed of fairly hard medium-light-gray and light-
22		brownish-gray silty mottled shale with abundant
23		carbonaceous fragments in brownish-gray part
24		(looks like a shale breccia); lower part in-
25		cludes a few sandy siltstone interbeds

1	3955.5-3955.8	Sandstone, medium-gray, very fine grained, few fine
2		grains, very silty and clayey, slightly micaceous,
3		not limy, many dark-gray grains, few fine carbo-
4		naceous fragments, several medium-gray shale
5-		laminae, irregular platy bedded
6	3955.8-3958	Missing
7	Tray 3	(1.7 ft. \pm core, rubbly in part)
8	3958-3958.7	Shale, medium-gray, silty, few clayey shale irregu-
9		lar laminae with poor slickensides, not limy,
10		carbonaceous leaf impressions on top surface, few
11		carbonaceous fragments partly at high angle to
12		part bedding, lower \wedge includes some siltstone in thin
13		beds (<1 in. thick), poor platy bedding
14	3958.7-3959.7	Sandstone, medium-gray, very fine grained, few fine
15-		grains, very silty and clayey, slightly micaceous,
16		many dark-gray grains, not limy, very few fine
17		carbonaceous fragments; about half of interval is
18		sandy siltstone, bedding mostly obscure but some
19		very thin bedded
20-	3759.7-3961	Missing
21	3961-3964	Not recovered
22	3964-3967	Sandstone, similar to above
23	3967-3970	Shale, dark-gray to black, very carbonaceous
24	3970-3975	Lignite, very finely to finely sandy in part; inter-
25-		bedded lignitic sandstone

1	3975-3980	Shale, dark-gray, carbonaceous
2	3980-3982	Lignite
3	3982-3996	Sandstone, as above; some medium-gray shale with
4		carbonaceous fragments in upper part
5	3996-4001	Shale, medium-gray; dark-gray carbonaceous shale;
6		lignite; some cement in samples
7	4001-4013	Sandstone, gray, fine-grained, some medium grains,
8		silty, loose; interbedded medium-gray shale
9	4013-4016	Shale, medium-gray
10	4016-4018	Siltstone, medium-dark-gray, limy
11	4018-4019	Shale, medium-gray
12	4019-4021	Sandstone, medium-dark-gray, very fine to fine-
13		grained, limy, silty, caving?
14	4021-4025	Sandstone, gray, fine-grained, probably some medium
15		grains, silty, loose
16	4025-4030	Shale, dark-gray, carbonaceous, lignite stringers
17	4030-4032	Lignite; medium-gray shale
18	4032-4037	Sandstone, as above
19	4037-4046	Shale, medium- to medium-dark-gray; some sandstone
20		as above
21	4046-4050	Sandstone, as above
22	4050-4053	Shale, as above
23	4053-4055	Siltstone, medium-dark-gray, limy
24		
25		

1	4055-4060	Sandstone, medium- to medium-dark-gray, very fine to
2		fine-grained, few medium grains, many dark-gray
3		grains, limy, silty, slightly micaceous
4	4060-4062	Lignite
5	4062-4064	Shale, dark-gray to black, carbonaceous
6	4064-4071	Sandstone, as above; some medium-gray shale in
7		middle
8	4071-4076	Shale, medium-gray
9	4076-4080	Sandstone, as above
10	4080-4083	Lignite
11	4083-4084	Shale, as above
12	4084-4086	Siltstone, medium-dark-gray, limy
13	4086-4090	Shale, dark-gray to black, carbonaceous
14	4090-4100	Sandstone, medium-gray, very fine to fine-grained,
15		few medium grains, many dark-gray grains, limy,
16		silty, slightly micaceous
17	4100-4102	Shale, medium-gray, silty, limy
18	4102-4108	Shale, medium- to medium-dark-gray, few carbonaceous
19		fragments
20	4108-4118	Sandstone, gray, fine-grained, some medium grains,
21		clay, locally interbedded dark-gray carbonaceous
22		shale
23	4118-4124	Shale, dark gray, carbonaceous
24	4124-4128	Sandstone, as above
25	4128-4130	Shale, as above; lignite

1	4130-4150	Sandstone, as above; interbedded shale as above
2	4150-4155	Shale, medium-dark-gray, many carbonaceous fragments
3	4155-4160	Sandstone, gray, fine-grained, some medium grains,
4		silty, loose
5	4160-4184	Sandstone, medium- to medium-dark-gray, fine- to
6		medium-grained, some coarse and very coarse grains,
7		many dark-gray grains, subangular to subrounded,
8		limy, silty, slightly micaceous, mostly loose,
9		poor samples
10	4184-4190	Shale, medium-gray; interbedded sandstone as above
11		except generally coarser and not limy
12	4190-4200	Sandstone, gray, fine- to coarse-grained, some very
13		coarse grains and granules, many dark-gray grains,
14		igneous-rock and metamorphic-rock grains, silty,
15		loose
16	4200-4210	Sandstone, medium-dark-gray, fine- to medium-
17		grained, few coarse and very coarse grains, many
18		dark-gray grains (some fragments of metamorphic
19		shale?), silty, limy
20	4210-4217	Shale, medium-dark-gray, many carbonaceous fragments
21	4217-4220	Shale, light-olive-gray, silty; siltstone, light-
22		olive-gray
23	4220-4237	Sandstone, gray, fine-grained, some medium grains,
24		silty, loose; interbedded olive-gray shale with
25		many carbonaceous fragments

1	4237-4240	Shale, dark-gray, carbonaceous, lignite stringers?
2	4240-4245	Sandstone, as above
3	4245-4250	Shale, medium-gray, fairly soft
4	4250-4262	Sandstone, as above; interbedded medium-dark-gray
5-		shale, carbonaceous, fragments
6	4262-4264	Sandstone, medium-gray, fine-grained, limy, silty
7	4264-4266	Shale, as above
8	4266-4268	Sandstone, gray, fine-grained, some medium grains,
9		silty, loose
10-	4268-4276	Shale, dark-gray, carbonaceous, fissile(?), many
11		plant fragments
12	4276-4282	Sandstone, medium- to medium-dark-gray, very fine
13		to fine-grained, few medium grains, many dark-gray
14		grains, silty, limy
15-	4282-4286	Sandstone, medium-dark-gray, very fine to fine-
16		grained, silty, carbonaceous
17	4286-4292	Shale, light-olive-gray, nonbedded(?), many plant
18		fragments randomly oriented
19	4292-4315	Sandstone, gray, fine- to medium-grained, some
20		coarse and very coarse grains, many dark-gray
21		grains, silty, loose
22	4315-4320	Sandstone, as above, limy
23	4320-4330	Sandstone, gray, fine- to medium-grained, some
24		coarse and very coarse grains, silty, loose

1	4330-4333	Shale, light-olive-gray, splintery, scattered black specks
2		
3	4333-4338	Sandstone, as above
4	4338-4343	Shale, medium-gray, fairly soft, few carbonaceous fragments
5-		
6	4343-4349	Sandstone, as above
7	4349-4365	Shale, as above; interbedded sandstone as above
8	4365-4367	Sandstone, medium-gray, very fine to fine-grained, silty, limy
9		
10-	4367-4370	Lignite; shale, dark-gray, carbonaceous, many plant fragments
11		
12	4370-4372	Shale, medium-light-gray
13	4372-4376	Siltstone, medium-dark-gray, very finely sandy, limy
14	4376-4380	Shale, medium-gray
15-	4380-4386	Sandstone, gray, fine-grained, some medium grains, silty, loose
16		
17	4386-4393	Shale, dark-gray, carbonaceous, lignite or coal stringers
18		
19	4393-4396	Sandstone, as above
20-	4396-4400	Shale, as above
21	4400-4415	Core 5; reported recovery 15 ft. (5 trays)
22	Tray 1	(1.9 ft. \pm core)
23	4400-4400.5	Shale, medium-gray, silty in lower part, not limy, fissile to platy bedding, few brown ironstones (1/16 in. \pm) near middle, abundant carbonaceous fragments and coal films (almost paper-thin) mostly subparallel to bedding
24		
25-		

- 1 4400.5-4401.9 Siltstone, medium-gray, very finely sandy in part,
 2 not limy, some fissile to platy bedding, carbo-
 3 naceous films and fragments mostly subparallel to
 4 bedding; few lenticular beds (up to 1 in. thick) of
 5- medium-gray very fine to medium-grained very silty
 6 fairly friable sandstone with included coal
 7 stringers (<1/16 in.) in upper 7 in.; includes a
 8 4-in. bed of medium-gray silty shale 5 in. above
 9 base; shale in upper 1 in. has brownish tint, some
 10- greenish-gray spots (reworked shale pebbles?), and
 11 many coal films and in lower obscurely bedded part
 12 many yellowish-brown limy ironstones(?); apparent
 13 dip on few beds about 10 degrees
- 14 4401.9-4403 Missing
- 15- Tray 2 (2 ft. \pm core, rubbly in part)
- 16 4403-4403.5 Shale, dark-gray in top 1 in., remainder medium-gray,
 17 silty, not limy, obscure bedding except platy in
 18 top 1 in., abundant paper-thin coal films and
 19 stringers (<1/8 in.) partly oriented at high angles
 20- to probable bedding; apparent dip at top about
 21 17 degrees
- 22
- 23
- 24
- 25

- 1 4403.5-4405 Siltstone, medium-gray, olive-gray and brownish-gray
 2 bands or streaks along some bedding, mostly very
 3 finely sandy, scattered fine and medium grains in
 4 part, not limy, obscure irregular platy bedding,
 5 some coal films and stringers ($< 1/8$ in.) mostly
 6 subparallel to bedding; upper half includes a few
 7 beds (< 1 in. thick) of medium-gray very fine to
 8 fine-grained silty sandstone; bright coal bed
 9 ($1/4$ in. thick) seemingly lies near base
- 10 4405-4406 Missing
- 11 Tray 3 (2.1 ft. \pm core)
- 12 4406-4407 Siltstone, medium-gray, very finely sandy in upper
 13 part, not limy, fissile to poor platy bedding,
 14 many paper-thin carbonaceous films and some coal
 15 lenses ($< 1/16$ in.) mostly subparallel to bedding,
 16 top $1/4$ in. is interlaminated dark-gray carbonaceous
 17 shale and coal
- 18 4407-4407.4 Shale, medium- to medium-dark-gray, silty, not limy,
 19 fissile to platy bedding, coal films and streaks
 20 common in lower half
- 21 4407.4-4408.1 Shale, dark-gray to black with abundant coal stringers
 22 and beds ($1/4$ in. \pm) in upper half, medium-gray
 23 with abundant carbonaceous fragments near middle,
 24 dark-gray with many coal films and well-developed
 25 slickensides in basal 2 in. \pm ; includes near middle
 a 2-in. \pm bed of medium-gray very fine to fine-grained
 silty slightly limy and micaceous sandstone with scattered vugs

1	4408.1-4409	Missing
2	Tray 4	(2.1 ft. \pm core; rubbly in part)
3	4409-4409.4	Shale, medium-gray, silty to finely sandy in basal
4		part, not limy, obscure bedding, abundant fine
5-		carbonaceous fragments and films, very few coal
6		lenses (<1/8 in.) partly at high angle to probable
7		bedding, lower contact probably gradational
8	4409.4-4411.1	Sandstone, medium-gray, very fine to fine-grained,
9		scattered medium grains, very silty and clayey,
10-		not limy, many dark-gray grains, subangular to
11		subrounded, few medium-gray shale fragments (<1/4
12		in.) in upper part, includes sandy siltstone in a
13		few thin (<1 in.) beds and in a 2.5-in. bed 2.5
14		in. above base, bedding mostly obscure but may be
15-		very thin to thin bedded, many small carbonaceous
16		fragments and films and few coal lenses (<1/4 in.)
17		partly at high angle to bedding; contact at 2.5
18		in. above base is sharp, slightly undulating, and
19		shows no apparent dip
20	4411.1-4412	Missing
21	Tray 5	(2 ft. core)
22	4412-4413.6	Sandstone, similar to above, mostly very "dirty",
23		includes 2-in. bed of sandy siltstone 3 in. above
24		base. lower contact gradational
25		

1	4413.6-4414	Siltstone, medium-gray, very finely sandy in upper
2		part, not limy, fissile to platy bedding somewhat
3		irregular in lower part, many carbonaceous films
4		subparallel to bedding, one coal lense (1/16 in.)
5		near base, few irregular laminae of medium-gray
6		clayey shale in basal part, apparent dip about 15
7		to 20 degrees
8	4414-4415	Missing
9	4415-4423	Sandstone, gray, fine-grained, silty, loose
10	4423-4427	Shale, medium-dark-gray, coal stringers
11	4427-4429	Siltstone, medium-dark-gray, very finely sandy, limy
12	4429-4442	Sandstone, medium-dark-gray, very fine to fine-
13		grained, few medium grains, many dark-gray grains,
14		silty, limy; interbedded with shale as above, some
15		amber fragments, coal stringers
16	4442-4460	Sandstone, medium- to medium-dark-gray, very fine
17		grained, silty, limy; interbedded medium- to
18		medium-dark-gray sandy limy siltstone
19	4460-4465	Shale, black, carbonaceous; coal; light-olive-gray
20		shale with abundant plant fragments
21	4465-4474	Sandstone, gray, fine-grained, some medium grains,
22		silty, loose; interbedded medium-gray shale
23	4474-4480	Sandstone, medium-dark-gray, very fine to fine-
24		grained, few medium grains, many dark-gray grains,
25		silty, limy

1	4480-4485	Siltstone, medium-dark-gray, very finely to finely
2		sandy, limy
3	4485-4488	Shale, medium-dark- to dark-gray, carbonaceous,
4		coal stringers
5	4488-4496	Sandstone, gray, fine-grained, some medium grains,
6		silty, loose; interbedded shale as above
7	4496-4500	Shale, medium-gray, many carbonaceous fragments
8	4500-4510	Sandstone, medium- to medium-dark-gray, very fine to
9		fine-grained, silty, limy; interbedded medium-
10		dark-gray limy siltstone
11	4510-4514	Shale, medium-dark-gray, silty, limy; siltstone as
12		above
13	4514-4520	Shale, dark-gray, carbonaceous, coal stringers
14	4520-4523	Sandstone, as above
15	4523-4526	Shale, as above
16	4526-4529	Sandstone, as above
17	4529-4533	Shale, medium-dark-gray, limy
18	4533-4536	Siltstone, medium-dark-gray, limy, some carbonaceous
19		fragments
20	4536-4540	Sandstone, as above
21	4540-4542	Shale, as above
22	4542-4545	Sandstone, as above
23	4545-4552	Shale and siltstone, as above
24	4552-4557	Sandstone, similar to above, scattered medium grains

1	4557-4560	Shale and siltstone, as above; trace of brownish-
2		gray clayey nonlimy shale with plant impressions
3		and scattered very fine to fine sand
4	4560-4569	Shale, medium-dark-gray, many carbonaceous fragments
5	4569-4572	Sandstone, medium-gray, very fine to fine-grained,
6		silty, limy
7	4572-4574	Shale, as above
8	4574-4575	Coal, caving?
9	4575-4578	Siltstone, medium-dark-gray, limy
10	4578-4586	Shale, dark-gray, carbonaceous, coal stringers?
11	4586-4590	Siltstone, medium-dark-gray, very finely sandy, limy,
12		few carbonaceous fragments
13	4590-4592	Shale, dark-gray, silty, limy, few carbonaceous
14		fragments
15	4592-4598	Shale, medium-dark-gray, carbonaceous
16	4598-4603	Sandstone, gray, fine-grained, some medium grains,
17		silty, loose
18	4603-4610	Shale, as above; dark-gray to black carbonaceous
19		shale, probably many coal stringers
20	4610-4660	Electrical log interpretation; no samples from 4620
21		to 4670; assumed 10-ft. sample lag
22	4610-4619	Siltstone; some sandstone at top
23	4619-4631	Shale; interbedded siltstone
24	4631-4650	Sandstone
25	4650-4659	Shale; interbedded siltstone

1	4660-4662	Siltstone, medium-dark-gray, limy
2	4662-4666	Shale, dark-gray, carbonaceous
3	4666-4667	Siltstone, as above
4	4667-4670	Sandstone, gray, fine-grained, some medium grains, silty, loose, poor sample
5		
6	4670-4890	Electrical-log interpretation; no samples from 4680 to 4900; assumed 10-ft. sample lag
7		
8	4670-4674	Sandstone
9	4674-4680	Shale
10	4680-4682	Coal
11	4682-4686	Sandstone
12	4686-4688	Coal
13	4688-4692	Sandstone
14	4692-4698	Shale
15	4698-4711	Sandstone; interbedded siltstone in lower half
16	4711-4712	Coal
17	4712-4718	Shale
18	4718-4739	Sandstone; some interbedded siltstone
19	4739-4740	Coal
20	4740-4753	Sandstone; some shale at top and siltstone near middle
21		
22	4753-4762	Shale and siltstone
23	4762-4769	Sandstone
24	4769-4770	Coal
25	4770-4780	Sandstone; some shale at top

1	4780-4797	Shale; interbedded siltstone
2	4797-4798	Coal
3	4798-4810	Sandstone; interbedded siltstone
4	4810-4828	Shale; interbedded sandstone and siltstone
5	4828-4830	Coal
6	4830-4840	Sandstone; some shale near base
7	4840-4865	Shale; interbedded siltstone
8	4865-4873	Sandstone; interbedded siltstone
9	4873-4890	Siltstone; interbedded shale; sandstone at base
10	4890-4892	Sandstone, gray, fine-grained, some medium grains,
11		silty, loose
12	4892-4897	Shale, medium-dark-gray, abundant carbonaceous films
13		and fragments, coal stringers
14	4897-4905	Sandstone, gray, fine- to medium-grained, silty,
15		loose, many dark-gray grains
16	4905-4908	Shale, medium-dark-gray, carbonaceous films and
17		fragments
18	4908-4910	Sandstone, as above
19	4910-4918	Shale, as above
20	4918-4923	Sandstone, as above
21	4923-4927	Shale, dark-gray to black, carbonaceous
22	4927-4929	Coal
23	4929-4930	Sandstone, similar to above
24	4930-4937	Shale, medium-dark- to dark-gray

1	4937-4947	Sandstone, medium- to medium-dark-gray, fine-grained,
2		some medium grains, many dark-gray grains, sub-
3		angular, silty, limy, slightly micaceous; some
4		interbedded shale as above
5	4947-4950	Shale, as above
6	4950-4952	Sandstone, gray, fine-grained, silty, loose
7	4952-4957	Shale, dark-gray, carbonaceous
8	4957-4958	Coal
9	4958-4963	Sandstone, as above
10	4963-4968	Shale, medium-dark-gray, many carbonaceous fragments
11		and films
12	4968-4970	Siltstone, medium-dark-gray, limy
13	4970-4973	Shale, as above
14	4973-4976	Sandstone, gray, fine-grained, some medium grains,
15		silty, loose
16	4976-4981	Shale, dark-gray to black, carbonaceous, coal
17		stringers
18	4981-4987	Sandstone, similar to above
19	4987-4989	Shale, dark-gray to black, carbonaceous, coal
20		stringers
21	4989-4992	Sandstone, as above
22	4992-5002	Shale, medium-dark- to dark-gray, carbonaceous frag-
23		ments; interbedded medium-dark-gray siltstone
24	5002-5004	Siltstone, medium-dark-gray, limy
25	5004-5010	Shale, as above; some sandstone as above

1	5010-5025	Electrical-log interpretation; no samples from 5020
2		to 5030
3	5010-5018	Shale; some sandstone near middle
4	5018-5022	Siltstone
5	5022-5025	Sandstone
6	5025-5035	Core 6; reported recovery 2 ft. (1 tray)
7	Tray 1	(1 ft. core, rubble in part)
8	5025-5026	Shale, medium- to medium-dark-gray, fairly hard,
9		silty in part, not limy, poor fissile to platy
10		partly wavy bedding, abundant small carbonaceous
11		fragments randomly oriented in large part, many
12		paper-thin carbonaceous films mostly subparallel
13		to bedding, few yellowish-white grainy specks
14		(fine-sand size) in small part of shale, worm
15		burrow(?) near base; includes some medium-gray
16		partly sandy siltstone with abundant small carbonaceous fragments
17		
18	5026-5027	Missing
19	5027-5028	Not recovered
20	5035-5100	Electrical-log interpretation; no samples from 5040
21		to 5130; assumed 10-ft. sample log
22	5035-5046	Shale; some siltstone in lower part
23	5046-5060	Sandstone; some siltstone and shale in middle
24	5060-5070	Shale
25	5070-5080	Sandstone; some shale near base

1	5085-5096	Shale; siltstone near middle
2	5096-5100	Sandstone
3	5100-5102	Sandstone, gray, fine- to medium-grained, silty,
4		loose, similar to above
5	5102-5107	Shale, medium- to medium-dark-gray, many carbonaceous
6		fragments
7	5107-5115	Sandstone and interbedded shale as above
8	5115-5118	Shale, dark-gray to black, carbonaceous
9	5118-5120	Coal
10	5120-5122	Shale, medium-gray, carbonaceous fragments
11	5122-5129	Siltstone, medium- to medium-dark-gray, very finely
12		sandy, limy
13	5129-5130	Coal
14	5130-5160	Electrical-log interpretation; no samples from 5140
15		to 5170; assumed 10-ft. sample lag
16	5130-5153	Sandstone; interbedded shale in upper part
17	5153-5160	Shale; siltstone near middle
18	5160-5164	Shale, dark-gray, carbonaceous
19	5164-5170	Sandstone, medium-dark-gray, fine- to medium-grained,
20		many dark-gray to black grains, some grains of
21		dark-colored metamorphosed shale(?), subangular,
22		limy
23	5170-5175	Shale as above
24	5175-5176	Sandstone, gray, fine-grained, many dark-gray grains
		oil y, loose; interbedded shale as above

1	5190-5250	Electrical-log interpretation; no samples from 5200
2		to 5260; assumed 10-ft. sample lag
3	5190-5201	Shale; sandstone near middle
4	5201-5227	Sandstone
5	5227-5237	Shale; sandstone near middle
6	5237-5238	Coal
7	5238-5245	Siltstone
8	5245-5250	Sandstone
9	5250-5252	Coal
10	5252-5256	Sandstone, gray, fine-grained, silty, loose, many
11		dark-gray grains
12	5256-5263	Shale, medium- to medium-dark-gray, carbonaceous
13		fragments
14	5263-5268	Sandstone, medium-dark-gray, very fine grained,
15		silty, limy
16	5268-5271	Shale, as above
17	5271-5276	Siltstone, medium-dark-gray, limy; interbedded shale
18		as above
19	5276-5278	Shale, yellowish-brown, slightly limy (dolomitic?)
20	5278-5280	Shale, medium-light-gray to yellowish-gray, silty
21	5280-5285	Shale, medium-dark-gray, many carbonaceous frag-
22		ments
23	5285-5288	Siltstone, medium-dark-gray, limy
24	5288-5290	Shale, medium-gray, some carbonaceous fragments
25	5290-5291	Siltstone, as above

1	5293-5297	Sandstone, medium-dark-gray, fine-grained, some
2		medium grains, silty, limy
3	5297-5300	Siltstone, light-olive-gray, carbonaceous fragments
4	5300-5302	Shale, light-olive-gray, conchoidal fracture
5	5302-5311	Shale, dark-gray to black, carbonaceous, fissile,
6		coal stringers
7	5311-5313	Sandstone, similar to above
8	5313-5320	Shale, medium-dark-gray, carbonaceous fragments
9	5320-5323	Siltstone, medium-dark-gray, very finely sandy, limy
10	5323-5327	Shale, dark-gray, carbonaceous, coal stringers
11	5327-5329	Siltstone, medium-dark-gray, limy
12	5329-5337	Shale, medium- to medium-dark-gray
13	5337-5341	Shale, dark-gray to black, carbonaceous
14	5341-5344	Siltstone, medium- to medium-dark-gray, partly sandy,
15		limy
16	5344-5347	Shale, medium-gray, few carbonaceous fragments
17	5347-5350	Siltstone, as above
18	5350-5357	Shale, as above
19	5357-5366	Siltstone, as above; interbedded with shale as above
20	5366-5370	Shale, medium-gray, few carbonaceous fragments
21	5370-5373	Siltstone, as above
22	5373-5375	Sandstone, medium- to medium-dark-gray, very fine
23		grained, silty, limy
24	5375-5378	Shale, olive-gray, clayey, flakey, no carbonaceous
25		fragments

1	5378-5380	Siltstone, as above
2	5380-5383	Sandstone, gray, fine-grained, silty, loose
3	5383-5387	Shale, medium-dark-gray, carbonaceous fragments
4	5387-5395	Sandstone, similar to above
5	5395-5435	Electrical-log interpretation; no samples from 5410
6		to 5450; assumed 15-ft. sample lag
7	5395-5403	Sandstone; some shale near middle
8	5403-5418	Shale; some interbedded siltstone
9	5418-5432	Siltstone and sandstone
10	5432-5435	Shale
11	5435-5439	Shale, dark-gray, carbonaceous
12	5439-5443	Sandstone, gray, fine-grained, silty, loose
13	5443-5447	Shale, medium-gray
14	5447-5448	Coal
15	5448-5450	Shale, medium-gray
16	5450-5457	Sandstone, medium-dark-gray, fine-grained, many
17		dark-gray grains, silty, limy
18	5457-5459	Shale, medium-gray
19	5459-5464	Sandstone, gray, fine-grained, silty, loose
20	5464-5469	Shale, dark-gray to black, carbonaceous, coal
21		stringers
22	5469-5473	Sandstone, as above
23	5473-5475	Siltstone, dark-gray, limy
24	5475-5477	Shale, medium-dark-gray
25	5477-5481	Sandstone, as above

1	5481-5485	Shale, dark-gray, carbonaceous
2	5485-5500	Electrical-log interpretation; no samples from 5500
3		to 5515; assumed 15-ft. sample lag
4	5485-5487	Coal
5	5487-5490	Sandstone
6	5490-5493	Coal
7	5493-5496	Shale
8	5496-5500	Sandstone and siltstone
9	5500-5515	Core 7; no recovery; electrical-log interpretation
10	5500-5505	Sandstone and siltstone
11	5505-5515	Shale; some siltstone near base
12	5515-5530	Core 8; reported recovery 14 ft. (5 trays)
13	Tray 1	(1.2 ft. \pm core, rubbly in part)
14	5515-5515.2	Coal and shale in subequal amounts, beds as much as
15		3/4 in. thick; coal, bright and dull, banded,
16		abundant plant fragments in dull parts; shale
17		(upper 3/4 in. bed), dusky-yellowish-brown, hard,
18		blocky and poor conchoidal fracture, many paper-
19		thin carbonaceous films parallel to bedding, some-
20		what resembles flint clay; other shale, medium-
21		dark- to dark-gray, fissile to platy bedded, abun-
22		dent plant impressions and some coaly films, some
23		slickensides, rubbly and arbitrarily included in
24		uppermost unit of core

1 5515.2-5516.2 Shale, medium- to medium-dark-gray, partly silty,
2 not limy, poor platy bedding, some carbonaceous
3 and coaly fragments partly at high angles to bed-
4 ding; includes small amounts of medium-dark-gray
5 siltstone, very fine to fine-grained shaly sand-
6 stone, and near middle a 3/8 in. coal bed; apparent
7 dip on coal bed about 15 degrees

8 5516.2-5518 Missing

9 Tray 2 (2 ft. core)

10 5518-5518.9 Siltstone, medium-gray, finely sandy in part, not
11 limy, fair platy bedding, carbonaceous films and
12 fragments and coal stringers (1/16 in.) mostly
13 subparallel to bedding, few coaly plant fragments
14 (1-1/4 in.+ in length) near middle and nearly
15 perpendicular to bedding, includes some medium-
16 gray silty shale in upper part and a few beds
17 (1/4 in.+) of very fine to fine-grained silty sand-
18 stone
19
20
21
22
23
24
25

1	5518.9-5520	Sandstone and siltstone in subequal amounts; sand-
2		stone, medium-gray, very fine to fine-grained,
3		scattered medium grains, slightly micaceous, sub-
4		angular, very silty, not limy, many dark-gray
5		"flat" shale grains mostly parallel to bedding,
6		fairly friable in parts, very "dirty", poor platy
7		bedding, some carbonaceous and coaly films mostly
8		subparallel to bedding, one carbonaceous fragment
9		(1-1/4 in. long) perpendicular to bedding at top;
10		siltstone, similar to above, good fissile to platy
11		bedding, many carbonaceous and coaly films parallel
12		to bedding; apparent dip about 5 degrees
13	5520-5521	Missing
14	Tray 3	(1.8 ft. core)
15	5521-5521.5	Siltstone, medium-gray, very finely sandy in upper
16		part, not limy, platy to very thin bedded, some
17		carbonaceous films and coal stringers (1/16 in.)
18		partly at high angles to bedding, large leaf im-
19		pressions on bedding near middle, lower half
20		grades into medium-gray silty shale, apparent dip
21		about 10 degrees
22	5521.5-5522.8	Sandstone, medium-gray, fine-grained, some medium
23		grains, not limy, slightly micaceous, not limy,
24		angular, not very fine, "dirty", obscure thin
25		carbonaceous and coaly fragments

1	5522.8-5524	Missing
2	Tray 4	(2.3 ft. core)
3	5524-5525.8	Shale, medium-gray, silty, not limy, fair to poor
4		fissile to platy bedding, abundant carbonaceous
5		and coaly films and fragments mostly subparallel
6		to bedding, few wavy coal lenses up to 1/8 in.
7		thick; includes 1 in. bed of coal and black carbo-
8		naceous shale 2 in. below top; apparent dip about
9		10 degrees in lower part
10	5525.8-5526.3	Siltstone, medium-gray, very finely sandy in part,
11		not limy, obscure very thin bedding, some carbo-
12		naceous films and coal stringers (1/16 in.) partly
13		oriented at high angle to bedding
14	5526.3-5527	Missing
15	Tray 5	(1.6 ft. core)
16	5527-5527.3	Sandstone, medium-gray, very fine to fine-grained,
17		very silty, slightly micaceous, not limy, obscure
18		bedding, some carbonaceous films and fragments
19	5527.3-5527.8	Siltstone, similar to above
20	5527.8-5528.6	Sandstone, similar to above, some medium grains in
21		part, mostly very "dirty"; probably includes near
22		top a 1/2 in. bed of medium-light-gray to light-
23		olive-gray silty shale with abundant very small
24		carbonaceous fragments and some slickensides
25	5528.6-5529	Missing, probably covered

1	5530-5532	Shale, medium-gray, few carbonaceous fragments
2	5532-5534	Sandstone, gray, fine-grained, silty, loose
3	5534-5535	Shale, dark-gray to black, carbonaceous
4	5535-5575	Electrical-log interpretation; no samples from 5550
5		to 5600; assumed 15-ft. sample lag
6	5535-5536	Coal
7	5536-5551	Siltstone; some interbedded shale and sandstone
8	5551-5555	Shale
9	5555-5575	Sandstone; interbedded siltstone; shale at base
10	5575-5576	Shale, medium-dark-gray
11	5576-5580	Sandstone, gray, fine-grained, silty, loose
12	5580-5582	Shale, medium-dark-gray
13	5582-5583	Coal
14	5583-5585	Sandstone and shale, as above
15	5585-5725	Electrical-log interpretation; no samples from 5600
16		to 5740; assumed 15-ft. sample lag
17	5585-5593	Sandstone
18	5593-5598	Shale
19	5598-5602	Sandstone
20	5602-5610	Shale; siltstone in lower part
21	5610-5650	Sandstone, interbedded siltstone and shale
22	5650-5660	Shale; siltstone in lower part
23	5660-5670	Sandstone
24	5670-5676	Shale
25	5676-5682	Sandstone

1	5682-5685	Coal
2	5685-5692	Siltstone
3	5692-5695	Coal
4	5695-5702	Siltstone; some sandstone
5	5702-5710	Shale; sandstone in middle
6	5710-5711	Coal
7	5711-5725	Sandstone; siltstone at top; shale near base
8	5725-5727	Sandstone, gray, fine-grained, silty, loose
9	5727-5730	Shale, medium-dark-gray
10	5730-5732	Coal
11	5732-5735	Shale, as above
12	5735-5765	Electrical-log interpretation; no samples from 5750
13		to 5780; assumed 15-ft. sample lag
14	5735-5740	Shale
15	5740-5745	Sandstone
16	5745-5755	Shale; some siltstone in lower half
17	5755-5760	Sandstone
18	5760-5765	Shale
19	5765-5768	Shale, medium to dark-gray, carbonaceous fragments
20	5768-5770	Sandstone, gray, fine-grained, very silty, loose
21	5770-5775	Shale, as above
22	5775-5784	Shale, dark-gray to black, carbonaceous, coal
23		stringers, caving?
24	5784-5787	Sandstone, similar to above
25	5787-5791	Shale, medium-dark-gray, carbonaceous fragments

1	5791-5795	Sandstone, as above
2	5795-5800	Shale, as above
3	5800-5804	Sandstone, as above
4	5804-5810	Shale, as above
5	5810-5813	Sandstone, as above
6	5813-5818	Shale, as above
7	5818-5824	Sandstone, as above
8	5824-5832	Shale, dark-gray to black, carbonaceous, coal
9		stringers
10	5832-5847	Sandstone, gray, fine-grained, very silty, loose;
11		interbedded medium- to medium-dark-gray shale
12	5847-5850	Shale, dark-gray, carbonaceous
13	5850-5855	Sandstone, as above
14	5855-5895	Electrical-log interpretation; no samples from 5870
15		to 5910; assumed 15-ft. sample lag
16	5855-5863	Shale
17	5863-5868	Sandstone
18	5868-5880	Shale; some interbedded siltstone
19	5880-5881	Coal
20	5881-5886	Shale; some siltstone at top
21	5886-5892	Sandstone
22	5892-5895	Siltstone and shale
23	5895-5903	Sandstone, medium-gray, very fine to fine-grained,
24		scattered medium grains, many dark-gray grains,
25		silty clay

1	5903-5905	Siltstone, medium-dark-gray, limy, hard, tight, few
2		carbonaceous fragments, looks like "dirty" lime-
3		stone
4	5905-5925	Electrical-log interpretation; no samples from 5920
5		to 5940, assumed 15-ft. sample lag
6	5905-5909	Shale
7	5909-5911	Coal
8	5911-5916	Sandstone
9	5916-5921	Shale.
10	5921-5922	Coal
11	5922-5925	Shale
12	5925-5929	Siltstone, medium-gray, carbonaceous fragments
13	5929-5930	Shale, medium-dark-gray, carbonaceous fragments
14	5930-5935	Sandstone, gray, fine- to medium-grained, silty,
15		loose
16	5935-5940	Shale, dark-gray to black, carbonaceous
17	5940-5942	Siltstone, medium-dark-gray, limy, hard, tight,
18		looks like "dirty" limestone, caving?
19	5942-5943	Coal, caving?
20	5943-5948	Shale, black, carbonaceous, caving?
21	5948-5952	Shale, medium-gray
22	5952-5955	Sandstone, similar to above
23	5955-5962	Sandstone, medium-light-gray, very fine to fine-
24		grained, few medium grains, some dark-gray grains,
25		silty, limy

Tyonek Formation

1		
2	5962-5963	Shale, medium-gray
3	5963-5964	Limestone, medium-gray, very fine grained, very
4		argillaceous
5	5964-5982	Shale, dark-gray to black, carbonaceous, caving(?);
6		1-ft. coal bed near base
7	5982-5986	Siltstone, medium-dark-gray, limy, caving?
8	5986-5989	Shale, dark-gray to black, carbonaceous
9	5989-5994	Coal
10	5994-5999	Shale, medium-dark-gray, carbonaceous fragments
11	5999-6002	Siltstone, medium-dark-gray, limy, hard
12	6002-6004	Sandstone, gray, fine-grained, silty, loose, caving?
13	6004-6008	Shale, as above; some sandstone as above,
14	6008-6010	Siltstone, medium-dark-gray, limy, hard, caving?
15	6010-6043	Shale, dark-gray to black, carbonaceous, coal
16		stringers
17	6043-6045	Sandstone, medium-gray, very fine to fine-grained,
18		many dark-gray grains, silty, limy
19	6045-6050	Shale, dark-gray, carbonaceous, coal stringers
20	6050-6058	Sandstone, medium- to medium-dark-gray, mottled with
21		light-olive-gray, very fine to fine-grained, some
22		medium grains, many dark-gray grains, silty, limy,
23		slightly micaceous, some carbonaceous fragments
24		and coal stringers
25	6058-6060	Coal

1	6060-6065	Shale, dark-gray, carbonaceous
2	6065-6100	Electrical-log interpretation; no samples from 6080
3		to 6100; assumed 15-ft. sample lag
4	6065-6082	Shale
5	6082-6086	Sandstone
6	6086-6100	Shale
7	6100-6115	Core 9; reported recovery 14 ft (4 trays)
8	Tray 1	(0.7 ft. core)
9	6100-6100.7	Sandstone, medium-light-gray, very fine to fine-
10		grained, silty, scattered medium grains, sub-
11		angular, slightly limy in very small part, many
12		dark-gray grains but probably fewer than in cores
13		above, some yellowish-brown and olive-gray clay
14		grains, few grains of coal, fairly friable, platy
15		bedded near middle and very thin to thin bedded
16		in remainder, few paper-thin coaly films and plant
17		fragments in middle part, apparent dip about 10
18		degrees
19	6100.7-6103	Missing
20	Tray 2	(1.4 ft. core)
21	6103-6104.4	Sandstone, similar to above, not limy, abundant
22		carbonaceous films in 2 ft. platy bedded sand-
23		stone 6 in. below top, pale- to dusky-brown clayey
24		partly flattened ironstone(?) grains more common
25		in 2 in. bed mentioned above, nearly no apparent dip

1	6104.4-6106	Missing
2	Tray 3	(1.9 ft. core)
3	6106-6106.9	Sandstone, medium-light-gray, very fine grained,
4		very silty, few fine grains, subangular, common
5		dark-gray grains, micaceous, not limy, good fissile
6		to platy bedding, abundant carbonaceous and coaly
7		sandstone laminae with abundant ironstone(?)
8		grains as above, apparent dip about 15 degrees
9	6106.9-6107.9	Sandstone, similar to above except rock is mostly
10		very thin to thin bedded and carbonaceous coaly
11		laminae are common (partly lenticular) only in
12		middle 2 in., apparent dips from near 0 degree to
13		about 12 degrees
14	6107.9-6109	Missing
15	Tray 4	(1.2 ft. core)
16	6109-6110.2	Sandstone, medium-light-gray, very fine to fine-
17		grained, subangular, common dark-gray grains,
18		silty, micaceous, not limy, fairly firm, fissile
19		to platy bedding in upper 8 in., highly contorted
20		bedding in upper 3-1/2 in., obscure thin bedding
21		in lower 6-1/2 in., carbonaceous and coaly lami-
22		nae common in upper 8 in., apparent dip near
23		middle about 5 degrees to 10 degrees
24	6110.2-6115	Missing or not recovered

1	6115-6128	Shale, dark-gray to black, carbonaceous; thin coal
2		beds near top
3	6128-6130	Siltstone, medium-dark-gray, limy
4	6130-6132	Shale, medium-dark-gray, limy
5	6132-6134	Sandstone, medium-gray, very fine to fine-grained,
6		some medium grains, many dark-gray grains, sub-
7		angular, silty, limy
8	6134-6137	Sandstone, medium-light-gray, mottled with yellowish-
9		brown, very fine to fine-grained, limy, silty
10	6137-6143	Sandstone, gray, fine-grained, silty, loose
11	6143-6150	Shale, medium-dark-gray, many carbonaceous frag-
12		ments
13	6150-6156	Shale, dark-gray, carbonaceous
14	6156-6160	Sandstone, as above
15	6160-6170	Shale, as above
16	6170-6177	Shale, black, very carbonaceous, coal stringers
17	6177-6180	Sandstone, medium-light-gray, very fine grained,
18		silty, limy
19	6180-6183	Siltstone, medium-dark-gray, limy, caving?
20	6183-6193	Shale, dark-gray to black; interbedded coal
21	6193-6196	Coal
22	6196-6200	Shale, as above
23	6200-6201	Coal
24	6201-6225	Shale, dark-gray, carbonaceous; some black carbo-
25		naeous shale

1	6225-6226	Coal
2	6226-6234	Shale, as above
3	6234-6237	Sandstone, as above
4	6237-6244	Shale, as above
5	6244-6246	Sandstone, medium-gray, very fine grained, silty,
6		limy
7	6246-6250	Shale, black, very carbonaceous; laminae of gray
8		very fine to fine-grained limy silty sandstone
9	6250-6257	Shale, dark-gray, carbonaceous
10	6257-6264	Sandstone, gray, fine-grained, silty, loose
11	6264-6269	Shale, dark-gray, carbonaceous
12	6269-6281	Sandstone, as above, some medium grains
13	6281-6285	Sandstone, light- to medium-light-gray, very fine to
14		fine-grained, some dark-gray grains, silty, limy
15	6285-6298	Shale, dark-gray, carbonaceous
16	6298-6300	Siltstone, medium-dark-gray, limy, caving?
17	6300-6306	Sandstone, gray, fine-grained, some medium grains,
18		silty, loose
19	6306-6307	Coal
20	6307-6313	Sandstone, similar to above, caving?
21	6313-6318	Sandstone, medium-light-gray, very fine to fine-
22		grained, some dark-gray grains, silty, limy
23	6318-6319	Coal
24	6319-6329	Shale, dark gray, carbonaceous
25	6329-6330	Coal

1	6330-6337	Shale, as above
2	6337-6340	Siltstone, medium-dark-gray, very finely sandy, fine
3		carbonaceous fragments
4	6340-6346	Shale, medium-dark-gray, carbonaceous fragments
5	6346-6347	Coal
6	6347-6349	Shale, medium-gray, nonbedded(?), carbonaceous frag-
7		ments
8	6349-6350	Sandstone, gray, fine-grained, silty, loose
9	6350-6360	Shale, medium-gray, many carbonaceous fragments,
10		coal stringers
11	6360-6363	Shale, black, carbonaceous
12	6363-6387	Shale, dark-gray, carbonaceous; stringers and thin
13		beds of sandstone similar to above
14	6387-6389	Siltstone, medium-dark-gray, very finely sandy, fine
15		carbonaceous fragments
16	6389-6390	Shale, as above
17	6390-6397	Sandstone, gray, fine-grained, silty, loose
18	6397-6399	Shale, dark-gray, carbonaceous
19	6399	Estimated sample lag 30 ft.
20	6399-6401	Coal
21	6401-6431	Shale, medium-dark-gray, many carbonaceous frag-
22		ments
23	6431-6434	Siltstone, olive-gray, very finely sandy, limy,
24		carbonaceous
25	6434-6448	Shale, brownish-black, carbonaceous

1	6448-6450	Sandstone, olive-gray to medium-gray, very fine
2		grained, silty, limy
3	6450-6457	Shale, dark-gray, carbonaceous, caving?
4	6457-6459	Siltstone, medium-gray, very finely sandy, limy
5	6459-6460	Shale, as above
6	6460-6465	Sandstone, medium-light-gray, fine- to medium-
7		grained, few coarse grains, some dark-gray grains,
8		angular to subangular, silty, limy
9	6465-6470	Sandstone, medium-gray, mottled with olive-gray,
10		very fine to fine-grained, silty, limy, micaceous,
11		coal stringers
12	6470-6474	Shale, dark-gray, carbonaceous
13	6474-6477	Coal
14	6477-6480	Shale, black, carbonaceous, coal stringers
15	6480-6488	Shale, brownish-black, carbonaceous
16	6488-6489	Coal
17	6489-6490	Shale, dark-gray, carbonaceous
18	6490-6492	Siltstone, medium-dark-gray, slightly limy
19	6492-6500	Shale, dark-gray, carbonaceous
20	6500-6530	Electrical-log interpretation; no samples from 6530
21		to 6560; assumed 30-ft. sample log
22	6500-6521	Shale
23	6521-6530	Siltstone; interbedded sandstone

1	6569-6571.3	Shale, similar to above, includes dark-gray to
2		black carbonaceous and coaly shale in two thin
3		(1-1/2 in.) beds in upper 1 ft., coal films and
4		lenses (1/16 ft.) probably somewhat more common
5		and mostly parallel to bedding, probably flat
6		lying
7	6571.3-6576	Missing or not recovered
8	6576-6580	Shale, medium-dark- to dark-gray, carbonaceous
9		fragments
10-	6580-6600	Shale, similar to above, silty in part, slight
11		brown tint in part
12	6600-6620	Electrical-log interpretation; no samples from 6630
13		to 6650; assumed 30-ft. sample lag
14	6600-6620	Shale
15	6620-6622	Coal
16	6622-6630	Shale, medium-gray, carbonaceous fragments
17	6630-6650	Shale, dark-gray, carbonaceous, coal stringers near
18		middle
19	6650-6660	Shale, medium-dark-gray, limy, caving?
20	6660-6664	Sandstone, light- to medium-light-gray, very fine to
21		fine-grained, some dark-gray, olive-gray, brown,
22		pink and light-greenish-gray grains, silty, limy
23	6664-6670	Siltstone, medium-dark-gray, limy
24	6670-6700	Shale, medium- to dark-gray, carbonaceous
25-	6700-6720	Shale, dark-gray to black, carbonaceous

1	6720-6723	Shale, brownish-black, silty, carbonaceous
2	6723-6746	Shale, dark-gray to black, carbonaceous; thin coal
3		bed near top
4	6746-6751	Coal
5	6751-6764	Shale, medium-dark- to dark-gray, carbonaceous;
6		brownish-gray dense limy ironstone(?); interbedded
7		gray fine-grained silty sandstone, loose
8	6764-6770	Shale, as above
9	6770-6788	Shale, medium-gray, carbonaceous fragments; some
10		dark-gray carbonaceous shale with coal stringers
11		near middle
12	6788-6805	Shale, dark-gray to black, carbonaceous, coal
13		stringers
14	6805-6818	Shale, medium-dark-gray, carbonaceous fragments
15	6818-6820	Coal
16	6820-6824	Shale, black, carbonaceous
17	6824-6830	Sandstone, gray, fine-grained, silty, carbonaceous
18		stringers, loose; dark-gray carbonaceous shale
19		in middle
20	6830-6837	Shale, medium-gray, carbonaceous fragments; brown-
21		ish-gray ironstone, caving?
22	6837-6839	Sandstone, as above
23	6839-6848	Shale, medium-gray, silty
24	6848-6849	Coal
25	6849-6850	Shale, medium-dark-gray, carbonaceous fragments

1	6860-6878	Shale, dark-gray, carbonaceous
2	6878-6885	Sandstone, gray, fine-grained, silty, loose; inter-
3		bedded dark-gray shale
4	6885-6890	Sandstone, medium-light-gray, fine-grained, silty,
5		limy, few medium grains, many dark-gray and light-
6		olive-gray grains; interbedded shale as above
7	6890-6914	Shale, dark-gray to black, carbonaceous
8	6914-6916	Coal
9	6916-6926	Shale, dark-gray to black, carbonaceous
10	6926-6930	Sandstone, gray, fine-grained, silty, loose
11	6930-6937	Shale, dark-gray, carbonaceous
12	6937-6942	Shale, black, carbonaceous, coal stringers
13	6942-6963	Shale, medium-dark-gray, carbonaceous fragments;
14		brownish-gray very fine grained ironstone
15	6963-6964	Coal
16	6964-6970	Shale, brownish-black, silty, carbonaceous, caving?
17	6970-6990	Shale, dark-gray to black, carbonaceous; may in-
18		clude very fine grained coaly sandstone stringers
19	6990-7017	Cone 11; reported recovery 14 ft. (5 trays)
20	Tray 1	(1.4 ft. core)
21	6990-6991.4	Shale, medium-dark-gray, olive-gray tint in upper
22		half, silty, includes much siltstone, many yellow-
23		ish-brown clayey(?) grains (volcanic ash?),
24		slightly micaceous, hard, slightly limy in 2 in. ±
25		partly yellowish-brown spot near middle, obscure
		thin bedded, carbonaceous film source in upper
		half and fairly common in remainder

1	6991.4-6993	Missing
2	Tray 2	(2.2 ft. core, rubbly in part)
3	6993-6995.2	Shale, medium-dark-gray, silty, scattered to abundant yellowish-brown clayey(?) grains (volcanic ash?), slightly micaceous, hard, yellowish-brown earthy dolomitic shale lenses (1/4 in.+) near base and at top, 2-in. partly sandy siltstone bed near middle, bedding mostly obscure but poorly fissile in small part, carbonaceous films and fragments fairly abundant in most of core
11	6995.2-6996	Missing
12	Tray 3	(2.2 ft. core, rubbly in large part)
13	6996-6997.6	Coal and interbedded shale, in beds up to 2 in. thick; coal, banded, bright and dull, some amber; shale, medium-dark-gray and silty in top 2 in., dark-gray to black in remainder, fissile to platy bedded, many paper-thin coal films and carbonaceous fragments, probably very little or no dip
19	6997.6-6998.2	Shale, medium-dark- to dark-gray, rubbly, not limy, poor fissile to platy bedding, some slickensides, many carbonaceous films, some coal stringers partly at high angle to bedding
23	6998.2-6999	Missing
24	Tray 4	(2.2 ft. core, rubbly in part)

1	6999-7000.1	Shale, similar to above, slight brown tint in upper
2		part, many carbonaceous films and coal lenses and
3		films
4	7000.1-7000.7	Coal, banded, bright and dull, includes several
5		laminae of black carbonaceous shale with plant
6		fragments
7	7000.7-7001.2	Shale, rubbly, medium-dark-gray to black, slight
8		brown tint in part, not limy, bedding obscure to
9		platy, some slickensides in part, many carbonaceous
10		fragments and coal films and lenses; may include
11		a few thin (<1 in.) coal beds
12	7001.2-7002	Missing
13	Tray 5	(1.5 ft. \pm core, very rubbly)
14	7002-7003.5	Coal, banded, bright and dull; includes some dark-
15		gray to black carbonaceous shale and one(?) thin
16		bed (1/2 in.) of dark-gray very fine to fine-
17		grained very argillaceous sandstone
18	7003.5-7017	Missing or not recovered
19	7017-7020	Siltstone, brownish-gray, very finely sandy, limy,
20		slightly micaceous, abundant fine carbonaceous
21		material
22	7020-7025	Sandstone, medium-light-gray to light-olive-gray,
23		very fine to fine-grained, silty, limy
24	7025-7027	Siltstone, as above
25	7027-7028	Coal

1	7028-7059	Shale, medium-dark- to dark-gray, carbonaceous
2		fragments, coal stringers in upper part
3	7059-7061	Coal
4	7061-7065	Shale, medium-gray, abundant carbonaceous fragments
5	7065-7075	Shale, dark-gray, carbonaceous; stringers of gray
6		fine-grained silty sandstone
7	7075-7087	Shale, as above; dusky-yellow-brown dense ironstone;
8		sandstone stringers as above
9	7087-7090	Sandstone, medium-light-gray to light-olive-gray,
10		very fine to fine-grained, some dark-gray grains,
11		silty, limy, slightly micaceous
12	7090-7097	Shale, medium-dark-gray
13	7097-7101	Coal and black carbonaceous shale
14	7101-7117	Sandstone, gray, fine-grained, silty, loose; inter-
15		bedded dark-gray carbonaceous partly sandy shale
16	7117-7118	Coal
17	7118-7126	Shale, as above
18	7126-7128	Sandstone, as above
19	7128-7129	Coal
20	7129-7131	Shale, dark-gray to black, carbonaceous
21	7131-7132	Sandstone, as above
22	7132-7145	Shale, medium-dark-gray to brownish-gray, silty;
23		dusky-brown ironstone (caving?); interbedded
24		medium-dark-gray to brownish-gray siltstone
25	7145-7152	Shale, medium- to medium-dark-gray, many fine
		carbonaceous fragments

1	7152-7160	Sandstone, light- to medium-gray, very fine to fine-
2		grained, few medium grains, silty, limy; some
3		dark-gray carbonaceous shale near middle
4	7160-7163	Siltstone, medium-dark-gray
5-	7163-7168	Shale, medium-gray
6	7168-7170	Sandstone, medium-gray to olive-gray, very fine to
7		fine-grained, many dark-gray grains, silty, limy,
8		some coaly shale fragments and stringers
9	7170-7186	Shale, dark-gray, carbonaceous; interbedded gray
10		fine-grained silty sandstone, loose
11	7186-7190	Coal and black carbonaceous shale
12	7190-7193	Sandstone, similar to above
13	7193-7200	Shale, medium-gray, many carbonaceous fragments
14	7200-7202	Limestone, brownish-gray, very fine grained,
15-		argillaceous
16	7202-7214	Shale, dark-gray to black, carbonaceous, coal
17		stringers
18	7214-7222	Shale, dark-gray, carbonaceous; interbedded gray
19		fine-grained silty sandstone
20-	7222-7227	Shale, dark-gray to black, carbonaceous, coal
21		stringers
22	7227-7230	Siltstone, medium- to medium-dark-gray
23	7230-7240	Shale, dark-gray, carbonaceous
24	7240-7246	Shale, dark-gray to black, some fine carbonaceous
25		fragments, coal

1	7248-7258	Shale, black, carbonaceous, some fine sandy stringers
2		in part; coal
3	7258-7261	Sandstone, gray, fine-grained, silty, loose,
4		caving(?); some dark-gray carbonaceous shale
5	7261-7264	Siltstone, medium-gray and brownish-gray, limy
6	7264-7273	Shale, dark-gray, carbonaceous; interbedded sand-
7		stone as above
8	7273-7277	Shale, as above
9	7277-7282	Coal and black carbonaceous shale
10	7282-7285	Siltstone, medium- to medium-dark-gray
11	7285-7290	Shale, medium- to medium-dark-gray, silty
12	7290-7292	Siltstone, olive-gray, slightly limy
13	7292-7296	Sandstone, light-olive-gray to medium-gray, very
14		fine to fine-grained, many dark-gray grains,
15		silty, limy, slightly micaceous
16	7296-7309	Shale, dark-gray, carbonaceous, caving?
17	7309-7317	Sandstone, similar to above; interbedded medium-
18		dark-gray shale with many carbonaceous fragments
19	7317-7320	Shale, light-olive-gray, slightly limy, fissile?
20	7320-7328	Sandstone, medium- to dark-gray, very fine to fine-
21		grained, carbonaceous; interbedded dark-gray
22		carbonaceous shale
23	7328-7334	Coal; black carbonaceous shale
24	7334-7344	Siltstone, medium-dark gray, limy, slightly mica-
		ceous; interbedded dark-gray carbonaceous shale

1	7344-7350	Shale, dark-gray, carbonaceous, coal stringers
2	7350-7353	Sandstone, yellowish-brown and medium-gray, very
3		fine to fine-grained, many dark-gray grains,
4		silty, limy, slightly micaceous
5-	7353-7363	Shale, dark-gray, carbonaceous
6	7363-7368	Shale, black, carbonaceous, coal stringers
7	7368-7378	Shale, dark-gray, carbonaceous
8	7378-7394	Sandstone, light- to medium-gray, fine- to medium-
9		grained, many dark-gray grains, some green and
10-		yellowish-brown grains, silty, limy, slightly
11		micaceous, mostly loose; some dark-gray carbo-
12		naceous shale near top and base
13	7394-7395	Coal
14	7395-7397	Shale, dark-gray, carbonaceous
15-	7397-7400	Sandstone, as above
16	7400-7408	Shale, dark-gray, slight brown tint, carbonaceous
17	7408-7410	Siltstone, medium-gray, limy, caving?
18	7410-7417	Sandstone, similar to above
19	7417-7420	Shale, black, carbonaceous, coal stringers
20	7420-7434	Sandstone, as above; interbedded dark-gray shale
21	7434-7436	Shale, black, carbonaceous
22	7436-7438	Coal
23	7438-7448	Shale, dark-gray, carbonaceous
24	7448-7455	Sandstone, similar to above; some shale as above
25-	7455-7458	Siltstone, medium-gray, limy

1	7458-7463	Shale, dark-gray, carbonaceous
2	7463-7465	Shale, brownish-gray to brownish-black, limy, looks
3		like "coal-ball" material, coal laminae, "slicken-
4		sides" (may be drill-bit marks)
5	7465-7470	Shale, dark-gray, carbonaceous
6	7470-7490	Electrical-log interpretation; no samples from 7490
7		to 7500; assumed 20-ft. sample lag
8	7470-7478	Shale
9	7478-7480	Coal -
10	7480-7490	Shale
11	7490-7515	Core 12; reported recovery 21 ft. (7 trays)
12	Tray 1	(1.8 ft. core)
13	7490-7491	Shale and siltstone, interbedded; shale, medium-
14		dark-gray, silty, slightly limy and micaceous,
15		hard, poor platy bedding, some lenticular bedding,
16		few small carbonaceous fragments on bedding; silt-
17		stone, medium-light-gray, very finely sandy in part,
18		slightly limy, micaceous, fissile to platy bedding,
19		some siltstone falls apart in water, carbonaceous
20		films and fragments on bedding; basal part (2.5
21		in.) is medium-light-gray very fine grained silty
22		sandstone with carbonaceous shale laminae; prob-
23		ably very little or no dip
24		

1 7491-7491.8 Shale, medium-dark-gray, partly silty, not limy,
2 hard, poor platy bedding, few siltstone laminae
3 as above, trace of fine carbonaceous fragments,
4 basal bed (1 in.) is medium-gray micaceous
5- carbonaceous siltstone with many fine yellowish-
6 brown clay(?) grains

7 7491.8-7493 Missing

8 Tray 2 (2.2 ft. core)

9 7493-7495.2 Shale, medium-dark-gray, pale-yellowish-brown limy
10- coarse mottling in upper 3 in., not limy in re-
11 mainder, partly silty, hard, poor platy bedding,
12 few small carbonaceous fragments on bedding;
13 probably very little or no dip

14 7495.2-7496 Missing

15- Tray 3 (1.7 ft. core)

16 7496-7496.5 Shale, medium-dark-gray, very silty, micaceous, not
17 limy, hard, poor platy bedding, carbonaceous--
18 fragments common on bedding, lower contact
19 gradational

20 7496.5-7497.7 Siltstone, medium-light- to medium-dark-gray, very
21 finely sandy in part, micaceous, some fine
22 yellowish-brown clay(?) grains, not limy, many
23 laminae of silty shale, fissile to platy bedding,
24 some lenticular beds, carbonaceous fragments
common to abundant mostly on bedding planes,
probably very little or no dip

1	7497.7-7499	Missing
2	Tray 4	(2.1 ft. core)
3	7499-7499.9	Siltstone, similar to above but yellowish-brown
4		clay(?) grains more abundant
5	7499.9-7501.1	Shale, medium-dark-gray, slight olive-gray tint in
6		part, very silty, micaceous, not limy, hard,
7		yellowish-brown clay(?) grains fairly common,
8		poor platy bedding, carbonaceous fragments
9		common on bedding, basal part (1 in.+) is light-
10		olive-gray nonbedded claystone with scattered
11		carbonaceous and coal fragments
12	7501.1-7502	Missing
13	Tray 5	(2 ft. core)
14	7502-7504	Shale, medium-dark-gray, very silty, micaceous, not
15		limy, hard, few yellowish-brown clay(?) grains in
16		part, some siltstone laminae and thin beds, poor
17		platy bedding, some cross bedding (small scale),
18		carbonaceous films and fragments common mostly on
19		bedding planes, at 15 in. below top includes a
20		2-in. diameter "nodule" of yellowish-brown earthy
21		slightly limy or dolomitic shale with abundant
22		mostly brown plant fragments, paper-thin coal
23		films abundant in 2-in. bed of dark-gray fissile
24		bedded shale about 1 in. above base
25	7504-7505	Missing

Tray 6 (1.9 ft. core)

7505-7505.7 Shale, medium-dark-gray to medium-gray in lower half, partly silty, slightly micaceous, not limy, hard, some yellowish-brown clay(?) grains, poor to obscure platy bedding, carbonaceous fragments common

7505.7-7506.9 Siltstone, medium-light-gray, very finely sandy in part, micaceous, not limy, many yellowish-brown clay(?) grains mostly associated with carbonaceous laminae, good fissile to platy bedding, abundant carbonaceous material and many paper-thin coal stringers on bedding planes, few thin beds of medium- to medium-dark-gray silty shale, apparent dip about 4 degrees.

7506.9-7508 Missing

Tray 7 (2.4 ft. core)

7508-7509.6 Shale, medium- to medium-dark-gray and olive-gray, very silty, hard, slightly limy in lower part, several thin (<2 in.) siltstone beds similar to above but partly limy, fissile to platy bedding, some thin lenticular beds, abundant carbonaceous material and many paper-thin coal stringers, apparent dip about 2 degrees

1	7509.6-7510.4	Shale, dark-gray to grayish-black, not limy, hard,
2		fissile to platy bedding, many small carbonaceous
3		fragments and coaly films in part, includes at
4		base(?) a 1-1/4 in. bed of dull to bright banded
5		coal with yellowish-gray translucent nonlimy
6		brittle fracture fillings, probably no apparent
7		dip
8	7510.4-7515	Missing or not recovered
9	7515-7521	Shale, medium-dark-gray, carbonaceous fragments
10	7521-7529	Siltstone, medium-gray to brownish-gray, carbonaceous fragments; interbedded shale as above
11		
12	7529-7533	Shale, dark-gray, carbonaceous, coal stringers
13	7533-7542	Shale, medium-dark-gray
14	7542-7545	Siltstone, medium-gray to olive-gray, very finely
15		sandy, carbonaceous fragments
16	7545-7551	Shale, as above
17	7551-7553	Coal
18	7553-7558	Shale, black, carbonaceous
19	7558-7562	Siltstone, brownish-gray, very finely sandy, limy,
20		micaceous, carbonaceous fragments; may include
21		stringers of very fine to medium grained limy
22		sandstone
23	7562-7568	Shale, medium-dark-gray, carbonaceous fragments
24	7568-7572	Siltstone, as above
25		

1	7572-7593	Shale, medium-dark to dark-gray, carbonaceous
2		fragments
3	7593-7596	Siltstone, brownish-gray, limy
4	7596-7603	Sandstone, brownish-gray, very fine to fine-grained,
5		many dark-gray grains, silty, limy, some carbo-
6		naceous fragments
7	7603-7606	Coal
8	7606-7613	Shale, black, carbonaceous; coal
9	7613-7627	Shale, dark-gray, carbonaceous
10	7627-7630	Siltstone, medium-dark-gray, micaceous, carbonaceous
11		fragments, caving?
12	7630-7660	Electrical-log interpretation; no samples from 7660
13		to 7690; assumed 30-ft. sample lag; much lost-
14		circulation material in 7650 to 7660 sample
15	7630-7644	Shale
16	7644-7650	Sandstone
17	7650-7657	Shale
18	7657-7660	Coal
19	7660-7661	Coal
20	7661-7664	Siltstone, medium-gray, micaceous
21	7664-7680	Shale, medium-dark-gray, carbonaceous fragments,
22		coal stringers near middle
23	7680-7682	Sandstone, medium-gray, very fine grained, many
24		dark-gray grains, silty, slightly limy, micaceous
25	7682-7684	Coal

1	7684-7698	Shale, similar to above .
2	7698-7706	Sandstone, gray, fine-grained, silty; interbedded
3		with shale as above
4	7706-7720	Shale, similar to above
5	7720-7722	Coal
6	7722-7730	Sandstone, gray, fine-grained, silty, clayey,
7		loose; interbedded shale as above
8	7730-7758	Shale, dark-gray to black, carbonaceous fragments,
9		coal stringers near middle
10	7758-7760	Coal; black carbonaceous shale
11	7760-7762	Sandstone, medium-gray, very fine grained, silty,
12		carbonaceous
13	7762-7768	Coal
14	7768-7770	Sandstone, similar to above
15	7770-7778	Shale, black, carbonaceous, coal stringers
16	7778-7781	Coal
17	7781-7785	Sandstone, medium-gray, fine- to medium-grained,
18		many dark-gray grains, subangular, silty, limy;
19		interbedded dark-gray carbonaceous shale
20	7785-7798	Shale, medium-dark gray, carbonaceous fragments
21	7798-7817	Sandstone, medium-light to medium-gray, fine- to
22		medium-grained, many elongate grains, some yellow-
23		ish-brown dolomite grains, silty, limy, slightly
24		micaceous, coal stringers, low porosity(?);
25		some fine-grained to medium-grained shale with carbon-
26		aceous fragments (a coarse-grained shale)

1	7817-7819	Coal
2	7819-7824	Sandstone, medium-gray, very fine to fine-grained,
3		silty, limy
4	7824-7825	Coal
5	7825-7837	Sandstone, similar to above; interbedded dark-gray
6		shale
7	7837-7841	Shale, dark-gray, carbonaceous
8	7841-7842	Coal
9	7842-7858	Shale, as above
10	7858-7862	Coal
11	7862-7864	Shale, dark-gray, carbonaceous
12	7864-7874	Shale, medium-dark-gray, silty, limy; interbedded
13		olive-gray to medium-gray limy fissile partly
14		waxy shale; nodules of brownish-gray very argill-
15		laceous very fine grained limestone
16	7874-7878	Shale, medium-gray, carbonaceous fragments, not limy
17	7878-7883	Sandstone, medium-light- to medium-gray, very fine
18		to fine-grained, silty, limy, caving?
19	7883-7889	Shale, dark-gray, carbonaceous
20	7889-7892	Coal
21	7892-7895	Sandstone, similar to above
22	7895-7900	Shale, dark-gray, carbonaceous
23	7900-7903	Sandstone, as above
24	7903-7906	Coal
25	7906-7909	Shale, medium-dark-gray, carbonaceous fragments

1	7973-7976	Sandstone, medium-gray to brownish-gray, very fine
2		to fine-grained, silty, limy, carbonaceous frag-
3		ments
4	7976-7980	Shale, dark-gray, carbonaceous
5	7980-7983	Sandstone, as above
6	7983-7988	Shale, as above
7	7988-7996	Sandstone, as above
8	7996-8000	Coal; interbedded dark-gray carbonaceous shale
9	8000-8009	Sandstone, yellowish-brown to medium-light-gray,
10		very fine to fine-grained, dolomite grains, silty,
11		limy, carbonaceous fragments, caving(?); inter-
12		bedded medium- to medium-dark-gray carbonaceous
13		shale
14	8009-8017	Shale, medium-dark- to dark-gray, carbonaceous
15	8017-8018	Coal
16	8018-8030	Shale, as above
17	8030-8034	Shale, medium-gray, carbonaceous fragments
18	8034-8036	Sandstone, similar to above
19	8036-8040	Shale, dark-gray, carbonaceous
20	8040-8063	Electrical-log interpretation; assumed 20-ft.
21		sample lag
22	8044-8044	Shale
23	8044-8047	Coal
24	8047-8052	Sandstone; core shale in middle
25	8052-8059	Shale

1	8058-8060	Coal
2	8060-8063	Shale
3	8063-8068	Core 14; reported recovery 25 ft. (9 trays)
4	Tray 1	(1.7 ft. core)
5	8063-8064.7	Shale, medium- to medium-dark-gray, partly silty,
6		not limy, hard, many yellowish-brown clayey grains
7		(volcanic ash?) in silty parts, obscure very thin
8		bedded, scattered carbonaceous films and coal
9		lenses (<1/16 in.) randomly oriented; includes at
10		top a 2-in. bed of medium-light-gray very finely
11		sandy nonlimy fissile-bedded siltstone with clayey
12		grains and abundant carbonaceous films on bedding
13		planes; bed of mostly bright banded coal (1 in.
14		thick?) at base; probably very little or no dip
15	8064.7-8065.8	Missing
16	Tray 2	(2 ft. core)
17	8065.8-8067.8	Siltstone, medium- to medium-dark-gray, olive-gray
18		tint in part, very finely sandy in part, hard,
19		slightly limy to limy, scattered to common yellow-
20		ish-brown clayey grains, obscure very thin to thin
21		bedded, few carbonaceous films and coal stringers
22		mostly at high angles to bedding; includes a few
23		beds (up to 1 in. thick) of medium- to medium-
24		dark-gray silty shale
	8067.8-8068.6	Missing

1	Tray 3	(1.6 ft. core)
2	8068.6-8070.2	Siltstone, medium-gray, very finely sandy in large part, hard, slightly liny in part, common to abundant yellowish-brown clayey grains, slightly micaceous, obscure very thin to thin bedded, scattered carbonaceous and coal fragments randomly oriented; basal 3 in. is medium-gray silty shale with many carbonaceous films and fragments
3		
4		
5		
6		
7		
8		
9	8070.2-8071.4	Missing
10	Tray 4	(1.8 ft. core)
11	8071.4-8073.2	Siltstone, similar to above, mostly nonliny, carbonaceous and coal films more common and mostly subparallel to bedding; lower 1-1/2 in. \pm bed is medium-light-gray silty poorly bedded shale with abundant carbonaceous films and fragments
12		
13		
14		
15		
16	8073.2-8074.2	Missing
17	Tray 5	(2.2 ft. core)
18	8074.2-8074.9	Siltstone, medium- to medium-dark-gray, very finely sandy in part, few medium sand grains, hard, slightly liny and micaceous, mostly abundant yellowish-brown clayey grains, few medium-light-gray very fine grained silty sandstone lenses up to 1/2 in. thick (one is bordered by a coal film and may be a filling of a tree branch), irregular platy to very thin bedded, carbonaceous fragments common on bedding planes
19		
20		
21		
22		
23		
24		

8074.9--8076.4 Sandstone, medium-gray, very fine grained, very silty, fairly hard, partly limy, many yellowish-brown clayey grains in part, many dark-gray grains, common moderate-brown dense grains (ironstone?), platy to thin bedded, includes several thin siltstone and silty shale beds similar to above, one 1/2 in. shale pebble 7 in. below top, fine carbonaceous fragments on bedding planes, few small coal fragments in lower half, probably little or no dip

8076.4--8077

Missing

Tray 6

(2.2 ft. core)

8077--8079.2

Siltstone and about 30 percent interbedded sandstone, both similar to above, slightly limy in part, beds up to 2 in. thick, some irregular lenticular beds, few thin (1/2 in. +) medium-dark-gray silty shale beds with many carbonaceous films

8079.2--8079.8

Missing

Tray 7

(2.1 ft. core)

1	8079.8-8081.9	Siltstone, medium- to medium-dark-gray, very finely
2		sandy, hard, not limy, abundant yellowish-brown
3		clayey grains, micaceous, irregular platy to very
4		thin bedded, some lenticular and interfingering
5		beds, many carbonaceous fragments mostly sub-
6		parallel to bedding, includes numerous stringers
7		and thin beds (up to 1/2 in. thick) of sandstone
8		similar to above, one-2-1/2 in. sandstone bed
9		13 in. below top, one 1-in. sandstone bed 19 in.
10		below top, basal 2-in. bed is medium-dark-gray
11		very silty shale with carbonaceous fragments and
12		abundant yellowish-brown clayey grains
13	8081.9-8082.6	Missing
14	Tray 8	(1.1 ft. core)
15	8082.6-8083	Siltstone, and sandstone, similar to above
16	8083-8083.7	Sandstone, medium-light- to medium-gray, very fine
17		grained, very silty, fairly hard, slightly limy
18		and micaceous, many dark-gray grains and yellow-
19		ish-brown clayey grains, laminae of medium-dark-
20		gray very finely sandy siltstone and silty shale,
21		platy bedded, carbonaceous fragments on bedding
22		planes
23	8083.7-8085.4	Missing
24	Tray 9	(1.9 ft. core)

1	8085.4-8087.3	Siltstone and interbedded sandstone in subequal
2		amounts, similar to above, beds up to 1-1/2 in.
3		thick, mostly irregular platy to very thin bedded
4	8087.3-8088	Missing
5	8088-8093	Shale, black, carbonaceous, coal stringers
6	8093-8095	Sandstone, medium-gray, very fine to fine-grained,
7		silty, slightly limy, micaceous
8	8095-8100	Shale, medium-dark-gray, carbonaceous fragments;
9		thin coal bed near middle
10	8100-8120	Sandstone, similar to above; interbedded with medium-
11		to medium-dark-gray shale with carbonaceous frag-
12		ments
13	8120-8126	Shale, dark-gray to black, carbonaceous, coal
14		stringers
15	8126-8131	Sandstone, light-olive-gray, very fine grained,
16		many yellowish-brown clayey grains, silty,
17		slightly limy, carbonaceous fragments, caving?
18	8131-8136	Shale, dark-gray to black, carbonaceous, coal
19		stringers
20	8136-8139	Sandstone, medium-gray, very fine grained, silty,
21		slightly limy
22	8139-8140	Limestone, brownish-gray to pale-yellowish-brown,
23		dense to earthy, very argillaceous, dolomitic
24	8140-8142	Shale, medium-dark-gray, carbonaceous fragments

1	8144-8152	Siltstone, medium-dark-gray, very finely sandy;
2		some interbedded shale as above
3	8152-8153	Coal
4	8153-8159	Sandstone, medium-gray to brownish-gray, very fine
5		grained, silty, slightly limy; interbedded shale
6		as above
7	8159-8164	Shale, dark-gray to black, carbonaceous; coal
8	8164-8166	Sandstone, similar to above
9	8166-8169	Shale, as above
10	8169-8171	Coal
11	8171-8175	Shale, as above
12	8175-8180	Sandstone, medium-light-gray, very fine to fine-
13		grained, some medium grains, dark-gray grains,
14		silty, limy; interbedded medium-dark-gray shale
15	8180-8183	Coal; black carbonaceous shale
16	8183-8186	Shale, medium-gray, carbonaceous fragments
17	8186-8190	Siltstone, medium-gray to brownish-gray, very finely
18		sandy, slightly limy
19	8190-8196	Shale, as above
20	8196-8200	Siltstone, as above
21	8200-8202	limestone, medium-gray, very fine grained, very
22		argillaceous
23	8202-8204	Shale, medium-gray, limy
24	8204-8208	Shale, medium-gray, carbonaceous fragments

1	8208-8216	Siltstone, medium-gray, slight olive-gray tint, very
2		finely sandy, slightly limy, micaceous; inter-
3		bedded shale as above
4	8216-8226	Shale, as above
5	8226-8230	Sandstone, medium-light-gray, very fine to fine-
6		grained, silty, limy
7	8230-8232	Shale, medium-dark-gray
8	8232-8235	Siltstone, medium-dark-gray, micaceous, fine carbo-
9		naceous material
10	8235-8240	Shale, black, carbonaceous, coal stringers
11	8240-8258	Siltstone, similar to above; interbedded medium- to
12		dark-gray shale with carbonaceous fragments
13	8258-8260	Shale, black, carbonaceous, coal stringers
14	8260-8275	Shale, medium-dark-gray, silty, carbonaceous frag-
15		ments
16	8275-8279	Sandstone, medium-light- to medium-gray, very fine
17		to fine-grained, some medium grains, many dark-
18		gray grains, silty, limy, some carbonaceous frag-
19		ments
20	8279-8283	Shale, medium-gray, carbonaceous fragments
21	8283-8286	Siltstone, medium-gray, very finely sandy, limy
22	8286-8288	Shale, black, carbonaceous
23	8288-8290	Coal
24	8290-8305	Siltstone, medium-gray, very finely sandy; inter-
25		bedded with medium- to dark-gray shale with
		carbonaceous fragments

1	8305-8309	Shale, as above
2	8309-8324	Sandstone, medium-gray, very fine grained, silty,
3		slightly limy, carbonaceous fragments; interbedded
4		with siltstone and shale as above
5	8324-8327	Shale, as above
6	8327-8340	Siltstone, as above; interbedded with sandstone and
7		shale as above
8	8340-8343	Shale, medium- to dark-gray, carbonaceous fragments
9	8343-8345	Siltstone, medium-dark-gray, micaceous
10	8345-8352	Shale, dark-gray to black, carbonaceous, coal
11		stringers
12	8352-8354	Sandstone, similar to above
13	8354-8372	Siltstone, olive-gray, very finely sandy, limy;
14		interbedded shale as above
15	8372-8375	Siltstone, olive-gray to medium-dark-gray, limy,
16		hard
17	8375-8378	Shale, medium-gray to olive-gray, limy
18	8378-8385	Sandstone, medium- to medium-light-gray, very fine
19		to fine-grained, many dark-gray grains, yellowish-
20		brown clayey grains, silty, limy, carbonaceous
21		fragments in part
22	8385-8387	Shale, dark-gray to black, carbonaceous
23	8387-8391	Coal
24	8391-8393	Sandstone, similar to above
25	8393-8397	Siltstone, similar to above

1	8396-8398	Shale, dark-gray, carbonaceous
2	8398-8433	Siltstone, medium-gray, slightly limy; interbedded
3		medium- to dark-gray shale
4	8433-8470	Sandstone, medium-gray, very fine to fine-grained,
5		silty, limy; much interbedded shale and siltstone
6		similar to above
7	8470-8474	Shale, dark-gray to black, carbonaceous
8	8474-8476	Coal
9	8476-8478	Sandstone, medium-dark-gray, very fine to fine-
10		grained, silty, slightly limy, slightly micaceous,
11		carbonaceous fragments
12	8478-8485	Coal
13	8485-8490	Sandstone, similar to above; thin coal bed in
14		middle
15	8490-8491	Shale, medium-dark-gray
16	8491-8503	Core 15; reported recovery 5 ft. (2 trays)
17	Tray 1	(1.3 ft. core)
18	8491-8491.5	Shale, medium-dark-gray, silty, not limy, hard,
19		poor platy bedded, scattered carbonaceous films
20		and paper-thin coal stringers

1	8491.5-8492.3	Siltstone, medium-gray, very finely sandy, slightly
2		micaceous, hard, not limy, many yellowish-gray
3		and yellowish-brown clayey grains, few yellowish-
4		brown lenticular dolomitic (ironstone?) streaks
5		less than 1/2 in. thick about 2 in.-3 in. below
6		top, mostly poor platy bedded, carbonaceous films
7		and very small fragments scattered to abundant;
8		includes several medium-dark-gray silty shale
9		laminae and thin beds and, 4 in. below top, 2-in.
10		bed of medium-light-gray very fine grained silty
11		sandstone; basal 1-in. bed is shale similar to
12		above
13	8492.5-8493.5	Missing
14	Tray 2	(0.8 ft. core)
15	8493.5-8494.3	Siltstone and some interbedded shale, similar to
16		above, large leaf impression on basal bedding
17		plane; includes a few thin irregular beds (up to
18		1/2 in. thick) of medium-light-gray very fine
19		slightly
20		grained, limy silty sandstone; some irregular wavy
21		and convoluted bedding (soft-sediment deformation),
22		micro-thrust fault, might have a few degrees
23		apparent dip
24	8494.3-8502	Missing or not recovered
25	8502-8520	Shale, medium-dark-gray, silty; interbedded medium-
26		dark-gray micaceous siltstone

1	8520-8523	Sandstone, medium-gray, very fine grained, silty,
2		slightly limy
3	8523-8538	Shale, medium-dark-gray, carbonaceous fragments;
4		interbedded siltstone as above
5	8538-8557	Shale, medium-dark-gray, carbonaceous fragments
6	8557-8560	Coal; black carbonaceous shale
7	8560-8577	Shale, medium-dark-gray; interbedded medium-gray
8		siltstone in upper and lower parts
9	8577-8583	Sandstone, medium-light-gray, fine-grained, few
10		medium grains, many dark-gray and some yellowish-
11		brown grains, some feldspar, subangular, silty,
12		dolomitic
13	8583-8585	Shale, dark-gray to black, carbonaceous
14	8585-8587	Coal
15	8587-8590	Shale, black, carbonaceous
16	8590-8610	Sandstone, similar to above, fine- to medium-
17		grained, scattered coarse grains; interbedded
18		medium-dark-gray shale with carbonaceous fragments
19	8610-8626	Sandstone, similar to above, limy in part; inter-
20		bedded siltstone as above
21	8626-8641	Shale, medium-dark-gray, carbonaceous
22		
23	8641-8657	
24		
25	8657-8673	
26		
27	8673-8689	
28		
29	8689-8705	
30		

1	8650-8668	Shale, medium-dark- to dark-gray, silty, carbonaceous fragments; interbedded medium-gray micaceous siltstone; brownish-gray dense ironstone
2		
3		
4	8668-8670	Siltstone, dark-gray, limy
5	8670-8684	Shale, medium-dark- to dark-gray, silty, carbonaceous fragments
6		
7	8684-8686	Siltstone, similar to above
8	8686-8707	Shale, as above
9	8707-8710	Siltstone, olive-gray to medium-dark-gray, slightly
10		limy, carbonaceous fragments; shale as above
11	8710-8712	Sandstone, light-olive-gray, very fine grained,
12		silty, limy
13	8712-8720	Shale, as above
14	8720-8723	Siltstone, brownish-gray, limy, carbonaceous fragments
15		
16	8723-8726	Shale, as above
17	8726-8728	Sandstone, similar to above
18	8728-8745	Siltstone, as above; medium-gray siltstone; interbedded medium-dark-gray shale with carbonaceous fragments
19		
20		
21	8745-8755	Shale, dark-gray to black, carbonaceous
22	8755-8770	Coal; interbedded black carbonaceous shale
23	8770-8776	Shale, medium-gray
24	8776-8790	Shale, medium-dark-gray, silty, carbonaceous fragments
25		

1	8790-8805	Coal; interbedded black carbonaceous shale
2	8805-8815	Core 16; reported recovery 9 ft. (3 trays)
3	Tray 1	(1.3 ft. core, rubbly in part)
4	8805-8806.3	Shale, dark-gray to black, slight brownish tint in
5		part, silty mostly in lower half, hard, not limy,
6		fairly good platy bedding, common to abundant
7		carbonaceous fragments and paper-thin coal lenses;
8		upper half includes 2(?) beds of bright banded
9		coal (each 1 in. thick) and a 1/2 in. bed of
10		medium-gray limy siltstone
11	8806.3-8808	Missing
12	Tray 2	(2.2 ft. core)
13	8808-8809.5	Siltstone and interbedded shale in subequal amounts:
14		siltstone, medium- to medium-dark-gray, very
15		finely sandy in part, micaceous, not limy, hard,
16		mostly indistinct platy bedded, fairly abundant
17		carbonaceous fragments and coal films and lenses
18		(up to 1/8 in.) mostly on bedding planes; shale,
19		medium-dark- to dark-gray, silty, micaceous, not
20		limy, hard, obscure platy bedded, many carbon-
21		aceous fragments and coal films; few lenses
22		(<1/2 in. thick) of medium-light-gray very fine
23		grained silty sandstone about 7 in.-9 in. below
24		top; probably little or no apparent dip

1	8809.5-8810.2	Shale, medium-dark- to dark-gray, hard, not limy,
2		platy bedded, abundant carbonaceous fragments and
3		paper-thin coal stringers, rubbly in lower part
4	8810.2-8811	Missing
5	Tray 3	(1.2 ft. \pm core, rubbly)
6	8811-8812.2	Shale, upper half similar to shale above, slight
7		brown tint, includes near top a 1-in. + bed of
8		medium-light-gray poorly bedded relatively soft
9		shale with many carbonaceous fragments; lower half
10		is medium- to medium-dark-gray poorly bedded hard
11		nonlimy shale with scattered carbonaceous frag-
12		ments (mostly plant stems?)
13	8812.2-8815	Missing or not recovered
14	8815-8818	Shale, medium-gray, carbonaceous fragments
15	8818-8825	Sandstone, medium-light-gray, fine- to medium-
16		grained, many dark-gray grains, angular to sub-
17		angular, slightly silty, dolomitic, slightly mica-
18		ceous, some carbonaceous fragments
19	8825-8838	Sandstone, similar to above, limy
20	8838-8846	Shale, dark-gray to black, carbonaceous, coal
21		stringers; interbedded medium-dark-gray to brown-
22		ish-gray limy siltstone
23	8846-8848	Siltstone, medium-dark-gray, slightly limy
24	8848-8850	Shale, medium-dark-gray, carbonaceous fragments
25	8850-8866	Sandstone, similar to above; medium-gray very fine
		grained silty micaceous slightly limy sandstone
		with dark-gray grains

1	8866-8872	Shale, as above
2	8872-8880	Shale, dark-gray to black, carbonaceous, coal
3		stringers
4	8880-8884	Siltstone, medium-gray, slightly limy; medium-gray
5		shale with carbonaceous fragments
6	8884-8896	Sandstone, medium-light-gray, very fine to fine-
7		grained, many dark-gray grains, silty, limy; some
8		medium-gray shale near middle
9	8896-8900	Coal; black carbonaceous shale
10	8900-8924	Shale, medium-dark- to dark-gray, carbonaceous frag-
11		ments; some interbedded medium-dark-gray siltstone
12	8924-8930	Sandstone, medium-light-gray, very fine to fine-
13		grained; dark-gray grains, yellowish-brown clayey
14		grains, silty, slightly limy
15	8930-8938	Sandstone, medium-gray, very fine grained, silty,
16		slightly limy; interbedded medium-dark-gray mica-
17		ceous siltstone
18	8938-8948	Shale, dark-gray, carbonaceous
19	8948-8950	Coal; black carbonaceous shale
20	8950-8952	Siltstone, similar to above
21	8952-8955	Shale, dark-gray, carbonaceous
22	8955-8957	Coal
23	8957-8960	Shale, medium-gray, carbonaceous fragments
24	8960-8967	Shale, medium-dark-gray, carbonaceous fragments

1	8967-8970	Siltstone, medium- to medium-dark-gray, micaceous,
2		carbonaceous fragments
3	8970-8977	Shale, dark-gray to black, carbonaceous, coal
4		stringers
5	8977-8982	Shale, medium-dark- to dark-gray, carbonaceous
6		fragments
7	8982-8992	Shale, medium-dark- to dark-gray, limy, hard, slight
8		brown tint in part, dusky-yellowish-brown dense
9		very argillaceous limestone concretions
10	8992-9000	Shale, medium- to medium-dark-gray, carbonaceous
11		fragments
12	9000-9003	Siltstone, medium-dark-gray, very limy, hard, looks
13		like "dirty" limestone
14	9003-9017	Shale, medium-dark- to dark-gray, carbonaceous
15		fragments
16	9017-9018	Coal
17	9018-9021	Shale, black, carbonaceous
18	9021-9027	Sandstone, medium-light-gray, very fine to fine-
19		grained, some medium grains, silty, limy, carbo-
20		naceous and coaly stringers
21	9027-9035	Shale, medium-dark-gray, carbonaceous fragments
22	9035-9040	Sandstone, similar to above
23	9040-9043	Siltstone, medium-gray, very finely sandy, mica-
24		ceous, fine carbonaceous fragments
25	9043-9043	Shale, medium-dark-gray, carbonaceous fragments

1	9053-9060	Shale, black, carbonaceous, coal stringers
2	9060-9077	Shale, medium-dark-gray, silty, micaceous, fine
3		carbonaceous fragments; interbedded medium-gray
4		micaceous carbonaceous siltstone
5	9077-9080	Siltstone, medium-gray, very finely sandy, slightly
6		limy
7	9080-9082	Shale, medium-gray, carbonaceous fragments
8	9082-9086	Coal; black carbonaceous shale
9	9086-9091	Sandstone, medium-gray, very fine grained, silty,
10		limy, micaceous, carbonaceous stringers
11	9091-9093	Coal
12	9093-9096	Siltstone, medium-dark-gray, micaceous, carbonaceous
13	9096-9100	Shale, medium-gray, carbonaceous fragments
14	9100-9102	Coal
15	9102-9119	Shale, medium-dark-gray, silty, carbonaceous frag-
16		ments
17	9119-9123	Siltstone, medium-gray, carbonaceous fragments
18	9123-9129	Shale, dark-gray to black, carbonaceous
19	9129-9130	Coal
20	9130-9144	Siltstone, medium-dark-gray, micaceous, carbon-
21		aceous; interbedded medium-dark-gray shale;
22		dusky-yellowish-brown dense argillaceous limestone
23		concretions (caving?)
24	9144-9146	Coal
25	9146-9148	Shale, medium-dark-gray

1	9148-9150	Sandstone, medium-gray, very fine grained, silty,
2		abundant yellowish-brown clayey grains and carbonaceous stringers (caving?)
3		
4	9150-9154	Shale, medium-gray, carbonaceous fragments
5	9154-9156	Sandstone, medium-light-gray, very fine grained,
6		silty, slightly limy
7	9156-9168	Siltstone, medium-gray; interbedded medium-dark-gray shale with carbonaceous fragments
8		
9	9168-9172	Shale, as above
10	9172-9176	Sandstone, similar to above
11	9176-9179	Shale, as above
12	9179-9185	Sandstone, medium-light-gray, fine- to medium-
13		grained, few coarse grains, many dark-gray grains,
14		subangular, silty, limy; interbedded shale as
15		above
16	9185-9196	Sandstone, similar to above, scattered very coarse
17		grains and granules (quartz, quartzite, gray chert,
18		dark-gray and dark-green grains)
19	9196-9200	Shale, black, carbonaceous, coaly
20	9200-9203	Coal
21	9203-9212	Shale, medium-gray, carbonaceous fragments
22	9212-9216	Sandstone, medium-light-gray, fine- to medium-
23		grained, many dark-gray grains, silty, limy
24	9216-9222	Shale, dark-gray, carbonaceous; medium-dark-gray
25		silty shale with much fine carbonaceous material

1	9222-9230	Sandstone, similar to above; some medium-dark-gray
2		shale near middle
3	9230-9234	Coal
4	9234-9250	Shale, medium-dark- to dark-gray, carbonaceous frag-
5		ments; interbedded medium-gray micaceous carbo-
6		naceous siltstone in lower half
7	9250-9252	Coal
8	9252-9257	Shale, dark-gray to black, carbonaceous; interbedded
9		coal
10	9257-9262	Shale, as above
11	9262-9271	Core 17; reported recovery 9 ft. (3 trays)
12	Tray 1	(1.3 ft. core, rubble in large part)
13	9262-9263.3	Shale and some interbedded coal: shale, dark-gray to
14		black, not limy, hard, mostly very carbonaceous,
15		platy bedded, many paper-thin coal lenses in part;
16		coal, bright and banded to dull and bony, beds up
17		to a few in. (?) thick
18	9263.3-9265	Missing
19	Tray 2	(1 ft. core, rubble in part)
20	9265-9265.5	Shale, as above, micaceous
21		
22		
23		
24		
25		

1	9265.5-9266	Coal and sandstone: coal, bright to moderately dull,
2		banded, includes a bed (<1/2 in. thick) of dark-
3		gray silty micaceous very carbonaceous shale;
4		sandstone, medium-gray, very fine grained, very
5		silty, slightly limy and micaceous, fairly hard,
6		2 in. thick, some yellowish-brown clayey grains,
7		fairly abundant carbonaceous fragments; probably
8		little or no apparent dip
9	9266-9268	Missing
10	Tray 3	(0.5 ft. \pm core, rubbly).
11	9268-9268.5	Sandstone and shale: sandstone, medium-light-gray,
12		very fine grained, silty, mostly limy, many dark-
13		gray and yellowish-brown grains, greatest thick-
14		ness 3 in., few coaly fragments; shale, medium-
15		gray, hard, not limy or silty, obscure platy bed-
16		ding, scattered poorly oriented carbonaceous frag-
17		ments; some dark-gray to black carbonaceous shale
18		with abundant paper-thin coal lenses
19	9268.5-9271	Missing
20	9271-9284	Shale, medium- to medium-dark-gray, carbonaceous
21		fragments
22	9284-9294	Sandstone, medium-light-gray, fine- to medium-grain-
23		ed, some coarse and very coarse grains and gran-
		ules (quartz and gray chert, rounded), dark-gray
		gravel, few pin' grains, subangular, limy

1	9294-9300	Shale, dark-gray to black, carbonaceous
2	9300-9304	Coal
3	9304-9308	Shale, black, carbonaceous
4	9308-9317	Shale, medium-dark-gray
5	9317-9326	Sandstone, medium-light-gray, very fine grained, silty, limy; interbedded shale as above
6		
7	9326-9330	Sandstone, medium-light-gray, very fine to fine-grained, silty, limy; olive-gray very fine to fine-grained silty limy sandstone
8		
9		
10	9330-9336	Sandstone, medium-light-gray, fine- to medium-grained, few coarse grains, many dark-gray grains, some yellowish-gray to yellowish-brown grains, slightly limy
11		
12		
13		
14	9336-9338	Coal
15	9338-9343	Shale, black, carbonaceous
16	9343-9348	Shale, medium-gray, carbonaceous fragments
17	9348-9352	Siltstone, medium- to medium-dark-gray, micaceous
18	9352-9356	Shale, dark-gray, carbonaceous
19	9356-9362	Siltstone, as above, many carbonaceous films and stringers and coal stringers
20		
21	9362-9372	Shale, dark-gray, carbonaceous
22	9372-9375	Sandstone, medium-gray, very fine grained, silty, slightly limy
23		
24	9375-9378	Siltstone, medium-gray, slightly silty, micaceous
25	9378-9382	Shale, medium-gray; black carbonaceous shale

1	9382-9385	Coal; black carbonaceous shale
2	9385-9388	Shale, medium-gray
3	9388-9391	Siltstone, dusky-yellowish-brown, limy, hard,
4		carbonaceous fragments
5	9391-9395	Sandstone, medium-gray to light-olive-gray, very
6		fine to fine-grained, many dark-gray and yellowish-
7		brown grains, silty, limy
8	9395-9399	Shale, medium-dark-gray
9	9399-9411	Siltstone, medium- to medium-dark-gray, micaceous,
10		carbonaceous fragments; interbedded with shale as
11		above
12	9411-9414	Coal
13	9414-9416	Siltstone, as above
14	9416-9423	Shale, medium-dark-gray, carbonaceous fragments
15	9423-9460	Sandstone, medium-light-gray, fine- to coarse-
16		grained, some very coarse grains and granules
17		(quartz, basalt, gray, green, and red chert),
18		limy, mostly drills loose; some interbedded gray
19		shale
20	9460-9470	Sandstone, light-olive-gray, very fine to fine-
21		grained, many dark-gray grains, some greenish-
22		gray grains, silty, limy; some medium-dark-gray
23		shale with carbonaceous fragments in lower part
24	9470-9472	Shale, brownish-gray, slightly limy, carbonaceous
25		fragments

1	9472-9475	Siltstone, brownish-gray, micaceous, carbonaceous
2	9475-9484	Shale, medium- to dark-gray
3	9484-9498	Siltstone, medium-dark-gray, micaceous; interbedded
4		shale as above
5	9498-9500	Shale, black to brownish-black, carbonaceous
6	9500-9502	Coal
7	9502-9509	Shale, black, carbonaceous, coal stringers
8	9509-9512	Coal
9	9512-9520	Shale, dark-gray to black, carbonaceous
10	9520-9530	Shale, medium-dark-gray, carbonaceous fragments
11	9530-9534	Siltstone, medium-gray, slightly limy, micaceous
12	9534-9536	Coal
13	9536-9540	Siltstone, as above
14	9540-9550	Sandstone, medium-light-gray, brownish-gray in part,
15		very fine to fine-grained, silty, limy; some
16		medium-dark-gray shale in middle
17	9550-9557	Sandstone, medium-light-gray, fine- to coarse-
18		grained, some very coarse grains and granules
19		(quartz, ls. chert, gray, green, and red chert),
20		lign. locally visible lower
21	9557-9570	Siltstone, medium-gray, carbonaceous fragments; inter-
22		bedded sandstone as above
23	9570-9584	Siltstone, medium-gray, carbonaceous
24	9584-9586	Siltstone, medium-gray, carbonaceous

1	9586-9594	Sandstone, yellowish-brown to light-olive-gray, very
2		fine to fine-grained, many dark-gray and brown
3		grains in part, silty, limy, coal fragments in
4		part
5	9594-9604	Shale, medium-gray, carbonaceous fragments
6	9604-9614	Shale, black, carbonaceous, coal stringers; inter-
7		bedded gray very fine grained silty sandstone
8	9614-9619	Shale, dark-gray to black, carbonaceous
9	9619-9620	Coal
10	9620-9627	Shale, medium-dark-gray, carbonaceous fragments
11	9627-9640	Sandstone, medium-light-gray, fine- to medium-
12		grained, subangular, silty, limy, drills loose;
12		some gray shale in lower part
14	9640-9647	Shale, dark-gray; thin coal bed near top
15	9647-9650	Siltstone, medium-gray, micaceous, carbonaceous
16		fragments
17	9650-9657	Shale, medium-dark-gray, silty
18	9657-9661	Coal
19	9661-9670	Shale, dark-gray to black, carbonaceous
20	9670-9676	Sandstone, medium-light-gray, very fine grained,
21		silty, slightly limy
22	9676-9679	Coal
23	9679-9682	Shale, black, carbonaceous
24	9682-9685	Siltstone, brownish-gray, slightly limy, micaceous
25	9685-9692	Shale, dark-gray, carbonaceous

1	9692-9694	Coal
2	9694-9698	Shale, medium-dark-gray, carbonaceous fragments
3	9698-9700	Sandstone, similar to above
4	9700-9702	Shale, medium-dark-gray
5	9702-9710	Sandstone, medium-light-gray, fine- to medium-grained, many dark-gray and yellowish-brown grains,
6		limy
7		limy
8	9710-9717	Sandstone, medium-light-gray, very fine to fine-grained, silty, limy
9		
10	9717-9720	Siltstone, medium-dark-gray, micaceous
11	9720-9721	Coal
12	9721-9726	Shale, medium-gray, carbonaceous fragments
13	9726-9730	Shale, medium-dark gray, silty, micaceous, carbonaceous fragments
14		
15	9730-9733	Coal
16	9733-9743	Shale, similar to above
17	9743-9748	Core 18; reported recovery 5 ft. (2 trays)
18	Tray 1	(0.4 ft. core)
19	9743-9743.4	Siltstone, medium-gray, mostly very finely sandy, shaly in part, micaceous, slightly limy in part, hard, many medium-dark-gray glassy grains, mostly clay bedded, some interfingering of sandy and shaly beds, no carbonaceous fragments
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9743-9743.4

Missing

Tray 2

(1.7 ft. core; highly in part)

1	9745.5-9747.2	Siltstone and shale: siltstone, similar to above,
2		not limy, obscure very thin to thin bedded, few
3		carbonaceous fragments; shale, medium-dark-gray,
4		very silty, not limy, hard, slightly micaceous,
5		scattered very fine sand grains, obscure platy to
6		very thin bedded, few carbonaceous fragments
7		partly at high angle to bedding; probably very
8		little or no apparent dip
9	9747.2-9748	Missing
10	9748-9756	Shale, medium-dark-gray, silty
11	9756-9762	Shale, medium-gray, abundant fine carbonaceous
12		fragments
13	9762-9768	Sandstone, medium-light-gray, very fine to fine-
14		grained, many dark-gray grains, light-olive-gray
15		tint in part, silty, limy
16	9768-9774	Sandstone, medium-light-gray, fine- to medium-
17		grained, dark-gray grains as above, few yellowish-
18		brown dolomite grains and light-green grains,
19		silty, slightly limy; some interbedded gray shale
20	9774-9780	Sandstone, similar to above, few coarse grains and
21		granules (caving?), fairly porous?
22	9780-9784	Coal
23	9784-9790	Shale, medium-dark- to dark-gray, silty
24	9790-9792	Shale, black, carbonaceous, coal stringers

1	9802-9803	Sandstone, medium-light-gray, very fine grained,
2		silty, slightly limy
3	9803-9810	Coal; few thin lenses of brownish-black dolomitic(?)
4		siltstone
5	9810-9820	Shale, medium-gray, carbonaceous fragments; some
6		interbedded dark-gray carbonaceous shale
7	9820-9827	Shale, dark-gray to black, carbonaceous
8	9827-9829	Siltstone, brownish-gray, limy; sandstone similar
9		to above
10	9829-9840	Shale, dark-gray, carbonaceous
11	9840-9841	Coal
12	9841-9848	Shale, black, carbonaceous
13	9848-9860	Shale, dark-gray, carbonaceous
14	9860-9870	Shale, medium-dark-gray, carbonaceous fragments
15	9870-9880	Siltstone, medium-dark-gray to dark-brownish-gray,
16		micaceous; interbedded shale as above
17	9880-9884	Shale, black, carbonaceous, coal stringers
18	9884-9895	Shale, medium-gray, carbonaceous fragments; inter-
19		bedded brownish-gray slightly limy siltstone
20	9895-9898	Shale, dark-gray, carbonaceous, slightly micaceous
21	9898-9906	Coal and black carbonaceous shale
22	9906-9907	Coal
23	9907-9910	Shale, dark-gray, carbonaceous
24	9910-9914	Siltstone, medium-dark-gray, micaceous, very fine
25		grained

1	9914-9937	Shale, dark-gray, carbonaceous; interbedded silt-
2		stone as above
3	9937-9950	Sandstone, medium-light-gray, very fine to fine-
4		grained, few medium grains, dark-gray grains,
5		silty, limy; interbedded shale as above
6	9950-9955	Shale, black, carbonaceous
7	9955-9957	Coal
8	9957-9960	Shale, black, carbonaceous
9	9960-9978	Shale, medium-gray, carbonaceous fragments
10	9978-9995	Shale, medium-dark-gray, silty, slightly micaceous,
11		carbonaceous fragments; interbedded medium-gray
12		shale
13	9995-10,004	Shale, dark-gray to black, carbonaceous, coal
14		stringers
15	10,004-10,006	Siltstone, medium-dark-gray, slightly micaceous
16	10,006-10,015	Shale, dark-gray to black, carbonaceous
17	10,015-10,030	Shale, dark-gray, silty, micaceous, carbonaceous
18	10,030-10,032	Coal
19	10,032-10,037	Shale, black, carbonaceous, coal stringers
20	10,037-10,040	Shale, dark-gray
21	10,040-10,048	Shale, dark-gray, silty, micaceous, carbonaceous
22	10,048-10,050	Siltstone, medium-dark-gray, micaceous, carbonaceous
23		fragments
24	10,050-10,052	Sandstone, medium-light-gray, fine-grained, some
25		medium grains (coarse?), silty, limy

1	10,052-10,054	Siltstone, as above
2	10,054-10,057	Shale, dark-gray, carbonaceous
3	10,057-10,062	Siltstone, as above
4	10,062-10,067	Shale, dark-gray, carbonaceous, coal stringers
5	10,067-10,092	Shale, medium-dark-gray, partly silty, carbonaceous fragments
6		
7	10,092-10,094	Sandstone, medium-light-gray, fine-grained, some medium grains, dark-gray and green grains, silty, limy, caving?
8		
9		
10	10,094-10,096	Shale, as above
11	10,096-10,098	Sandstone, medium-gray, very fine grained, silty
12	10,098-10,100	Shale, dark-gray, carbonaceous
13	10,100-10,104	Shale, black, carbonaceous
14	10,104-10,106	Siltstone, dark-gray, carbonaceous fragments
15	10,106-10,108	Shale, black, carbonaceous
16	10,108-10,110	Coal
17	10,110-10,113	Shale, black, carbonaceous
18	10,113-10,120	Shale, medium-gray, carbonaceous fragments
19	10,120-10,125	Shale, dark-gray, carbonaceous
20	10,125-10,130	Shale, black, carbonaceous, coal stringers
21	10,130-10,164	Shale, medium-dark-gray, carbonaceous fragments
22	10,164-10,170	Sandstone, medium-light-gray, fine- to coarse-grained, some very coarse grains and granules of subangular quartz and gray and red chert, limy
23	10,170-10,171	Shale, medium-dark-gray, carbonaceous fragments

1	10,172-10,174	Sandstone, medium-light-gray, fine- to medium-
2		grained, limy
3	10,174-10,181	Shale, dark-gray, silty, carbonaceous, micaceous
4	10,181-10,183	Sandstone, medium-light-gray, very fine grained,
5		silty
6	10,183-10,185	Shale, dark-gray, carbonaceous
7	10,185	Estimated sample lag 15 ft.
8	10,185-10,188	Limestone, brownish-gray, very fine grained, very
9		argillaceous, scattered black specks
10	10,188-10,202	Shale, medium-dark-gray, carbonaceous fragments
11	10,202-10,205	Coal
12	10,205-10,208	Shale, black, carbonaceous
13	10,208-10,215	Shale, medium- to medium-dark-gray, carbonaceous
14		fragments
15	10,215-10,244	Electrical-log interpretation; no samples from
16		10,230 to 10,250; assumed 15-ft. sample lag
17	10,215-10,230	Shale; interbedded siltstone
18	10,230-10,244	Siltstone
19	10,244-10,259	Core 19; reported recovery 15 ft. (6 trays)
	Core 2	(2 ft. core)

- 1 10,244-10,244.7 Siltstone, medium-gray, very finely sandy, hard,
2 slightly limy in part, abundant yellowish-brown
3 clayey grains in few thin beds, micaceous, ir-
4 regular platy to very thin bedded, some carbo-
5 naceous fragments and scattered small coal frag-
6 ments; includes a few beds and lenses (<1 in.
7 thick) of medium-dark-gray silty shale and, in
8 lower half, some very fine grained very silty
9 sandstone; apparent dip about 2 degrees
- 10 10,244.7-10,246 Sandstone, medium-light-gray, speckled ("salt and
11 pepper"), mottled with yellowish-brown, medium-
12 to coarse-grained, some very coarse grains, scat-
13 tered rounded granules and small pebbles (up to
14 1/2 in.), subangular, many dark-gray to black
15 basalt(?) grains, some medium- to dark-gray,
16 green and red chert grains and yellowish-brown
17 clayey ironstone(?) grains, very limy, slightly
18 silty and micaceous, hard, massive (no apparent
19 bedding), one vertical fracture (core was not
20 sawed), probably low porosity
- 21 10,246-10,246.5 Missing
- 22 Tray 2 (1.5 ft. core)
- 22 10,246.5-10,247.5 Sandstone and some shale, similar to above

1 10,247.5-10,248 Sandstone, similar to above but mostly fine- to
 2 medium-grained, upper 1.5 in. includes many
 3 rounded granules and pebbles (maximum dimension
 4 exceeds 2 in.) of basalt(?), quartz, quartzite,
 5 and green chert, no granules or pebbles in re-
 6 mainder of sandstone, one near-vertical fracture,
 7 probably low porosity

8 10,248-10,249 Missing
 9 Tray 3 (1.5 ft. core)

10 10,249-10250.5 Sandstone, as above, few coarse and very coarse
 11 grains, scattered granules and pebbles (up to 1/2
 12 in.), massive; includes at top a 1.5 in.-bed of
 13 medium-dark-gray slightly silty nonlaminar shale
 14 with no carbonaceous fragments; vertical fracture
 15 in upper part (probably extends downward but not
 16 seen in our half of core); probably low porosity

17 10,250.5-10,251.5 Missing
 18 Tray 4 (1.5 ft. core)

10,251.5-10,252.2 Siltstone and shale; siltstone, medium-light- to medium-gray, mostly very finely sandy, slightly limy and micaceous, hard, fairly abundant yellowish-brown clayey grains, includes some very fine grained silty sandstone and numerous thin (up to 1/4 in.) very irregular medium-dark-gray silty shale lenses, platy to very thin irregular bedding, carbonaceous films and fragments sub-parallel to bedding; shale (upper 3 in. of unit), medium-dark- to dark-gray, slightly silty, not limy, hard, poor platy bedded, few small carbonaceous fragments

10,252.2-10,253 Sandstone, medium-light-gray, speckled ("salt and pepper"), fine- to medium-grained, silty, slightly limy and micaceous, many dark-gray to black basalt(?) grains, subangular, fairly friable, massive (no apparent bedding), probably fairly good porosity; basalt(?) part of unit (may be out of place) is bright coal (1 in. thick) and shale similar to above (1/2 in. thick)

10,253-10,254 Missing

Tray 5 (1.5 ft. \pm core, bubbly in part)

10,254-10,255.5 Sandstone, conglomeratic sandstone, shale, coal, and siltstone, seemingly interbedded but relative positions of several beds questionable; sandstone (at top), 5.5 in. thick, similar to above but not limy in lower part; conglomeratic sandstone, medium-light-gray, fine- to very coarse grained, slightly limy and silty, many rounded granules and pebbles (up to 1 in. diameter) of quartz, quartzite, basalt(?), and gray chert, no apparent bedding, fairly friable, probably good porosity in part; shale, dark-gray to black, carbonaceous, abundant coal film and stringers, hard, well developed "slickensides" associated with large coalified plant fragment, fissile to platy bedded; coal, about 2 in. thick, bright, banded; siltstone, 1.5 in. thick, medium-gray, very finely sandy, slightly limy and micaceous, many yellowish-brown clayey grains, fairly hard, many small carbonaceous fragments

10,255.5-10,256.5 Missing

Trey 6 (1.4 ft. 1 core, rubble in part)

10,256.5-10,257.9 Sandstone, conglomeratic similar to above, few pink quartzite pebbles, maximum dimension of pebbles about 2 in.; includes a few chunks of bright coal up to 1 in. thick

1	10,257.9-10,259	Missing
2	10,259-10,291	Core 20; reported recovery 32 ft. (12 trays)
3	Tray 1	(0.8 ft. \pm core, rubbly in part)
4	10,259-10259.8	Sandstone and some shale, seemingly interbedded but
5		relative positions of some beds questionable;
6		sandstone, medium-light-gray, speckled ("salt and
7		pepper"), in part fine- to medium-grained and
8		silty, some medium- to very coarse grained, con-
9		glomeratic in part with rounded granules and
10		pebbles (up to 1-1/4 in.) similar to above,
11		slightly limy in part, includes a 1-in. bed of
12		platy-bedded very fine grained silty very
13		limy sandstone with abundant yellowish-brown dolo-
14		mitic(?) clayey grains and much carbonaceous
15		material on bedding planes; shale, medium-gray
16		with many small mostly randomly oriented plant
17		fragments; some dark-gray to brownish-black
18		carbonaceous shale; unit includes a 1-in. bed of
19		medium-dark-gray very finely sandy uniformly
20		fissile-bedded siltstone with abundant carbon-
21		aceous material on bedding
22	10,259.8-10,261.7	Missing
23	Tray 2	(1.4 ft. core)

10,261.7-10,263.1 Sandstone, conglomeratic, medium-light-gray, speckled ("salt and pepper"), medium- to very coarse grained, subangular, abundant rounded granules and pebbles (maximum dimension about 2 in.) of basalt(?), quartz, quartzite, gray, green, and red chert, and light-green conglomerite(?), silty, much white clay or fine silt matrix, few coal films, few very thin brownish-gray silty shale lenses, fairly friable, becomes coarser downward and lower 5 in. is a conglomerate; top 3.5 in. is medium-gray very finely sandy siltstone with abundant yellowish-brown clayey grains, finely divided carbonaceous material, and a few paper-thin coal lenses

10,263.1-10,264.4 Missing

Tray 3 (1.9 ft. core)

10,264.4-10,266.3 Sandstone, medium-light-gray, speckled ("salt and pepper"), fine- to medium-grained, many dark-gray to black grains and yellowish-brown clayey grains, subangular, silty, slightly lity in part, few paper-thin coal lenses, fairly friable, conglomeratic bed (1-1/2 in. thick) about 1/4 in. below top and another(?) about 4 in. above base, fairly good porosity(?); lower part(?) includes medium-gray chert pebbles in one bed about 1 in. thick

- 1 10,266.3-10,267.1 Missing
- 2 Tray 4 (2 ft. core, rubbly in upper part)
- 3 10,267.1-10,269.1 Sandstone, similar to above, medium- to coarse-
- 4 grained in part, very conglomeratic in upper 5 in.
- 5 (largest pebble 2-1/4 in. x 2 in. x 1-1/2 in.) and
- 6 slightly to moderately conglomeratic in most of
- 7 remainder, massive (no apparent bedding), prob-
- 8 ably fairly good porosity
- 9 10,269.1-10,269.8 Missing
- 10 Tray 5 (1.1 ft. core)
- 11 10,269.8-10,270.9 Sandstone, similar to above, scattered rounded
- 12 granules and pebbles (up to 1-1/4 in. long) in
- 13 lower half
- 14 10,270.9-10,272.5 Missing
- 15 Tray 6 (1.7 ft. core)
- 16 10,272.5-10,274.2 Sandstone, similar to above, mostly fine- to medium-
- 17 grained, some coarse and very coarse grains,
- 18 scattered rounded granules and pebbles (mostly <
- 19 1/4 in., one pebble about 1 in.), several very
- 20 thin (1/16 in.) coal stringers in upper 1.5 in.,
- 21 massive
- 22 10,274.2-10,275.2 Missing
- 23 Tray 7 (2.2 ft. core, rubbly in small part)
- 24
- 25

10,275.2-10,277.4 Sandstone, similar to above, in part fine- to coarse-grained and silty and clayey, very conglomeratic in 0.7 ft. zone 0.4 ft. below top and in basal 0.4 ft., pebbles similar to above and as much as 3/4 in. long, few carbonaceous and clayey laminae in upper 0.4 ft., probably fairly good porosity; tray includes near top(?) a chunk of light-olive-gray shale (3/8 in.) with scattered carbonaceous fragments and a chunk of dark-gray hard carbonaceous shale (3/4 in.) with "slickensides" and many coal films

10,277.4-10,277.9 Missing

Tray 8 (1.7 ft. core)

10,277.9-10,279.6 Sandstone, medium-light-gray, speckled ("salt and pepper"), fine- to medium-grained, coarse and very coarse grains in parts, subangular, scattered rounded granules and pebbles (mostly <1/2 in. but one exceeds 1-1/4 in.) of basalt(?), quartz, and gray, red, and green chert, silty, white and brown clay, slightly limy, few coal stringers (1/16 in.) near top, few coal grains mostly in coarser parts, massive (no apparent bedding), fairly friable, probably fairly good porosity; includes near top(?) a chunk of medium-dark-gray hard carbonaceous shale (3/4 in.) with coal fragments

1	10,279.6-10,280.6	Missing
2	Tray 9	(1.3 ft. core)
3	10,280.6-10,281.9	Sandstone, similar to above, medium- to very coarse
4		grained with granules and pebbles (about 1/4 in.)
5		in top 1 in. and basal 7 in., few carbonaceous and
6		coal files near base, probably fairly good porosity
7	10,281.9-10,283.3	Missing
8	Tray 10	(1.7 ft. core)
9	10,283.3-10,283.6	Siltstone, medium- to medium-dark-gray, very finely
10		sandy, slightly limy, hard, platy irregular bed-
11		ded, carbonaceous material on bedding, few coal
12		fragments, one large leaf impression on top, prob-
13		ably little or no apparent dip
14	10,283.6-10,285	Sandstone, similar to above, abundant similar rounded
15		granules and pebbles (mostly <1/2 in. but one is
16		1-3/8 in. long) in lower 10 in., massive, prob-
17		ably fairly good porosity
18	10,285-10,286	Missing
19	Tray 11	(1.8 ft. \pm core, rubble in part)
20	10,286-10,287.8	Sandstone, similar to above, rounded granules and
21		pebbles as above (mostly 1/4 in. - 1 in. but one is
22		1-3/4 in. long) abundant in upper 1 ft. and scat-
23		tered in remainder, one large carbonaceous plant
24		impression near middle: includes near middle(?)
25		some dark-gray carbonaceous shale (1 in. thick)
26		and some bright sand (1/2 in. thick)

1	10,287.8-10,288.7	Missing
2	Tray 12	(1.4 ft. \pm core, rubbly in part)
3	10,288.7-10,290.1	Sandstone, similar to above, fairly abundant pebbles
4		similar to above; includes 3-1/2-in. bed of bony
5		coal and dark-gray to black carbonaceous shale
6		about 5 in. below top; probably little or no
7		apparent dip on coal
8	10,290.1-10,291	Missing
9	10,291-10,294	Sandstone, similar to above
10	10,294-10,300	Shale, medium-dark-gray, silty, micaceous, carbonaceous fragments
11		
12	10,300-10,310	Shale, dark-gray to black, carbonaceous, coal
13		stringers
14	10,310-10,338	Shale, medium-dark-gray, carbonaceous fragments
15	10,338-10,339	Coal
16	10,339-10,346	Shale, dark-gray, carbonaceous
17	10,346-10,348	Siltstone, medium-dark-gray
18	10,348-10,370	Shale, medium-dark-gray, carbonaceous fragments
19	10,370-10,375	Shale, medium- to medium-dark-gray, silty, micaceous,
20		carbonaceous fragments
21	10,375-10,386	Siltstone, medium-gray, very finely sandy, micaceous
22		
23	10,386-10,390	Sandstone, medium-light-gray, fine- to medium-
24		grained, many dark-gray grains and yellowish-
25		brown clay grains, silty, limy

1	10,390-10,392	Sandstone, medium-gray, very fine grained, very
2		silty, slightly limy
3	10,392-10,394	Shale, medium-dark-gray
4	10,394-10,411	Sandstone, medium-light-gray, fine- to medium-
5		grained, some coarse and very coarse grains and
6		granules of quartz, basalt(?), gray and red chert,
7		silty, slightly limy, mostly drills loose
8	10,411-10,416	Shale, medium-dark- to dark-gray, carbonaceous frag-
9		ments
10	10,416-10,425	Core 21; no recovery; lithology described from
11		rotary samples
12	10,426-10,428	Shale, as above
13	10,428-10,434	Sandstone, similar to above, slightly coarser(?),
14		few light-blue and bluish-green grains
15	10,434-10,440	Shale, medium- to medium-dark-gray
16	10,440-10,450	Siltstone, medium-dark-gray, micaceous; interbedded
17		shale as above
18	10,450-10,453	Shale, as above
19	10,453-10,460	Shale, dark-gray, carbonaceous
20	10,460-10,473	Shale, medium- to medium-dark-gray, carbonaceous
21		fragments
22	10,473-10,481	Shale, dark-gray, silty, micaceous, carbonaceous
23	10,481-10,497	Shale, dark-gray to black, carbonaceous
24	10,497-10,500	Coal and black carbonaceous shale
25	10,500-10,512	Shale, dark-gray, carbonaceous

1	10,512-10,525	Shale, black, carbonaceous, coal stringers
2	10,525-10,538	Shale, medium-dark-gray, carbonaceous fragments
3	10,538-10,543	Core 22; no recovery; rotary sample indicates shale
4		as above
5	10,543-10,550	Limestone, dusky-yellow-brown to medium-dark-gray,
6		very fine grained, very silty, micaceous, carbonaceous fragments
7		
8	10,550-10,560	Shale, medium- to medium-dark-gray, carbonaceous
9		fragments
10	10,560-10,569	Shale, medium-dark-gray, silty, micaceous, carbonaceous fragments
11		
12	10,569-10,578	Sandstone, medium-light- to medium-gray, very fine to fine-grained, silty
13		
14	10,578-10,580	Sandstone, medium-gray, very fine to fine-grained, silty, limy, fine carbonaceous material
15		
16	10,580-10,600	Shale, medium-dark-gray, carbonaceous fragments
17	10,600-10,607	Shale, dark-gray to black, carbonaceous, coal stringers
18		
19	10,607-10,613	Sandstone, medium-light- to medium-gray, fine-grained, some medium grains, silty, slightly limy
20		
21	10,613-10,620	Shale, medium-gray, silty, micaceous; interbedded medium-light-gray very fine to fine-grained silty slightly limy sandstone
22		
23	10,620-10,627	Coal or interbedded sandstone similar to above

1	10,622-10,630	Sandstone, medium-light-gray, fine- to medium-
2		grained, some coarse and very coarse grains and
3		rounded granules of quartz, basalt(?), gray and
4		red chert, slightly silty, limy
5	10,630-10,637	Sandstone, medium-gray, very fine to fine-grained,
6		many dark-gray grains, silty, very limy, tight
7	10,637-10,642	Core 23; no recovery; lithology described from
8		rotary samples
9	10,637-10,647	Shale, medium-dark-gray, silty, micaceous, fine
10		carbonaceous fragments
11	10,647-10,650	Siltstone, medium-dark-gray, micaceous, fine carbo-
12		naceous fragments
13	10,650-10,655	Shale, as above
14	10,655-10,660	Siltstone, medium-dark-gray, very finely sandy,
15		micaceous, carbonaceous fragments
16	10,660-10,666	Shale, dark-gray to black, carbonaceous, coal
17		stringers
18	10,666-10,676	Sandstone, medium-light-gray, fine- to coarse-
19		grained, some very coarse grains and rounded
20		granules similar to above and light-green quartz-
21		ite and light-gray igneous rock, slightly silty,
22		limy
23	10,676-10,682	Siltstone, medium-gray, very finely sandy, slightly
24		limy
25		

1	10,682-10,685	Siltstone, medium-dark-gray, limy, hard, tight,
2		carbonaceous films, looks like limestone
3	10,685-10,687	Shale, medium-dark-gray
4	10,687-10,690	Siltstone, medium-dark-gray, micaceous, fine carbonaceous fragments
5		
6	10,690-10,700	Shale, dark-gray to black, carbonaceous, coal stringers
7		
8	10,700-10,711	Shale, medium-dark-gray, silty, carbonaceous fragments
9		
10	10,711-10,714	Siltstone, medium-gray, micaceous, slightly limy, carbonaceous fragments
11		
12	10,714-10,720	Shale, as above
13	10,720-10,738	Siltstone, as above; interbedded with shale as above
14	10,738-10,745	Shale, medium-dark-gray, silty, carbonaceous fragments
15		
16	10,745-10,748	Siltstone, as above
17	10,748-10,752	Sandstone, medium-light-gray, very fine to fine-grained, silty, slightly limy, carbonaceous fragments
18		
19		
20	10,752-10,758	Sandstone, medium-light-gray, fine- to medium-grained, some coarse and very coarse grains and granules as above, silty, limy
21		
22		
23	10,758-10,761	Sandstone, medium-light-gray, very fine grained, silty, micaceous, fine carbonaceous fragments
24		
25	10,761-10,764	Shale, medium-dark-gray

1	10,764-10,778	Siltstone, medium- to medium-dark-gray, micaceous,
2		slightly limy, fine carbonaceous material; inter-
3		bedded shale as above
4	10,778-10,814	Shale, medium-dark- to dark-gray, carbonaceous
5		fragments
6	10,814-10,817	Shale, black, carbonaceous
7	10,817-10,819	Coal
8	10,819-10,839	Shale, black, carbonaceous
9	10,839-10,843	Coal
10	10,843-10,845	Shale, black, carbonaceous
11	10,845-10,856	Shale, medium- to medium-dark-gray, carbonaceous
12		fragments
13	10,856-10,865	Shale, light-gray to light-olive-gray, silty, non-
14		bedded(?), scattered very fine carbonaceous
15		material
16	10,865-10,875	Shale, medium-light-gray, clayey, some carbonaceous
17		fragments, caving?
18	10,875-10,897	Shale, medium-dark-gray
19	10,897-10,900	Shale, black, carbonaceous, coal stringers with
20		calcite "veins"
21	10,900-10,904	Siltstone, medium-dark-gray, micaceous, much fine
		carbonaceous material

1	10,904-10,908	Sandstone, medium-light-gray to light-olive-gray,
2		fine- to medium-grained, some coarse and very
3		coarse grains and rounded granules and small
4		pebbles of quartz, basalt(?), and chert, silty,
5		limy
6	10,908-10,910	Sandstone, medium-gray, very fine grained, silty,
7		slightly limy, carbonaceous fragments
8	10,910-10,917	Sandstone, similar to that at 10,904-10,908
9	10,917-10,920	Siltstone, medium-dark-gray, very finely sandy, much
10		fine carbonaceous material and coal stringers
11	10,920-10,936	Sandstone, similar to above, granules and pebbles
12		of igneous and metamorphic rocks
13	10,936-10,938	Siltstone, dark-gray to black, very carbonaceous,
14		coaly
15	10,938-10,946	Shale, dark-gray, carbonaceous
16	10,946-10,960	Shale, black, carbonaceous, coal stringers
17	10,960-10,971	Shale, medium-dark- to dark-gray, carbonaceous
18	10,971-10,980	Siltstone, medium-gray, micaceous; interbedded shale
19		as above
20	10,980-11,006	Shale, medium-gray, carbonaceous fragments
21	11,006-11,013	Shale, black, carbonaceous, coal stringers
22	11,013-11,037	Shale, dark-gray, carbonaceous
23	11,032-11,036	Limestone, brownish-gray, very fine grained, very
24		silty, hard, carbonaceous fragments

1	11,036-11,040	Sandstone, yellowish-brown, fine- to medium-grained,
2		few coarse grains, some dark-gray grains, silty,
3		very limy, low porosity?
4	11,040-11,048	Sandstone, medium-light-gray, fine- to coarse-
5		grained, some granules and small pebbles of
6		quartz, quartzite, granite, and chert, silty, limy
7	11,048-11,053	Sandstone, medium-light- to medium-gray, very fine
8		to fine-grained, silty, slightly limy
9	11,053-11,061	Shale, dark-gray to black, carbonaceous
10	11,061-11,063	Coal
11	11,063-11,067	Shale, dark-gray, carbonaceous
12	11,067-11,075	Shale, medium- to medium-dark-gray, carbonaceous
13		fragments
14	11,075-11,086	Shale, medium-dark-gray, silty, micaceous, carbo-
15		naceous fragments
16	11,086-11,090	Siltstone, medium- to medium-dark-gray, micaceous,
17		carbonaceous fragments
18	11,090-11,104	Shale, medium-dark- to dark-gray, silty, micaceous,
19		carbonaceous
20	11,104-11,106	Coal
21	11,106-11,120	Shale, black, carbonaceous
22	11,120-11,135	Shale, medium- to dark-gray, carbonaceous fragments
23	11,135-11,168	Shale, medium-dark-gray, silty, carbonaceous material
24	11,168-11,180	Shale, black, carbonaceous, coal stringers

1	11,180-11,190	Shale, medium-dark-gray, silty, carbonaceous frag-
2		ments
3	11,190-11,197	Siltstone, medium-gray, limy, carbonaceous fragments
4	11,197-11,205	Shale, medium-dark-gray, carbonaceous fragments
5	11,205-11,225	Shale, medium-dark-gray, silty, micaceous, carbonaceous fragments
6		
7	11,225-11,249	Shale, dark-gray, slight brownish tint; carbonaceous
8		in part
9	11,249-11,251	Coal
10	11,251-11,254	Shale, black, carbonaceous
11	11,254-11,270	Shale, medium-dark- to dark-gray, carbonaceous frag-
12		ments
13	11,270-11,280	Shale, dark-gray, silty, carbonaceous fragments
14	11,280-11,287	Shale, black, carbonaceous; thin coal bed near
15		middle
16	11,287-11,299	Shale, medium- to medium-dark-gray, carbonaceous
17		fragments
18	11,299-11,310	Siltstone, medium- to medium-dark-gray, micaceous,
19		carbonaceous fragments; interbedded medium-dark-
20		to dark-gray shale with carbonaceous fragments
21	11,310-11,332	Shale, as above; some interbedded siltstone as
22		above
23	11,332-11,335	Coal
24	11,335-11,347	Shale, black, carbonaceous; coal

1	11,347-11,353	Sandstone, medium-gray, slight brownish tint, very
2		fine to fine-grained, many dark-gray grains,
3		silty, limy, low porosity?
4	11,353-11,356	Shale, medium-gray, silty, micaceous; medium-gray
5		micaceous siltstone.
6	11,356-11,364	Sandstone, medium-light-gray, fine- to medium-
7		grained, some coarse and very coarse grains and
8		granules, some dark-gray grains, limy, mostly
9		drills loose
10	11,364-11,365	Shale, medium-gray
11	11,365-11,369	Sandstone, medium-gray, very fine grained, silty,
12		limy
13	11,369-11,370	Shale, medium-gray
14	11,370-11,376	Siltstone, medium-gray, very finely sandy, limy,
15		micaceous
16	11,376-11,379	Siltstone, medium-dark-gray, micaceous, very fine
17		carbonaceous fragments
18	11,379-11,382	Shale, black, carbonaceous
19	11,382-11,390	Shale, dark-gray, some brown tint, carbonaceous
20		fragments; some medium-dark-gray micaceous silt-
21		stone and very fine carbonaceous fragments near
22		middle
23	11,390-11,415	Siltstone, as above; interbedded shale as above
24	11,415-11,416	Coal
25	11,416-11,420	Shale, dark-gray

1	11,420-11,422	Limestone, dusky-yellowish-brown, very fine grained,
2		very argillaceous, caving?
3	11,422-11,425	Siltstone, medium-gray, very finely sandy, limy,
4		micaceous
5	11,425-11,428	Shale, dark-gray
6	11,428-11,436	Shale, black, carbonaceous, coal stringers
7	11,436-11,440	Shale, dark-gray
8	11,440-11,443	Siltstone, medium-gray, micaceous
9	11,443-11,448	Shale, dark-gray
10	11,448-11,450	Limestone, dusky-yellowish-brown, mottled medium-
11		gray, very fine grained, very silty, fish scales(?),
12		carbonaceous fragments
13	11,450-11,454	Shale, dark-gray
14	11,454-11,456	Limestone, medium- to medium-dark-gray, very fine
15		grained, very silty, fossils as above, caving?
16	11,456-11,460	Siltstone, dark-gray to black, very carbonaceous,
17		caving?
18	11,460-11,477	Shale, dark-gray to black, carbonaceous, coal
19		stringers
20	11,477-11,480	Coal
21	11,480-11,500	Shale, black, carbonaceous; few thin coal beds
22	11,500-11,504	Coal, bright
23	11,504-11,510	Shale, dark-gray to black, carbonaceous
24	11,510-11,522	Shale, dark-gray, silty, carbonaceous
25	11,522-11,524	Coal, bright

1	11,524-11,526	Shale, dark-gray
2	11,526-11,533	Siltstone, medium-gray, micaceous, very fine carbonaceous fragments
3		
4	11,533-11,536	Shale, medium-dark-gray
5	11,536-11,540	Siltstone, medium-gray, very finely sandy, limy
6	11,540-11,546	Shale, medium- to medium-dark-gray, silty, carbonaceous fragments
7		
8	11,546-11,548	Coal
9	11,548-11,555	Shale, black, carbonaceous
10	11,555-11,563	Shale, dark-gray, carbonaceous
11	11,563-11,568	Sandstone, medium-gray, very fine grained, silty, micaceous, slightly limy, carbonaceous fragments
12		
13	11,568-11,570	Shale, dark-gray
14	11,570-11,572	Coal; black carbonaceous shale
15	11,572-11,577	Sandstone, similar to above
16	11,577-11,580	Shale, medium-dark-gray, carbonaceous fragments
17	11,580-11,590	Sandstone, medium-gray, fine- to medium-grained, few coarse grains, dark-gray grains, silty, clayey, coal and carbonaceous fragments
18		
19		
20	11,590-11,594	Sandstone, similar to above, light-olive-gray in part, some coarse and very coarse green grains
21		
22	11,594-11,598	Shale, medium-dark-gray
23	11,598-11,610	Sandstone, medium-light-gray, fine- to medium-grained, some coarse and very coarse grains and granules of quartz, quartzite, gray, red, and green chert, limy, silty, clayey?
24		
25		

1	11,610-11,620	Sandstone, light-olive-gray, fine- to medium-
2		grained, many dark-gray grains, silty, limy
3	11,620-11,625	Shale, medium-dark-gray, carbonaceous fragments
4	11,625-11,632	Siltstone, medium-dark-gray to olive-gray, mica-
5		ceous, carbonaceous fragments; interbedded olive-
6		black shale
7	11,632-11,648	Shale, medium-dark-gray, slight brown tint, carbo-
8		naceous fragments
9	11,648-11,654	Sandstone, light-olive-gray, very fine grained,
10		silty, limy
11	11,654-11,660	Siltstone, light-olive-gray to greenish-gray, limy,
12		micaceous
13	11,660-11,667	Shale, dark-gray; interbedded siltstone as above
14	11,667-11,669	Siltstone, brownish-gray, limy, hard, looks like
15		limestone
16	11,669-11,673	Shale, dark-gray
17	11,673-11,684	Sandstone, medium-light-gray, fine- to medium-
18		grained, few coarse grains, many dark-gray and
19		olive-gray grains, silty, clayey, looks "dirty",
20		probably low porosity
21	11,684-11,693	Shale, medium-dark-gray, micaceous, silty; inter-
22		bedded sandstone similar to above
23	11,693-11,700	Shale, medium-dark- to dark-gray, carbonaceous

1	11,709-11,713	Sandstone, yellowish-brown, medium-grained, few
2		coarse grains, many dark-gray grains, some red,
3		green and olive-gray grains, silty, very limy,
4		hard, looks tight
5	11,713-11,718	Shale, medium-dark-gray
6	11,718-11,720	Sandstone, as above
7	11,720-11,732	Sandstone, medium-light-gray to light-greenish-gray,
8		fine- to medium-grained, many dark-gray grains,
9		silty, clayey, limy in part; interbedded dark-gray
10		shale
11	11,732-11,740	Sandstone, medium-light-gray, medium- to coarse-
12		grained, some very coarse grains and granules of
13		quartz, quartzite, green, red, and gray chert,
14		basalt(?), silty, limy
15	11,740-11,756	Sandstone, similar to above, includes small pebbles
16	11,756-11,758	Sandstone, greenish-gray, fine- to medium-grained,
17		many dark-gray grains, some coarse grains, silty,
18		clayey, slightly limy
19	11,758-11,760	Shale, medium-dark-gray, carbonaceous fragments
20	11,760-11,763	Sandstone, as above
21	11,763-11,766	Siltstone, dark-gray to black, very carbonaceous
22	11,766-11,774	Shale, black, carbonaceous; coal
23	11,774-11,781	Shale, dark-gray, carbonaceous
24	11,781-11,790	Siltstone, medium- to medium-dark-gray, micaceous,
		carbonaceous fragments; interbedded dark-gray shale

1	11,790-11,800	Shale, medium-dark-gray, silty, carbonaceous frag-
2		ments
3	11,800-11,813	Shale, medium-dark-gray, slight olive-gray tint in
4		part
5	11,813-11,818	Limestone, brownish-gray, very fine grained, very
6		argillaceous, hard, scattered very fine sand
7		grains in lower part, carbonaceous fragments
8	11,818-11,826	Shale, medium-dark-gray
9	11,826-11,829	Siltstone, medium-gray, micaceous, very fine carbo-
10		naceous fragments
11	11,829-11,830	Limestone, medium-gray, very fine grained, very
12		argillaceous
13	11,830-11,833	Siltstone, similar to above
14	11,833-11,836	Shale, brownish-black, hard, carbonaceous fragments
15	11,836-11,838	Siltstone, medium-dark-gray, micaceous, very fine
16		carbonaceous material
17	11,838-11,849	Shale, dark-gray, carbonaceous
18	11,849-11,850	Coal
19	11,850-11,870	Shale, dark-gray, carbonaceous
20	11,870-11,874	Siltstone, medium-dark-gray, micaceous, very fine
21		carbonaceous fragments
22	11,874-11,878	Shale, black, carbonaceous; bony coal
23	11,878-11,894	Sandstone, medium- to medium-dark-gray, very fine
24		to fine-grained, many dark-gray grains, silty,
25		clayey, "dirty"

1	11,881-11,890	Siltstone, similar to above
2	11,890-11,896	Sandstone, medium-gray, fine-grained, silty,
3		carbonaceous, abundant coal laminae and lenses
4	11,896-11,899	Siltstone, medium-dark-gray, micaceous, carbonaceous
5	11,899-11,900	Coal
6	11,900-11,908	Shale, medium-dark-gray, silty, micaceous; dark-
7		gray shale
8	11,908-11,915	Siltstone, olive-gray, micaceous, very fine carbo-
9		naceous fragments; interbedded medium-dark-gray
10		shale
11	11,915-11,918	Shale, black, carbonaceous; coal
12	11,918-11,933	Sandstone, medium-gray, fine- to medium-grained,
13		dark-gray grains, few rounded granules of quartz,
14		gray chert, basalt(?), silty; interbedded medium-
15		dark-gray shale in lower half
16	11,933-11,934	Shale, as above
17	11,934-11,938	Sandstone, medium-gray, very fine to fine-grained,
18		silty, limy, dark-gray grains as above
19	11,938-11,939	Shale, medium-dark- to dark-gray
20	11,939-11,948	Sandstone, medium-gray, very fine to fine-grained,
21		dark-gray grains, silty
22	11,948-11,950	Shale, as above; sandstone as above
23	11,950-11,968	Core 43 (redrilled hole): reported recovery 18 ft.
24		(8 trays)
25	Tray 1	(1 ft. ± core - probably)

- 1 11,950-11,951 Shale, medium-dark-gray, some olive-gray and dark-
 2 gray, mostly very silty, micaceous, not limy, hard,
 3 mostly poor platy to very thin bedded, small and
 4 large carbonaceous fragments and films fairly
 5 abundant and generally subparallel to bedding; in-
 6 cludes a few lenses (<1/2 in.) of medium-gray to
 7 olive-gray very finely sandy limy siltstone and a
 8 bed (1 in.?) of medium-light-gray speckled very
 9 fine to fine-grained silty sandstone with much
 10 white clay matrix
- 11 11,951-11,952.3 Missing
- 12 Tray 2 (1.3 ft. ± core, rubble in large part)
- 13 11,952.3-11,953.6 Siltstone and sandstone, interbedded; siltstone,
 14 medium-dark-gray to olive-gray, finely sandy,
 15 slightly micaceous, not limy, hard, abundant
 16 carbonaceous films and coal fragments; sandstone,
 17 medium-gray to olive-gray, very fine to fine-
 18 grained, many dark-gray grains, very silty and
 19 clayey, slightly micaceous, not limy, hard,
 20 irregular platy to very thin bedded, abundant
 21 carbonaceous films and coal fragments partly
 22 oriented at high angle to bedding; includes one
 23 chunk of sandstone similar to that in tray 1
- 24 11,953.6-11,954.5 Missing
- 25 Tray 3 (1.4 ft. ± core, rubble in large part)

- 1 11,954.5-11,955.9 Sandstone and siltstone similar to above, some
2 sandstone is fine to medium grained
- 3 11,955.9-11,956.8 Missing
- 4 Tray 4 (0.9 ft. core)
- 5- 11,956.8-11,957.7 Sandstone, medium-light- to medium-gray, speckled
6 ("salt and pepper"), fine-grained, some medium
7 grains, subangular, many dark-gray grains, silty,
8 much white clay matrix, slightly limy and mica-
9 ceous, poorly friable, probably medium-bedded
10 (no apparent bedding), fair porosity(?); top
11 1 in. \pm is sandy siltstone similar to above
- 12 11,957.7-11,959 Missing
- 13 Tray 5 (1.4 ft. core)
- 14 11,959-11,960.4 Sandstone, as above, core has one vertical fracture
- 15- 11,960.4-11,961.3 Missing
- 16 Tray 6 (2.3 ft. \pm core, rubbly in part)
- 17 11,961.3-11,963.6 Sandstone, similar to above, very fine to fine-
18 grained in large part, mostly not limy, vertical
19 fracture in some core pieces, platy to very thin
bedded in part as shown by several micaceous shaly
laminæ, apparent dip (cross bedding?) near
middle as much as 10 degrees
- 20 Tray 7 (1.9 ft. core)

- 1 11,963.6-11,965.5 Sandstone, medium-light- to medium-gray, speckled
 2 ("salt and pepper"), fine-grained, many medium
 3 grains in part, subangular, many dark-gray grains,
 4 silty, much white clay matrix, micaceous, slightly
 5 limy in part, poorly friable, mostly medium-bedded,
 6 abundant carbonaceous films and coal films in 2-in.
 7 part 8 in. below top, vertical fracture in most
 8 core fragments, probably fairly good porosity
- 9 11,965.5-11,965.8 Missing
- 10 Tray 8 (2.2 ft. core)
- 11 11,965.8-11,968 Sandstone, similar to above, not limy, carbonaceous
 12 films fairly common in lower 0.8 ft. and very
 13 scattered in remainder, vertical fracture in most
 14 core fragments, apparent dip (cross bedding?) near
 15 base as much as 5 degrees
- 16 11,968-11,996 Core 44 (redrilled hole); reported recovery 28 ft.
 17 (10 trays)
- 18 Tray 1 (0.9 ft. \pm core, rubble in part)
- 19 11,968-11,968.9 Sandstone, medium-light-gray, speckled ("salt and
 20 pepper"), fine- to medium-grained, subangular,
 21 many dark-gray to black grains, silty, limy, much
 22 white clay matrix and less limy in lower part,
 23 slightly micaceous, poorly friable, bedding ob-
 24 scure, vertical fracture in most core fragments,
 25 probably fairly good porosity; includes (near
 26 middle?) a thin bed (1 in.?) of olive-gray very
 27 fine grained silty clayey slightly limy sandstone
 28 with many carbonaceous films and fragments

11,968.9-11,970.8 Missing

Tray 2 (2 ft. core)

11,970.8-11,972.8 Sandstone, medium-light-gray, speckled ("salt and pepper"), mostly fine-grained, some fine- to medium-grained, few coarse grains to small pebbles ($3/8$ in.) in basal 2 in., subangular, many dark-gray to black grains, silty, few pin-point limy spots, much white clay matrix, slightly micaceous, poorly friable, many carbonaceous films and very thin coal stringers in upper half and inclined as much as 35 degrees to core axis (cross bedding?), vertical fracture as above, probably fairly good porosity; top 2.5 in. is dark-gray to dark-olive-gray silty nonlimy hard shale with carbonaceous fragments and several laminae of olive-gray limy siltstone

11,972.8-11,973.6 Missing

Tray 3 (1.4 ft. core)

11,973.6-11,975.4 Sandstone, similar to above, fine- to medium-grained, mostly medium-bedded, cross-bedded, top sharply separate dips up to 20 degrees, vertical fracture as above, probably fairly good porosity; top 1/2 in. bed of dark-gray silty carbonaceous shale

11,975.4-11,976.2

Tray 4 (2.1 ft. core)

11,976.4-11,977.7 Sandstone, similar to above, mostly medium-grained with some coarse and a few very coarse grains in lower half, one 3/8-in. quartz pebble 3 in. above base, cross bedded(?) in uppermost and basal parts, carbonaceous films mostly in upper part, one bright coal lense (1/8 in. x 1 in. x 3 in.) at base and oriented at about 30 degrees to core axis, vertical fracture in some core fragments

11,977.7-11,978.5 Sandstone, greenish-gray, very fine to fine-grained, many dark-gray grains, very silty, not limy, slightly micaceous, hard, platy somewhat lenticular and wavy bedded, many carbonaceous and coaly laminae, vertical fracture

11,978.5-11,979.2 Missing

Tray 5 (1.6 ft. core)

11,979.2-11,980.8 Sandstone, as above, medium-gray in part; basal 5 in. is light-olive-gray to medium-gray speckled fine- to medium-grained silty clayey sandstone

11,980.8-11,982 Missing

Tray 6 (1.2 ft. core)

1 11,982-11,983.8 Sandstone, light-olive-gray to medium-light-gray,
2 speckled ("salt and pepper"), fine- to medium-
3 grained, subangular, many dark-gray grains, silty,
4 clayey, few pin-point limy spots in lower part,
5 slightly micaceous, medium-bedded, few carbonaceous
6 and coaly fragments near top, no vertical frac-
7 ture, probably fairly good porosity

8 11,983.8-11,984.8 Missing

9 Tray 7 (2.5 ft. core)

10 11,984.8-11,987.3 Sandstone, similar to above, limy in upper-middle
11 part, many carbonaceous shaly laminae in lower-
12 middle part, basal 4 in. \pm is medium- to very
13 coarse grained silty clayey conglomeratic sand-
14 stone with rounded granules and pebbles (up to
15 1/2 in. long) of quartz, basalt(?), and chert and
16 a few carbonaceous coaly films, cross bedded(?)
17 in part with apparent dips up to 13 degrees

18 11,987.3-11,987.6 Missing

19 Tray 8 (0.9 ft. core)

1 11,987.6-11,988.5 Sandstone, light-olive-gray, speckled ("salt and
2 pepper"), medium-grained, many coarse and very
3 coarse grains and few granules in lower half, sub-
4 angular, many dark-gray grains, silty, clayey,
5 slightly limy and micaceous, several carbonaceous
6 films mostly in middle part, cross bedded(?) in
7 part with apparent dips of about 6 degrees, prob-
8 ably fairly good porosity

9 11,988.5-11,990.4 Missing

10 Tray 9 (1.2 ft. core)

11 11,990.4-11,991.6 Sandstone, light-olive-gray, speckled ("salt and
12 pepper"), fine- to medium-grained, subangular,
13 many dark-gray grains, silty, clayey, micaceous,
14 slightly limy in part, slightly friable, very
15 thin to thin bedded, cross bedded(?) with apparent
16 dips up to 10 degrees, many carbonaceous and coaly
17 films mostly in upper part, vertical fracture in
18 part of core

19 11,991.6-11,993.2 Missing

20 Tray 10 (2.4 ft. core)

1	11,993.2-11,995.6	Sandstone, similar to above, some coarse and very
2		coarse grains and few pebbles (up to 1/4 in.) in
3		8-in. zone 10 in. below top, limy streak near
4		base, mostly medium-bedded, some platy bedding,
5		cross bedded(?) with apparent dips of about 5
6		degrees-10 degrees, carbonaceous films and very
7		thin coal lenses fairly abundant in middle
8		(coarser) part and scattered in remainder, verti-
9		cal fracture in part of core, probably fairly good
10		porosity
11	11,995.6-11,996	Missing
12	11,996-12,009	Shale, medium-dark- to dark-gray, carbonaceous
13		fragments; some medium-light-gray fine- to
14		medium-grained silty sandstone in upper part
15	12,009-12,028	Sandstone, similar to above, some coarse grains and
16		granules of quartz, gray chert, basalt(?); inter-
17		bedded shale as above
18	12,028-12,030	Sandstone, medium-gray to moderate-brown, fine- to
19		coarse-grained, very limy, tight
20	12,030-12,034	Shale, dark-gray to black, carbonaceous
21	12,034-12,036	Sandstone, medium-light-gray, finer to medium-
22		grained, dark-gray grains, granules as above, silty
23	12,036-12,038	Siltstone, medium-gray, micaceous, carbonaceous
24		fragments

1	12,038-12,050	Sandstone, similar to above, abundant carbonaceous
2		material in part
3	12,050-12,056	Sandstone, medium-gray, fine- to medium-grained,
4		dark-gray grains, very silty
5	12,056-12,067	Sandstone, medium-gray, very fine to fine-grained,
6		very silty; interbedded medium-dark-gray shale
7	12,067-12,080	Core 45 (redrilled hole); reported recovery 13 ft.
8		(6 trays)
9	Tray 1	Missing (part might be included in tray 2)
10	Tray 2	(3 ft. \pm core)
11	12,069-12,072	Sandstone, olive-gray, faintly speckled, fine- to
12		medium-grained, many dark-gray grains, some
13		grains of coal, very silty, micaceous, slightly
14		laminar in part, firm, mostly medium-bedded, some
15		platy to very thin bedded, carbonaceous films and
16		very thin coal stringers in parts, apparent dips
17		up to 5 degrees, vertical fracture, fair porosity
18		(?); includes, at or near top, medium-dark-gray
19		very silty hard nodular shale about 1 in. thick
20	Tray 3	(4.1 ft. core)
21	12,072-12,072.5	Sandstone, similar to above, basal 2 in. includes
22		abundant carbonaceous films and very thin coal
23		stringers and is really very lamy

12,072.8-12,074.1 Sandstone, medium-dark-gray to olive-gray, very fine to fine-grained, some medium grains, very silty, micaceous, limy at top, hard, very thin to thin bedded, carbonaceous films on bedding, scattered very small coal fragments, apparent dip about 2 degrees-5 degrees, vertical fracture in part of core, fairly low porosity?

Tray 4 (1.6 ft. core)

12,074.1-12,075.7 Sandstone, olive-gray, medium-grained, some coarse grains and rounded pebbles (up to 3/4 in. long) of quartz, gray chert, and basalt(?) in upper 9 in., many dark-gray grains, silty, limy, slightly micaceous, slightly friable, mostly medium-bedded, very little carbonaceous material, vertical fracture, probably fairly good porosity; at 2-1/2 in. below top includes 2-1/2-in. bed of medium-dark-gray to olive-gray very fine grained very silty platy bedded hard sandstone with several carbonaceous laminas

Tray 5 (1 ft. ± core, rubble in part)

12,075.7-12,076.7 Sandstone, shale, and siltstone; sandstone (top 4-1/2 in.), olive-gray, very fine to fine-grained, some medium grains in lower part, many dark-gray grains, silty, not limy, slightly micaceous, hard, one bed, few grains of coal; sandstone (lower part), similar to above in part, one bed (1-1/4 in.?) of olive-gray medium- to very coarse grained nonlimy silty clayey very conglomeratic sandstone with rounded pebbles (up to 3/4 in. long) of quartz, chert, basalt(?), and dark-gray shale (position of bed uncertain); shale, dark-gray, partly silty, not limy, hard, some carbonaceous fragments and very thin coal stringers; siltstone, olive-gray to medium-dark-gray, very finely sandy in part, hard, many carbonaceous films and some coal lenses up to 1/4 in. thick

12,076.7-12,078 Missing
Tray 6 (0.5 ft. \pm core, rubble in large part)

12,078-12,078.5 Shale, medium-dark- to dark-gray, not silty or limy, hard, obscure bedding, many carbonaceous plant fragments and very thin coal stringers randomly oriented, some slickensides

12,078.5-12,080 Missing

12,080-12,100 Core 46 (redrilled hole); reported recovery 20 ft. (5 trays)

Tray 1 (0.3 ft. core)

12,030-12,080.3 Sandstone, medium-light-gray to light-olive-gray, speckled ("salt and pepper"), medium- to coarse-grained, some very coarse grains and rounded pebbles (up to 1-1/4 in. x 2 in. +) of quartz, quartzite, basalt(?), and silicified sandy carbonate(?), many dark-gray to black grains, silty, limy, micaceous, somewhat friable, scattered carbonaceous fragments, fair porosity?

12,080.3-12,082.5 Missing

Tray 2 (2.1 ft. core)

12,082.5-12,084.6 Sandstone, medium-light- to medium-gray, speckled ("salt and pepper"), fine- to medium-grained, coarse grains fairly abundant in lower part, scattered rounded pebbles (up to 1-1/2 in. long) of quartz, basalt(?), and dark-gray silty hard shale in lower half, subangular, many dark-gray grains, silty, much white clay matrix, micaceous, many limy streaks, mostly medium-bedded, many carbonaceous and coaly films about 6 in.-7 in. below top, vertical fracture in parts of core, apparent dip (carbonaceous part) about 10 degrees, fair porosity?

12,084.6-12,086.6 Missing

Tray 3 (0.4 ft. core)

1	12,085-12,085.4	Sandstone, similar to above, rounded-pebble zone
2		(1 in. \pm thick) near middle (quartz, basalt(?),
3		gray chert), few red chert granules, not limy
4	12,085.4-12,087.5	Missing
5	Tray 4	(1.6 ft. \pm core, robbly in upper part)
6	12,087.5-12,088.4	Sandstone, medium-gray, speckled ("salt and pepper"),
7		medium-grained, some thin beds are medium- to very
8		coarse grained, many granules and rounded pebbles
9		(up to 1-1/4 in. long) of quartz, basalt(?),
10		quartzite, and conglomerate(?) in middle part,
11		silty, clayey, micaceous, not limy, firm, abun-
12		dant carbonaceous material on several bedding
13		planes mostly near top and base, apparent dip at
14		top 20 degrees (cross bedding?)
15	12,088.4-12,089.1	Sandstone, medium-gray, speckled ("salt and pepper"),
16		fine- to medium-grained, scattered coarse grains,
17		many dark-gray grains, subangular, silty, clayey,
18		micaceous, not limy, firm, few carbonaceous
19		laminae mostly in upper part, bedding mostly ob-
20		scure, vertical fracture, fairly good porosity?
21	12,089.1-12,090	Missing
22	Tray 5	(2 ft. core)

- 1 12,090-12,092 Sandstone, similar to above, obscure very thin
 2 bedded, apparent dip (near middle) as much as 10
 3 degrees, vertical fracture in some core pieces,
 4 fairly good porosity(?); includes near base(?) a
 5 thin bed (1/2 in.?) of medium-dark-gray fine- to
 6 medium-grained slightly limy very clayey tight
 7 sandstone with scattered coal grains
- 8 12,092-12,092.5 Missing
 9 Tray 6 (1.6 ft. core)
- 10 12,092.5-12,094.1 Sandstone, medium-gray, speckled ("salt and pepper"),
 11 medium-grained, some coarse grains in parts, sub-
 12 angular, abundant dark-gray to black grains,
 13 numerous green and few red grains, silty, clayey
 14 in upper 2 in. and lower 3 in., limy to very limy
 15 in remainder, micaceous, firm to hard, medium-
 16 bedded (very little apparent bedding), few carbo-
 17 naceous films mostly in middle part, vertical
 18 fracture in a few core pieces and a curving high-
 19 angle diagonal fracture in lower part, fair
 20 porosity(?); includes at base(?) a 1-in. bed of
 21 medium-dark- to dark-gray very finely sandy mica-
 22 ceous solidly hard siltstone with many carbo-
 23 naceous fragments
- 24 12,094.1-12,095 Missing
 25 Tray 7 (2 ft. core, mostly in middle part)

- 12,095-12,095.6 Sandstone, similar to above, clayey, not limy,
massive, fair porosity?
- 12,095.6-12,096.3 Conglomerate, medium-gray, rounded granules and
pebbles (mostly up to 1 in. long) of quartz,
basalt(?), gray and green chert, and other hard
rocks, matrix of olive-gray medium- to coarse-
grained silty mostly limy sandstone, becomes con-
glomeratic sandstone in lower part
- 12,096.3-12,097 Sandstone, medium-gray, somewhat speckled, very fine
to fine-grained, silty, not limy, micaceous,
fairly hard, few medium-dark-gray shale lenses
($< 1/8$ in.) near top, very thin bedded, few carbon-
aceous laminae
- 12,097-12,097.5 Missing
- Tray 8 (1.4 ft. \pm core, rubbly in upper part)
- 12,097.5-12,098.1 Sandstone, medium-dark-gray to olive-gray, speckled,
mostly medium-grained, coarse grains in part, many
dark-gray grains, subangular, silty, clayey,
slightly micaceous, not limy, firm, very thin to
thin bedded, carbonaceous films on few bedding
planes; might include one or two thin (< 1 in.)
beds of conglomerate similar to underlying bed;
includes a few laminae and very thin beds ($1/4$ in.)
of medium-dark-gray hard siltstone and very fine
to medium-grained poorly sorted very silty tight
sandstone

12,098.1-12,098.9 Conglomerate, medium-gray, rounded granules and pebbles (up to about 2-1/2 in. long but mostly up to 1 in.) of quartz, basalt(?), quartzite, gray chert, granite(?), and other hard metamorphic(?) rocks, matrix of medium-gray to olive-gray medium- to coarse-grained silty clayey mostly nonlimy sandstone with a few coal lenses (<1/16 in. thick)

12,098.9-12,100 Missing

12,100-12,126 Core 47; (redrilled hole); reported recovery 26 ft. (9 trays)
Tray 1 (2.4 ft. core)

12,100-12,101 Sandstone, medium-light-gray, speckled ("salt and pepper"), fine- to medium-grained, subangular, many dark-gray grains, silty, much white clay matrix, slightly micaceous, not limy, firm, medium-bedded, vertical fracture in part, abundant carbonaceous films near middle, fair porosity?

12,101-12,102.4 Sandstone, medium-light- to medium-gray, speckled ("salt and pepper"), medium- to coarse-grained, with very coarse grains and scattered granules, some dark gray to black grains, subangular, silty, micaceous, slightly micaceous, limy at top, slightly medium-bedded, no carbonaceous

12,102.4-12,102.6

Tray 2 (1.5 ft. core)

12,102.9-12,104.4 Sandstone, olive-gray, somewhat speckled, fine- to medium-grained, few coarse grains and scattered rounded granules and pebbles (1/4 in.) of quartz, basalt(?), and gray chert, one loose rounded pebble (1 in. x 1-3/4 in. x 2-1/4 in.) at top consists of medium-gray chert(?) containing "floating" subrounded coarse quartz grains and angular feldspar(?) grains altered to olive-gray clay, becomes medium- to coarse-grained in lower part, many dark-gray grains, silty, very clayey, slightly micaceous, not limy, somewhat friable, medium-bedded, no carbonaceous fragments, fair to poor porosity?

12,104.4-12,105.8 Missing

Tray 3 (1.5 ft. core)

12,105.8-12,107.3 Sandstone, medium-light-gray, speckled ("salt and pepper"), fine-grained, some medium grains, dark-gray grains less abundant than above, silty, white clay matrix, micaceous, some pin-point limy spots, fairly friable, medium- to platy-bedded in lower part, many clayey micaceous streaks on bedding in lower part, apparent dip in lower part about 10 degrees-15 degrees, fair porosity?

12,107.3-12,108.7 Missing

Tray 4 (2.2 ft. core)

12,108.7-12,110.9 Sandstone, medium-light- to medium-gray and light-
olive-gray, speckled ("salt and pepper"), fine-
to medium-grained, scattered coarse grains and
granules in middle and lower parts, many dark-
gray grains, subangular, silty, clayey, micaceous,
some pin-point limy spots, mostly massive, some
very thin bedded, several carbonaceous and coaly
films in upper 8 in., apparent dip (probably
cross bedding) about 10 degrees-13 degrees in
upper part, vertical fracture in most core pieces,
fair porosity?

12,110.9-12,111.6 Missing

Tray 5 (1.7 ft. core)

12,111.6-12,113.3 Sandstone, medium-gray to olive-gray, somewhat
speckled, fine- to medium-grained, some coarse
and few very coarse grains in lower part, many
dark-gray grains, subangular, silty, clayey to
very clayey, micaceous, not limy, firm, mostly
thin- to medium-bedded, vertical fracture in part,
apparent dip near top about 10 degrees-15 degrees,
some carbonaceous films mostly near top and base,
coal stringer (1/16 in.) at base, mostly poor
porosity?

12,113.3-12,114.5 Missing

Tray 6 (1.4 ft. core)

12,114.5-12,115.9 Sandstone, medium-light-gray, speckled ("salt and pepper"), medium- to coarse-grained, some very coarse grains and granules mostly in middle and lower parts, many dark-gray grains, subangular, silty, much white clay matrix, micaceous, few pinpoint limy spots, firm to somewhat friable, obscure medium(?) bedding, no carbonaceous films, fair porosity(?); includes (unknown position) a bed (1 in.?) of medium-dark-gray very finely sandy nonlimy hard siltstone

12,115.9-12,117.4 Missing

Tray 7 (1.1 ft. core)

12,117.4-12,118.5 Sandstone, similar to above, medium-grained, few coarse grains, several carbonaceous films in basal 1 in. ±

12,118.5-12,120.3 Missing

Tray 8 (0.8 ft. core)

12,120.3-12,121.1 Sandstone, similar to above, medium- to coarse-grained in part with few very coarse grains, limy, coal stringer (1/16 in.) about 3 in. above base, two vertical fractures in part would intersect at about 47 degrees, fairly good porosity?

12,121.1-12,123.2 Missing

Tray 9 (1.7 ft. core, rubble in part)

12,123.2-12,124.9 Sandstone, similar to above, not limy except for scattered pin-point spots; includes at base(?) a bed (1-1/2 in. +) of medium-gray medium- to very coarse grained silty clayey nonlimy very conglomeric sandstone with rounded granules and pebbles (up to 1 in. long) of quartz, basalt(?), gray shale, gray chert, and other hard rocks

12,124.9-12,126 Missing

12,126-12,143 Core 48; (redrilled hole); reported recovery 14 ft. (5 trays)

Tray 1 (1 ft. core, rubbly in part)

12,126-12,127 Sandstone, medium- to medium-dark-gray, somewhat speckled, medium- to very coarse grained, becomes generally coarser downward, few subrounded granules in middle part, many dark-gray grains, few coal grains, subangular, silty, mostly very clayey, slightly micaceous, nonlimy, fairly friable mostly in coarser part, obscure very thin and thin bedded, scattered carbonaceous fragments and coal lenses (up to 1/8 in. thick), vertical fracture in one core fragment, mostly poor porosity?

12,127-12,128.8 Missing

Tray 2 (1.8 ft. core, rubbly to middle part)

12,128.8-12,130.6 Sandstone, medium-gray to olive-gray, speckled in part, fine- to medium-grained in upper 6 in. and medium- to coarse-grained (some very coarse grains) in remainder, many dark-gray grains, subangular, silty, clayey, slightly micaceous, limy in top 1 in., fairly friable mostly in coarser part, obscure thin- to medium-bedded, carbonaceous and coal fragments fairly abundant, apparent dip (cross bedding?) about 8 degrees-18 degrees in parts of core; tray contained a rounded pebble (1-3/4 in. long) of medium-dark-gray chert and a pebble (1/2 in. ϕ) of medium-gray quartzite or silicified limestone (position of pebbles in core unknown); includes in middle(?) part a bed (1-1/2 in. \pm) of medium-dark-gray irregularly laminated siltstone, very fine to fine-grained silty sandstone, and silty shale with many carbonaceous fragments and some coal films

12,130.6-12,131.6 Mottled
 (1.2 ft. core)

12,130.6-12,132.8 Sandstone, olive-gray to medium-gray, somewhat speckled in part, mostly coarse- to very coarse grained, some fine- to coarse-grained, many sub-rounded granules and few very small pebbles (quartz, basalt?, weathered igneous rocks) in lower half, some dark-gray to black grains, many grains altered to clay in coarser part, sub-angular, silty, much light-olive-gray clayey matrix, not limy, firm to fairly friable, obscure thin to medium-bedded, many carbonaceous fragments and coal lenses (up to 1/8 in.) in upper half, poor porosity?

12,132.8-12,134.4 Missing

Tray 4 (1.7 ft. \pm core, rubely in part)

12,134.4-12,136.1 Sandstone, medium-gray to olive-gray, speckled ("salt and pepper"), mostly medium-grained, coarse and very coarse grains scattered in upper part and more numerous downward, scattered rounded granules and pebbles of quartz, basalt(?), quartzite, granite, and silicified limestone(?) generally less than 1 in. long, one loose pebble (2-1/4 in.) and one loose rounded granite cobble (2-1/2 in. to 3 in. long), many dark-gray to black grains, angular, silty, much light-olive-gray clay matrix, silty micaceous, limy in upper-middle part, obscure very thin to thin bedded, some carbonaceous films and coal fragments in upper part, poor porosity?

12,136.1-12,137.2 Missing

Tray 5 (1.5 ft. core)

12,137.2-12,138.7 Sandstone, similar to above, many pin-point limy spots, rounded granules and pebbles (about 1/2 in.) mostly scattered but fairly abundant about 5 in. above base, one loose quartz cobble (2 in. + long, but probably about 3 in.) at top(?), many white grains of clay(?) in lower 5 in., obscure bedding, vertical fracture in part, few if any carbonaceous or coal fragments, mostly fair porosity?

12,138.7-12,143 Missing or not recovered

12,143-12,168 Core 49: (redrilled hole); reported recovery 23 ft. (8 trays)

Tray 1 (0.5 ft. ± core, rubble)

12,143-12,143.5 Sandstone, olive-gray, somewhat speckled, medium-grained, conglomeratic in half of core with rounded pebbles (maximum length 2 in. +) of quartz, quartzite, medium-dark-gray chert, basalt(?), and brownish-gray to dark-gray very fine grained hard rock, many dark-gray to black grains, subangular, silty, clayey, limy in conglomeratic part, bedding obscure, vertical fracture in part, few carbonaceous films and coal fragments: includes a bed (about 1 in. thick) of hard medium-gray very fine grained non-limy micaceous silty sandstone with several carbonaceous fragments.

12,143.5-12,145.9 Missing

Tray 2 (2 ft. core)

12,145.9-12,147.9 Sandstone, medium-dark-gray to olive-gray in lower half, fine-grained, some medium grains (more abundant in lower half), subangular, many dark-gray grains, silty, clayey, upper half speckled by many white angular clay(?) grains (altered volcanic material?), micaceous, slightly limy in part, hard, very thin to medium bedded, vertical fracture in part, apparent dip ranges from zero degrees near top to about 20 degrees at base (probably cross bedding), few carbonaceous films and fragments

12,147.9-12,148.8 Missing

Tray 3 (1.2 ft. core)

12,148.8-12,150 Sandstone, olive-gray to medium-gray, somewhat speckled, mostly fine-grained, some fine- to medium-grained, many dark-gray grains, subangular, silty, clayey, micaceous, limy in top 2 in. becoming less limy downward, firm, obscure thin- to medium-bedded, vertical fracture in part, few carbonaceous fragments, upper(?) part includes one hard rounded flat pebble (3/4 in.) of weathered granite(?), low porosity?

Missing

Tray 4 (1.5 ft. 1 core, rubble in large part)

12,151.7-12,153.2 Sandstone, similar to above, slightly limy, much white clay matrix in middle part, few coarse grains, trace of red grains, rounded quartz and basalt(?) pebbles (about 1/2 in. long) generally very scattered but abundant in a thin bed (1 in.?) in middle(?) part, obscure thin bedded, vertical fracture in part, some carbonaceous fragments, poor to fair porosity(?); includes in upper(?) part a thin bed of dark-olive-gray very fine grained very silty shaly sandstone with many carbonaceous fragments

12,153.2-12,154.6 Missing

Tray 5 (1.3 ft. core)

12,154.6-12,155.9 Sandstone, medium-gray, some white speckling as above (Tray 2), fine- to medium-grained, some coarse grains and scattered rounded pebbles (1/2 in. long), many dark-gray grains, subangular, very silty, clayey, micaceous, not limy, firm to hard, very thin to medium-bedded, very few carbonaceous fragments, vertical fracture in part, poor to fair porosity?

12,155.9-12,157.5 Missing

Tray 6 Missing

12,157.5-12,160.4

Tray 7 (1.5 ft. \pm core, rubbly in part)

Oligocene or Miocene Series

Homlock Conglomerate

12,160.4-12,161.9 Sandstone, medium-light-gray, speckled ("salt and pepper"), medium-grained, abundant rounded granules and small pebbles (quartz, basalt?, and chert) in thin bed near middle(?), many dark-gray grains, subangular, silty, some to much white clay matrix, micaceous, scattered pin-point limy spots, obscure thin bedded, several discontinuous shaly laminae in parts, cross bedded(?) in upper part suggested by apparent dip of 20 degrees-25 degrees, fairly good porosity?

12,161.9-12,163.3 Missing

Tray 8 (1.4 ft. core)

12,163.3-12,164.7 Sandstone, similar to above, includes a bed (2-1/2 in.) of medium- to coarse-grained hard limy sandstone 3 in. below top, limy in basal 3-1/2 in., thin- to medium-bedded, several carbonaceous shaly laminae near top with apparent dip (cross bedding?) of about 15 degrees, vertical fracture in part, fairly good porosity?

12,164.7-12,168 Missing or not recovered

12,168-12,193 Core 50: (redrilled hole); reported recovery 25 ft. (9 ft.)

Tray 1 (0.5 ft. \pm core, rubble)

12,168-12,168.5 Sandstone (two kinds): upper(?) sandstone, olive-gray, somewhat speckled with white clay, fine- to medium-grained, some medium- to very coarse grained with rounded granules, many dark-gray to black grains, subangular, silty, clayey, micaceous, few pin-point limy spots, firm, mostly low porosity(?); lower(?) sandstone, medium-light-gray, speckled ("salt and pepper"), medium- to coarse-grained, some very coarse grains and rounded granules and few pebbles (up to 1 in.) of quartz, basalt(?), gray chert, and greenish-gray weathered igneous rock, many dark-gray to black grains, very few red grains, subangular, slightly silty and very limy in part, much white clay matrix and more silty in nonlimy to slightly limy part, fairly friable in part, some coal fragments and stringers, fairly good porosity?

12,168.5-12,170.8 Missing

Tray 2 (1.4 ft. core)

12,170.8-12,172.2 Sandstone, similar to lower(?) sandstone in tray 1 above, much white clay matrix, limy in part, very fine and coarse to very coarse grained with scattered rounded granules and pebbles (1/2 in.) in 5-in. bed 3 in. above base, basal 3-in. bed is very coarse grained very conglomeratic sandstone with abundant rounded granules and pebbles (up to 1 in. long) of quartz, basalt(?), gray, green and red chert, black shale, coal, and other rocks, obscure thin- to medium-bedded, fairly good porosity(?) for the most part; includes at top(?) a 1-1/4 in.-bed of olive-gray fine- to medium-grained silty clayey sandstone

12,172.2-12,173.6 Missing

Tray 3 (1.3 ft. core)

12,173.6-12,174.9 Sandstone, medium-light-gray, speckled ("salt and pepper"), medium- to coarse-grained, some very coarse grains becoming more abundant downward, some rounded granules and pebbles in upper 10 in. (up to 1 in. long and similar to above), abundant rounded granules and pebbles (mostly less than 1/2 in. but up to 1-1/2 in. long) and several irregular coal lenses (<1/4 in. thick) in lower part, top 1-2 in. to black grains, very few white grains, much white clay matrix, obscure bedding, fairly good porosity

1 12,174.9-12,176.4 Missing

2 Tray 4 (1.5 ft. core, rubbly in part)

3 12,176.4-12,177.9 Conglomerate and some sandstone, interbedded(?);

4 conglomerate, medium-light- to medium-gray, spot-

5 ted with dark-gray to black, rounded granules and

6 pebbles (mostly less than 1/2 in. long but as much

7 as 1 in.) of quartz, basalt(?), gray chert, olive-

8 gray to greenish-gray weathered igneous(?) rocks,

9 and minor red and green chert(?), few coal frag-

10 ments, some medium and coarse sand, much white

11 clay matrix, limy in small part near middle, low

12 porosity(?); sandstone, mostly similar to tray 3,

13 includes at top a bed (3 in. +) of olive-gray

14 fine-grained silty clayey micaceous slightly limy

15 sandstone

16 12,177.9-12,179.2 Missing

17 Tray 5 (1.2 ft. core)

18 12,179.2-12,180.4 Conglomerate, very similar to above, much coarse and

19 very coarse sand in middle part

20 12,180.4-12,182 Missing

Tray 6 (1.6 ft. core)

1 12,182-12,183.6 Sandstone and conglomerate; sandstone, medium-light-
 2 gray, speckled ("salt and pepper"), mostly coarse-
 3 to very coarse grained, some medium-grained, some
 4 rounded granules and pebbles (up to 1/2 in.) simi-
 5- lar to above mostly in lower half, many dark-gray
 6 to black grains, very few red, pink and green
 7 grains, subangular, silty, much white clay matrix,
 8 few pin-point limy spots, obscure thin-bedded,
 9 coal fragments (up to 1/4 in. thick) abundant at
 10- base and 4-1/2 in. above base and scattered in
 11 remainder, fair porosity(?); conglomerate, simi-
 12- lar to above, 4-in. bed near top and 1-in. bed
 13 near middle, upper bed mostly very limy with
 14 little clay matrix.

15 12,183.6-12,184.8 Missing

16 Tray 7 (1.3 ft. \pm core, rubbly in part)

- 1 12,184.8-12,186.1 Conglomerate, sandstone, and shale; conglomerate,
 2 similar to trays 4 and 5, average size of pebbles
 3 slightly greater, not limy, much white clay
 4 matrix; sandstone, partly similar to tray 6, one
 5 bed (1-1/2 in.) in middle of dark-olive-gray fine-
 6 to coarse-grained silty clayey nonlimy sandstone
 7 with several rounded pebbles (up to 1-1/4 in.),
 8 some medium-gray slightly speckled fine-grained
 9 silty clayey nonlimy sandstone; shale (basal 3/4
 10 in.), medium-dark- to dark-gray, silty, micaceous,
 11 hard, platy bedded, much fine carbonaceous material,
 12 includes laminae of olive-gray siltstone
- 13 12,186.1-12,187.6 Missing
- 14 Tray 8 Missing
- 15 12,187.6-12,190.4
- 16 Tray 9 (0.7 ft. core)
- 17 12,190.4-12,191.1 Sandstone, medium-light-gray, speckled ("salt and
 18 pepper"), fine-grained, few medium grains, many
 19 dark-gray grains, subangular, silty, white clay
 20 matrix, micaceous, scattered pin-point limy spots,
 21 fine, platy to very thin bedded, many dark-gray
 22 paper-thin clayey micaceous streaks, apparent dip
 23 (cross bedding?) about 5 degrees, little or no
 24 carbonaceous material, fair porosity?
- 25 12,191.1-12,192.1 Missing

1 12,193-12,203 Core 51 (redrilled hole) reported recovery 9 ft.
 2 (4 trays)
 3 Tray 1 (0.4 ft. \pm core, rubble)
 4 12,193-12,193.4 Shale, siltstone, sandstone, and coal, sequence un-
 5 known; shale, dark-gray, slightly brownish tint,
 6 slightly to very silty, micaceous, not limy, hard,
 7 platy to very thin-bedded(?), few carbonaceous
 8 fragments on bedding; siltstone, olive-gray, very
 9 finely sandy, micaceous, not limy, hard, many
 10 carbonaceous fragments; sandstone, medium-light-
 11 gray, speckled, fine- to medium-grained, many
 12 dark-gray grains, silty, limy, micaceous, firm,
 13 fair porosity(?); coal (1/4 in. +), banded, fair-
 14 ly bright
 15 12,193.4-12,195.3 Missing
 16 Tray 2 (2 ft. core)
 17 12,195.3-12,197.3 Sandstone, medium-light-gray, speckled ("salt and
 18 pepper"), fine-grained, some fine- to medium-
 19 grained in lower half, many dark-gray grains, sub-
 20 angular, silty, white clay matrix, micaceous,
 21 limy in upper 3 in., scattered pin-point limy
 22 spots in remainder, many dark-gray clayey mica-
 23 ceous streaks, platy to very thin bedded, prob-
 24 ably cross bedded, apparent dips about 3 degrees-
 25 10 degrees, few carbonaceous films and very thin
 coal stringers, fair porosity?

- 1 12,197.3-12,197.5 Missing
- 2 Tray 3 (1 ft. \pm core, rubble)
- 3 12,197.5-12,198.5 Shale (two kinds); shale, dark-gray to black, slight
- 4 brown tint in part, slightly silty, micaceous,
- 5- not limy, hard, few "floating" sand grains, fissile
- 6 to platy bedded, scattered to abundant paper-thin
- 7 coal films and coal lenses (1/16 in.); shale,
- 8 medium-dark-gray, some light-olive-gray tint in
- 9 part, poorly bedded, many long narrow carbonaceous
- 10- plant fragments; includes bright banded coal
- 11 (greatest thickness 1/2 in.) and olive-gray fine-
- 12- to medium-grained silty clayey slightly limy sand-
- 13 stone (3/4 in. thick) with scattered carbonaceous
- 14 fragments and rounded granules and pebbles (up to
- 15- 1/2 in. long)
- 16 12,198.7-12,199.8 Missing
- 17 Tray 4 (1 ft. \pm core, rubble in upper part)
- 18 12,199.8-12,200.8 Shale, siltstone, and sandstone (in downward order);
- 19 shale, same as poorly bedded shale above; silt-
- 20- stone (7 in. thick), medium-gray, very finely
- 21 sandy, micaceous, hard, obscure thin(?) bedded,
- 22 many carbonaceous fragments (similar to those in
- 23 overlying shale) mostly oriented subparallel to
- 24 bedding; sandstone (1-1/4 in. thick), medium-light-
- 25 gray, speckled, very fine grained, silty, mica-
- 26 ceous, not limy, little if any carbonaceous

1	12,200.8-12,203	Missing or not recovered
2	12,203-12,220	Shale, medium-dark- to dark-gray; interbedded medi-
3		um- light-gray very fine to fine-grained silty
4		micaceous sandstone
5	12,220-12,222	Siltstone, medium-gray, very micaceous, carbonaceous
6		fragments
7	12,222-12,229	Sandstone, medium-light-gray, fine-grained, silty,
8		micaceous; trace of greenish-blue fine-grained
9		silty slightly limy sandstone
10	12,229-12,230	Shale, brownish-gray, micaceous
11	12,230-12,232	Minestone, brownish-gray, very fine grained,
12		argillaceous, hard, tight; brownish-gray very
13		fine to medium-grained silty limy tight sandstone
14	12,232-12,253	Core 52 (redrilled hole); reported recovery 21 ft.
15		(7 trays)
16	Tray 1	(0.8 ft. \pm core, rubbly in part)
17	12,232-12,232.8	Sandstone, medium-light-gray, finely spotted with
18		very pale orange, speckled ("salt and pepper"),
19		fine-grained at top, medium-grained with scattered
20		coarse grains in lower part, many dark-gray to
21		black grains, scattered red grains, subangular,
22		silty at top, micaceous, limy, firm, thin- to
23		med. bedded(?), no carbonaceous material; in-
24		cludes some medium-dark-gray very silty shale,
25		medium-gray very micaceous siltstone, and olive-
26		gray slightly limy pebble conglomerate

12,232.8-12,235 Missing

Tray 2 (1.5 ft. core)

12,235-12,236.5 Sandstone, medium-light-gray, speckled ("salt and pepper"), fine- to medium-grained, some coarse grains. many dark-gray to black grains, very scattered rounded granules and pebbles (maximum length 1 in.+) of quartz and gray hard slightly limy sandstone, few grains of coal, silty, much white clay matrix, micaceous, not limy, firm, very thin to thin bedded mainly indicated by very micaceous laminae, no carbonaceous fragments, apparent dip (cross bedding?) as much as 12 degrees near top, fair porosity(?); includes (about 3-1/2 in. above base) a bed (3 in. +) of medium-light-gray clayey granule conglomerate with a large coal fragment and many dark-gray to black granules; also includes a thin bed of medium-dark-gray finely sande siltstone with many carbonaceous fragments

12,236.5-12,238 Missing

Tray 3 (1.6 ft. core)

12,238-12,239.6 Sandstone, similar to above, medium-grained in upper part and medium- to coarse-grained in lower part, scattered very coarse grains and granules, very few rounded pebbles (up to 1/2 in. long), fair porosity?

1	12,239.6-12,241	Missing
2	Tray 4	(1.9 ft. core)
3	12,241-12,242.9	Sandstone, similar to above, medium-grained, some
4		medium- to coarse-grained, scattered very coarse
5-		grains and rounded granules and pebbles (1/2 in.)
6		of quartz, basalt(?), and gray chert(?), generally
7		coarser in upper 5 in., bedding mostly obscure,
8		apparent dip (cross bedding?) in lower part may
9		be 10 degrees, fair porosity?
10-	12,242.9-12,244	Missing
11	Tray 5	(1.3 ft. \pm core, rubbly in part)
12	12,244-12,245.3	Siltstone, sandstone, and some shale, probably inter-
13		bedded; siltstone, medium- to medium-dark-gray,
14		brownish-gray tint in small part (oil stained?),
15-		mostly very finely sandy, micaceous, not limy,
16		hard, platy to thin bedded, some carbonaceous
17		films; sandstone, mostly medium-grained and simi-
18		lar to above, some medium-gray, speckled, fine-
19		grained, silty, and not limy, some medium-light-
20-		gray, speckled, very fine grained, silty, well
21		sorted, micaceous and not limy; shale, medium-dark-
22		gray to brownish-gray, very silty, micaceous, not
23		limy, hard, carbonaceous fragments; some cross-
24		bedded(?) siltstone and sandstone near base has
25-		apparent dips of about 2 degrees to 25 degrees

1 12,245.3-12,247 Missing

2 Tray 6 (1.6 ft. \pm core, rubbly in part)

3 12,247-12,248.6 Siltstone, sandstone, and some shale; siltstone,

4 medium-gray, mostly very finely sandy, very mica-

5 ceous (some bedding planes feel "soapy"), not limy,

6 hard, platy to very thin bedded, some small-scale

7 disturbed bedding (burrows?) and lenticular bed-

8 ding, mostly interlaminated with dark-gray mica-

9 ceous shale, few carbonaceous fragments; sandstone

10 (4-1/2 in. \pm in thickness and 4 in. below top of

11 tray), medium-gray, speckled, medium- to coarse-

12 grained, some very coarse grains, several rounded

13 granules and few very small pebbles of quartz,

14 chert(?), and basalt(?), many dark-gray to black

15 grains, subangular, silty, much white to light-

16 olive-gray clay matrix, not limy, bedding ob-

17 scure, poor to fair porosity; shale, dark-gray,

18 partly silty, micaceous, not limy, hard, several

19 coal films and stringers (<1/16 in.)

20 12,249.6-12,250 Missing

21 Tray 7 (1.4 ft. \pm core, rubbly in part)

1	12,250-12,251.4	Siltstone, medium-light- to medium-dark-gray, some
2		brownish tint in part, very finely sandy in part,
3		micaceous, not limy, hard, irregular platy bedded,
4		mostly interlaminated with dark-gray micaceous
5		shale, many carbonaceous fragments on bedding
6		planes and, in lower part, at high angle to bed-
7		ding; includes near middle two irregular beds
8		(1 in.-1-1/2 in. thick) of medium-gray very fine
9		grained silty limy sandstone; lower part includes
10		some medium-dark-gray very silty shale
11	12,251.4-12,253	Missing
12	12,253	T.D. of redrilled hole
13	12,253-12,258	Siltstone, medium-gray, very finely sandy, micaceous
14	12,258-12,261	Sandstone, medium-light-gray, very fine to fine-
15		grained, silty, micaceous
16	12,261-12,273	Shale, medium-dark- to dark-gray; interbedded silt-
17		stone similar to above
18	12,273-12,283	Sandstone, medium-light-gray, very fine to fine-
19		grained, silty, partly limy; medium-gray medium-
20		to coarse-grained silty clayey sandstone with
21		dark-gray to black grains
22	12,283-12,287	Sandstone, medium-gray, fine- to medium-grained,
23		silty, clayey, dark-gray grains
24	12,287-12,296	Shale, dark-gray to black, carbonaceous, coal
25		streaking, cavities

1	12,296-12,300	Sandstone, medium-gray, very fine to fine-grained,
2		silty, micaceous, much carbonaceous material in
3		part
4	12,300-12,312	Sandstone, medium-gray, fine- to medium-grained,
5		silty, clayey, micaceous, limy in part
6	12,312-12,316	Sandstone, similar to above, some coarse grains
7		and granules
8	12,316-12,320	Sandstone, medium-light-gray, fine- to medium-
9		grained, some dark-gray grains, silty, limy
10	12,320-12,324	Sandstone, brownish-gray and light-olive-gray, fine-
11		to medium-grained, some coarse grains and gran-
12		ules, silty, clayey, partly limy
13	12,324-12,340	Siltstone, medium- to medium-dark-gray, very finely
14		sandy, micaceous, carbonaceous fragments; inter-
15		bedded dark-gray shale
16	12,340-12,347	Sandstone, medium-light-gray, fine- to medium-
17		grained, dark-gray grains, limy, micaceous
18	12,347-12,350	Sandstone, medium-gray, fine- to medium-grained,
19		some granules of quartz, basalt(?), and gray chert,
20		silty, clayey, micaceous
21	12,350-12,356	Sandstone, medium-light gray, speckled, very fine to
22		fine-grained, silty, micaceous
23	12,356-12,360	Sandstone, light- to yellowish-brown, medium-
24		to coarse-grained, micaceous as above, silty, limy

1	12,360-12,380	Sandstone, light-olive-gray, fine- to coarse-
2		grained, granules as above, few small pebbles,
3		silty, clayey, micaceous
4	12,380-12,390	Sandstone, medium-gray, medium- to coarse-grained,
5		granules as above, silty, clayey, micaceous
6	12,390-12,395	Sandstone, light-olive-gray, fine- to medium-grained,
7		silty, clayey, micaceous
8	12,395-12,400	Sandstone, medium-light-gray, speckled, very fine to
9		fine-grained, dark-gray grains, silty, micaceous,
10		partly limy
11	12,400-12,404	Siltstone, medium-gray, micaceous
12	12,404-12,408	Shale, olive-gray, silty
13	12,408-12,409	Siltstone, medium-light-gray, very finely sandy,
14		micaceous
15	12,409-12,424	Shale, dark-gray to black, carbonaceous, coal
16		stringers, caving?
17	12,424-12,427	Sandstone, olive-gray, fine- to medium-grained,
18		dark-gray grains, silty, clayey, partly limy
19	12,427-12,442	Sandstone, medium-light-gray to yellowish-brown,
20		medium-grained, dark-gray grains, some granules
21		of quartz, basalt, gray chert, and granite(?),
22		very few brown, red, and green chert grains and
23		pebbles, limy

1	12,442-12,448	Sandstone, medium-light- to medium-gray, speckled,
2		very fine to fine-grained, silty, micaceous, fine
3		carbonaceous fragments
4	12,448-12,452	Sandstone, olive-gray, fine- to coarse-grained, few
5		granules as above, silty, clayey
6	12,452-12,462	Sandstone, olive-gray, very fine to fine-grained,
7		silty, clayey, carbonaceous fragments
8	12,462-12,470	Sandstone, medium-light-gray, medium- to coarse-
9		grained, granules as above, limy
10	12,470-12,478	Sandstone, light-olive-gray, fine- to medium-
11		grained, dark-gray grains, silty, clayey, mica-
12		ceous, few coal fragments
13	12,478-12,484	Sandstone, medium-light-gray, fine- to medium-
14		grained, silty, limy
15	12,484-12,488	Shale, medium-dark-gray, micaceous
16	12,488-12,491	Coal
17	12,491-12,494	Siltstone, medium- to medium-dark-gray, micaceous,
18		partly limy, fine carbonaceous material
19	12,494-12,500	Shale, dark-gray; interbedded with siltstone as
20		above
21	12,500-12,503	Siltstone, brownish-gray, hard, very limy, looks
22		like limestone
23	12,503-12,517	Shale, dark-gray, carbonaceous fragments; inter-
24		bedded with light- to medium-dark-gray mica-
25		ceous siltstone

1	12,517-12,522	Sandstone, olive-gray to medium-gray, very fine to
2		fine-grained, very silty, clayey, many dark-gray
3		grains, some altered volcanic(?) material
4	12,522-12,526	Siltstone, similar to above
5	12,526-12,529	Shale, brownish-black, smooth, clayey, conchoidal
6		fracture
7	12,529-12,532	Siltstone, medium-gray to brownish-gray, micaceous,
8		carbonaceous fragments
9	12,532-12,534	Shale, dark-gray
10	12,534-12,537	Sandstone, medium-gray, very fine to fine-grained,
11		silty, dark-gray grains
12	12,537-12,552	Siltstone, medium-gray, micaceous, fine carbonaceous
13		material; interbedded dark-gray shale
14	12,552-12,555	Shale, dark-gray
15	12,555-12,560	Sandstone, medium-light-gray, speckled, very fine
16		to fine-grained, silty, dark-gray grains
17	12,560-12,565	Sandstone, medium-light-gray, speckled, fine- to
18		medium-grained, limy, silty
19	12,565-12,567	Coal
20	12,567-12,570	Sandstone, similar to above
21	12,570-12,573	Sandstone, medium-gray, speckled, fine- to coarse-
22		grained, silty, clayey
23	12,573-12,575	Shale, dark-gray
24	12,575-12,576	Coal
25	12,576-12,577	Sandstone, similar to above

1	12,577-12,583	Shale, dark-gray
2	12,583-12,590	Siltstone, medium- to medium-dark-gray, micaceous,
3		many carbonaceous fragments; interbedded black
4		carbonaceous shale
5	12,590-12,595	Sandstone, medium-gray, very fine to fine-grained,
6		silty, micaceous, carbonaceous fragments
7	12,595-12,603	Sandstone, medium-gray, fine- to medium-grained,
8		some coarse grains and granules (caving?), silty
9	12,603-12,610	Sandstone, olive-gray to medium-gray, medium-grained,
10		dark-gray grains, very silty, clayey, coal
11		stringers
12	12,610-12,614	Shale, black, carbonaceous; coal
13	12,614-12,616	Siltstone, medium-gray, very finely sandy, mica-
14		ceous, fine carbonaceous material
15	12,616-12,623	Shale, black, carbonaceous
16	12,623-12,632	Shale, medium-dark- to dark-gray, silty, micaceous,
17		carbonaceous fragments
18	12,632-12,636	Siltstone, medium-gray, micaceous, carbonaceous
19		fragments
20	12,636-12,640	Sandstone, medium-light-gray, speckled, very fine
21		to fine-grained, silty, micaceous
22	12,640-12,646	Sandstone, medium-light-gray, speckled, fine- to
23		medium-grained, few coarse grains and granules of
24		quartz, basalt(?), gray and red chert, hard green
25		igneous(?) rock, clay

1	12,646-12,657	Sandstone, medium-gray, fine- to medium-grained,
2		coarse grains and granules as above, silty, clayey
3	12,657-12,660	Siltstone, medium- to medium-dark-gray, very finely
4		sandy, micaceous, carbonaceous fragments
5	12,660-12,663	Sandstone, similar to above
6	12,663-12,672	Sandstone, medium-light-gray, speckled, fine- to
7		medium-grained, silty, limy, micaceous
8	12,672-12,675	Shale, olive-gray, silty, carbonaceous fragments
9	12,675-12,678	Sandstone, olive-gray, fine- to medium-grained, few
10		coarse grains and granules, dark-gray grains,
11		silty, clayey
12	12,678-12,680	Shale, dark-gray
13	12,680-12,683	Sandstone, olive-gray, medium- to coarse-grained,
14		some granules, very silty, clayey, partly limy
15	12,683-12,686	Shale, dark-gray
16	12,686-12,687	Coal
17	12,687-12,690	Sandstone, similar to above
18	12,690-12,696	Sandstone, medium-light-gray, speckled, fine- to
19		medium-grained, dark-gray grains, silty, partly
20		limy
21		Eocene Series
22		West Foreland Formation
23	12,696-12,704	Siltstone, medium-gray, very finely sandy, mica-
24		ceous; includes at top some medium-gray very fine
25		grained silty sandstone

1	12,704-12,710	Shale, olive-gray, silty, carbonaceous fragments
2	12,710-12,720	Sandstone, medium-gray to olive-gray, fine- to
3		coarse-grained, silty, clayey; interbedded dark-
4		gray shale, slight brown tint, carbonaceous frag-
5-		ments
6	12,720-12,723	Siltstone, brownish-gray, limy, looks like lime-
7		stone, caving?
8	12,723-12,736	Shale and interbedded sandstone, similar to above
9	12,736-12,740	Sandstone, medium-light-gray, speckled, very fine
10-		to fine-grained, dark-gray grains, silty, caving?
11	12,740-12,743	Shale, dark-olive-gray
12	12,743-12,746	Siltstone, medium- to medium-dark-gray, micaceous,
13		carbonaceous fragments
14	12,746-12,747	Shale, dark-gray
15-	12,747-12,760	Sandstone, light-olive-gray, fine- to medium-
16		grained, dark-gray grains, silty, clayey; inter-
17		bedded dark-gray shale
18	12,760-12,763	Shale, medium-light-gray, very finely micaceous,
19		caving?
20-	12,763-12,770	Siltstone, medium-gray to brownish-gray, micaceous;
21		interbedded dark-gray shale
22	12,770-12,778	Sandstone, olive-gray to medium-gray, fine- to
23		medium-grained, some coarse and very coarse
24		grains, very few dark-gray grains, silty, clayey;
25		interbedded shale as above

1	12,778-12,782	Sandstone, similar to above, some granules and
2		pebbles of quartz, gray to greenish-gray chert,
3		brown to red chert, and other rocks
4	12,782-12,784	Shale, dark-gray
5	12,784-12,790	Sandstone, similar to above
6	12,790-12,792	Shale, dark-gray
7	12,792-12,816	Sandstone, similar to above, some dark-gray to black
8		grains and granules, much detrital chert
9	12,816-12,830	Sandstone, similar to above; interbedded medium-dark-
10		to dark-gray silty micaceous shale
11	12,830-12,835	Siltstone, medium-dark-gray, very finely sandy,
12		micaceous
13	12,835-12,842	Sandstone, olive-gray, fine- to coarse-grained, silty,
14		clayey; some interbedded siltstone as above
15	12,842-12,858	Shale, medium-dark- to dark-gray, silty, micaceous,
16		carbonaceous fragments
17	12,858-12,862	Siltstone, medium-gray, micaceous
18	12,862-12,867	Shale, black, carbonaceous
19	12,867-12,870	Sandstone, medium-light-gray, fine- to medium-grain-
20		ed; very few dark-gray grains, limy, silty
21	12,870-12,872	Coal
22	12,872-12,875	Shale, medium-light-gray, carbonaceous fragments
23	12,875-12,882	Sandstone, light-olive-gray, medium- to coarse-
24		grained, few dark-gray grains, silty, clayey;
25		interbedded medium-dark-gray shale
26	12,882-12,886	Shale, medium-dark-gray
27	12,886-12,890	Sandstone, olive-gray, medium- to coarse-grained,
28		some very coarse grains and granules, some dark-
29		gray grains, silty, clayey

1	12,890-12,894	Siltstone, brownish-gray, very limy, very fine
2		carbonaceous material
3	12,894-12,897	Shale, brownish-black, hard, splintery
4	12,897-12,900	Shale, dark-yellowish-brown, sandy, many glass
5-		shards(?), few carbonaceous fragments
6	12,900-12,913	Sandstone, similar to above, many granules of
7		basalt(?), quartz, and gray chert; interbedded
8		medium-dark-gray shale with carbonaceous frag-
9		ments
10-	12,913-12,918	Shale, dark-gray to black, carbonaceous, many coal
11		stringers
12	12,918-12,920	Sandstone, light-olive-gray, fine- to medium-grained,
13		dark-gray grains, silty, very clayey
14	12,920-12,922	Coal
15-	12,922-12,928	Sandstone, similar to above, probably some coarse
16		to very coarse grains and granules
17	12,928-12,932	Shale, black, very carbonaceous, coal stringers,
18		caving?
19	12,932-12,935	Siltstone, medium-gray, micaceous, very fine carbo-
20-		naceous fragments, caving?
21	12,935-12,940	Shale, olive-gray, silty; includes at base a thin
22		bed of siltstone similar to above
23	12,940-12,945	Shale, medium-dark-gray, carbonaceous fragments
24	12,945-12,947	Sandstone, light-olive-gray, fine- to medium-
25		grained, silty, very clayey

1	12,947-12,950	Shale, as above
2	12,950-12,953	Sandstone, as above
3	12,953-12,955	Shale, as above
4	12,955-12,960	Sandstone, light-olive-gray, medium- to coarse-
5-		grained, silty, limy
6	12,960-12,968	Sandstone, olive-gray, medium- to coarse-grained,
7		some coarse and very coarse grains and granules of
8		basalt(?), quartz, gray chert, greenish-gray chert,
9		and other very fine grained hard rock, silty,
10-		clayey
11	12,968-12,970	Shale, medium-gray, silty, micaceous, caving?
12	12,970-13,000	Sandstone, similar to above; some interbedded shale
13		as above in middle part
14	13,000-13,022	Sandstone, olive-gray to grayish-olive, medium- to
15-		coarse-grained, some coarse and very coarse grains
16		and granules as above, silty, very clayey
17	13,022-13,024	Siltstone, medium-light-gray, micaceous, very fine
18		carbonaceous material
19	13,024-13,033	Sandstone, olive-gray, fine-grained, some medium
20-		grains, silty, slightly micaceous
21	13,033-13,040	Siltstone, light-olive-gray, slightly micaceous,
22		few carbonaceous fragments; olive-gray siltstone
23	13,040-13,047	Siltstone, olive-gray, very finely sandy, slightly
24		micaceous, many dark-gray to black carbonaceous
25		shale stringers

1	13,047-13,050	Shale, dark-gray to black, carbonaceous
2	13,050-13,057	Sandstone, olive-gray, medium- to coarse-grained,
3		some very coarse grains and granules similar to
4		above, silty, very clayey
5	13,057-13,059	Shale, medium-gray, carbonaceous fragments, caving?
6	13,059-13,070	Sandstone, similar to above
7	13,070-13,074	Sandstone, light-olive-gray, fine- to medium-
8		grained, silty, clayey, limy
9	13,074-13,080	Siltstone, medium-gray, micaceous, fine carbonaceous
10		material, caving?
11	13,080-13,085	Shale, brownish-gray, fissile, carbonaceous frag-
12		ments
13	13,085-13,088	Shale, brownish-black
14	13,088-13,094	Siltstone, medium-dark-gray, very finely sandy,
15		micaceous, fine carbonaceous material
16	13,094-13,106	Sandstone, olive-gray, medium-grained, silty, very
17		clayey, limy in part; interbedded olive-gray
18		siltstone
19	13,106-13,110	Shale, olive-gray
20	13,110-13,120	Sandstone, light-olive-gray, fine- to medium-
21		grained, silty, clayey, limy in part
22	13,120-13,122	Shale, brownish-gray
23	13,122-13,126	Sandstone, olive-gray, medium- to coarse-grained,
		some very coarse grains and granules, silty,
		clayey

1	13,128-13,135	Shale, olive-gray; interbedded olive-gray siltstone
2	13,135-13,138	Sandstone, medium-gray, fine- to medium-grained,
3		silty
4	13,138-13,140	Shale, medium-dark-gray
5	13,140-13,171	Electrical-log interpretation
6	13,140-13,154	Shale and interbedded sandstone
7	13,154-13,171	Sandstone; some shale in middle
8	13,171-13,182	Core 24; reported recovery 11 ft. (4 trays)
9	Tray 1	(1.1 ft. core)
10	13,171-13,172.1	Sandstone, conglomeratic, olive-gray to grayish-
11		olive, coarse- to very coarse grained, many round-
12		ed to subrounded granules and pebbles (mostly less
13		than 1 in. long) of basalt(?), gray to greenish-
14		gray chert, quartz, quartzite, and other rocks,
15		very silty and clayey, very slightly limy in part,
16		some dark-gray grains, trace of reddish-brown
17		grains, slightly micaceous, hard, obscure bedding,
18		rough vertical fracture(?) in part, no carbonaceous
19		fragments, low porosity
20	13,172.1-13,173.8	Missing
21	Tray 2	(1.9 ft. core)
22	13,173.8-13,175.7	Sandstone, similar to above, medium- to coarse-
23		grained in part, few pebbles in upper 2 in.,
24		grades into conglomerate in lower 6 in.
25	13,175.7-13,176.5	Missing

Tray 3 (2.4 ft. \pm core, rubbly in part)

13,176.5-13,178.9 Sandstone, similar to above, medium- to very coarse grained, mostly very conglomeratic, average pebble size somewhat greater (maximum length 2-1/2 in.+), includes near base a bed (7 in. \pm) of olive-gray fine- to medium-grained silty clayey sandstone with some coarse grains and a few very thin (1/16 in.) coal lenses

13,178.9-13,179.3 Missing

Tray 4 (1 ft. core)

13,179.3-13,180.3 Sandstone, partly conglomeratic, grayish-olive, coarse- to very coarse grained, some medium- to coarse-grained, many rounded granules and pebbles (mostly about 1/2 in.) similar to above, one loose rounded medium-light-gray partly mottled quartzite cobble (3-1/4 in. +) at top, very silty and clayey, very slightly limy in part, hard, obscure bedding, vertical fracture in part, low porosity

13,180.3-13,182 Missing

13,182-13,209 Sandstone, olive-gray, medium- to coarse-grained, some very coarse grains and granules of chert, quartzite, and other rocks, silty, clayey

13,209-13,212 Shale, olive-gray; interbedded olive-gray very fine to sandy silts

1	13,213-13,216	Siltstone, brownish-gray, very finely sandy, slightly
2		limy in part
3	13,216-13,223	Sandstone, olive-gray to medium-gray, medium- to
4		coarse-grained, some very coarse grains, silty
5	13,223-13,228	Siltstone, similar to above
6	13,228-13,252	Sandstone, olive-gray, medium- to coarse-grained,
7		some very coarse grains and granules, silty,
8		clayey, limy in part; some interbedded brownish-
9		gray and olive-gray shale
10	13,252-13,265	Sandstone, olive-gray to medium-gray, fine- to
11		medium-grained, silty, clayey; interbedded olive-
12		gray shale and brownish-black shale with carbo-
13		naceous fragments, caving?
14	13,265-13,278	Sandstone, similar to above
15	13,278-13,284	Shale, olive-gray; interbedded sandstone similar to
16		above
17	13,284-13,286	Sandstone, similar to above
18	13,286-13,288	Siltstone, olive gray, very finely sandy
19	13,288-13,292	Shale, medium-dark-gray
20	13,292-13,298	Sandstone, as above; interbedded siltstone, as
21		above
22	13,298-13,314	Sandstone, olive-gray, medium- to coarse-grained,
23		some very coarse grains and granules, silty,
24		clayey; some interbedded olive-gray and brownish-
25		gray siltstone

1	13,314-13,316	Shale, olive-gray to brownish-gray, silty
2	13,316-13,330	Sandstone, olive-gray, very fine to fine-grained,
3		silty, clayey, some carbonaceous fragments; inter-
4		bedded siltstone and shale as above
5	13,330-13,336	Sandstone, olive-gray, medium- to coarse-grained,
6		some very coarse grains and granules of gray and
7		greenish-gray chert, quartz, basalt(?), dark-green
8		very fine grained hard rock and other rocks, silty,
9		clayey
10	13,336-13,340	Shale, brownish-gray, carbonaceous fragments, cav-
11		ing(?); dark-gray to black carbonaceous shale
12	13,340-13,341	Coal
13	13,341-13,353	Sandstone, similar to above
14	13,353-13,360	Shale, dark-gray to black, carbonaceous, some light-
15		olive-gray very finely sandy micaceous carbonaceous
16		siltstone
17	13,360-13,361	Coal
18	13,361-13,380	Sandstone, olive-gray, medium- to coarse-grained,
19		some very coarse grains and granules similar to
20		above, silty, clayey
21	13,380-13,387	Sandstone, medium-gray to olive-gray, fine- to
22		medium-grained, silty, clayey
23	13,387-13,390	Shale, medium-dark-gray

1	13,389-13,407	Sandstone, olive-gray, medium- to coarse-grained,
2		very coarse grains and granules as above, silty,
3		clayey
4	13,407-13,409	Shale, olive-gray
5	13,409-13,415	Sandstone, brownish-gray to medium-dark-gray, fine-
6		to medium-grained, silty, clayey
7	13,415-13,430	Sandstone, medium-gray, medium- to very coarse
8		grained, granules similar to above, silty, clayey
9	13,430-13,436	Sandstone, medium-light-gray, medium-grained, some
10		coarse grains and dark-gray grains (caving?),
11		silty, limy
12	13,436-13,440	Shale, medium-dark- to dark-gray, silty, micaceous,
13		carbonaceous fragments, caving?
14	13,440-13,442	Coal, caving?
15	13,442-13,447	Shale, as above
16	13,447-13,465	Sandstone, medium-gray to olive-gray, medium- to
17		coarse-grained, some very coarse grains and gran-
18		ules, silty, clayey
19	13,465-13,489	Sandstone, similar to above, more silty and clayey
20	13,489-13,494	Shale, olive-gray, silty
21	13,494-13,514	Sandstone, olive-gray, medium- to very coarse
		grained, granules as above, very silty and clayey
22	13,514-13,517	Siltstone, dark-greenish-gray to olive-gray
23	13,517-13,522	Shale, dark-greenish-gray to olive-gray; dark-gray
24		smooth shale, carbonaceous fragments

1	13,522-13,528	Sandstone, olive-gray to medium-gray, medium- to
2		very coarse grained, granules as above, very silty
3		and clayey
4	13,528-13,533	Shale, dark-gray
5	13,533-13,549	Sandstone, medium-gray, medium- to coarse-grained,
6		silty, clayey; interbedded dark-gray shale
7	13,549-13,560	Shale, dark-gray
8	13,560-13,575	Sandstone, medium-gray, medium- to coarse-grained,
9		granules as above, very silty and clayey
10	13,575-13,602	Electrical-log interpretation; no samples from
11		13,600 to 13,800; allowed 25-ft. sample lag
12	13,575-13,578	Sandstone
13	13,578-13,582	Shale
14	13,582-13,597	Sandstone; some siltstone in upper part
15	13,597-13,602	Shale
16	13,602-13,624	Core 25; reported recovery 22 ft. (10 trays)
17	Tray 1	(1.3 ft. \pm core, rubble)
18	13,602-13,603.3	Shale, dark-gray (considerable green tint) to dark-
19		olive-gray, partly silty, not limy, hard, brittle,
20		obscure bedding, many coaly plant fragments with
21		random orientation
22	13,603.3-13,604.2	Missing
23	Tray 2	(1.1 ft. \pm core, in large part)

1 13,604.2-13,605.3 Shale, dark-gray, some green tint, silty and finely
2 to medium sandy in lower(?) part, not limy, hard,
3 brittle, obscure bedding, some coaly plant frag-
4 ments as above; lower 3 in. is dark-olive-gray
5 fine- to medium-grained very silty clayey hard
6 sandstone with many dark-gray grains and some
7 reddish-brown grains

8 13,605.3-13,606.4 Missing

9 Tray 3 (1.5 ft. \pm core, rubbly in upper part)

10 13,606.4-13,607.9 Shale and siltstone; shale, dark-gray, some green
11 tint, olive-gray in small part, not limy, hard,
12 brittle, obscure bedding, some carbonaceous frag-
13 ments; siltstone, (about 7 in. thick in lower-
14 middle part), dark-gray, some green tint, very
15 finely to finely sandy in part, clayey, dark-gray
16 and reddish-brown sand grains as above, not limy,
17 hard, bedding obscure, few carbonaceous fragments
18 randomly oriented

19 13,607.9-13,608.6 Missing

20 Tray 4 (0.7 ft. \pm core, rubble)

21 13,608.6-13,609.3 Shale, olive-gray to medium-dark-gray, not silty or
22 limy, hard, brittle, obscure bedding, some carbo-
23 naceous fragments randomly oriented, slicken-
24 slides fairly common in olive-gray shale

25 13,609.3-13,610.8 Missing

Tray 5 (0.7 ft. \pm core, rubble)

13,610.8-13,611.5 Shale, as above; mostly olive-gray, includes a few fragments of bright coal (3/4 in. thick)

13,611.5-13,613 Missing

Tray 6 (0.8 ft. \pm core, rubble)

13,613-13,613.8 Shale, similar to above but mostly medium-dark- to dark-gray, some brownish-gray mottling ("bleaching") around plant fragments; includes some dark-greenish-gray nonlimy hard siltstone with scattered to abundant carbonaceous fragments.

13,613.8-13,615.2 Missing

Tray 7 (0.8 ft. \pm core, rubble)

13,615.2-13,616 Shale, olive-gray, not silty or limy, hard, brittle, obscure bedding, carbonaceous fragments and very few coaly plant fragments randomly oriented; includes some dark-olive-gray medium- to coarse-grained silty clayey conglomeratic sandstone with rounded granules and pebbles (mostly about 1/2 in.-3/4 in.) of basalt(?), quartz, gray to greenish-gray chert, brownish-gray clayey siltstone, and other rocks

13,616-13,617.4 Missing

Tray 8 (0.8 ft. \pm core, rubble in part)

1 13,617.4-13,618.2 Siltstone, dark-greenish-gray mottled with olive-
 2 gray and some dark-gray, very finely to finely
 3 sandy, very clayey, many dark-gray grains, some
 4 reddish-brown grains, not limy, hard, bedding ob-
 5 scure, some carbonaceous fragments and paper-thin
 6 coal films; includes some shale as above and some
 7 sandstone similar to above; includes 2 loose
 8 rounded pebbles (1-3/4 in.) of greenish-gray hard
 9 tuff(?) containing many white angular feldspar
 10 grains and small black carbonaceous(?) fragments

11 13,618.2-13,619.6 Missing

12 Tray 9 (0.5 ft. core)

13 13,619.6-13,620.1 Conglomerate, dark-greenish-gray, subrounded to
 14 rounded granules and pebbles (maximum length ex-
 15 ceeds 2-1/4 in.) of mostly dark-gray to dark-
 16 greenish-gray hard rock, medium to very coarse
 17 sand matrix, very clayey and silty, obscure bed-
 18 ding, no carbonaceous fragments; includes some
 19 conglomeratic sandstone; low porosity?

20 13,620.1-13,621.8 Missing

21 Tray 10 (0.6 ft. ± core, rubbly in part)

22 13,621.8-13,622.4 Conglomerate and conglomeratic sandstone, similar
 to above, olive-gray, in part, limy mostly in con-
 glomerate part, low porosity?

23 13,622.4-13,623.6 Missing

1 13,624-13,637 Core 26; reported recovery 6 ft. (2 trays)
 2 Tray 1 (1.1 ft. \pm core, rubbly in part)
 3 13,624-13,625.1 Conglomerate, olive-gray, subrounded to rounded
 4 granules and pebbles (up to 2 in. long) of many
 5 kinds of rock (igneous, metamorphic, volcanic?,
 6 and greenish-gray to olive-gray shale and sand-
 7 stone), colors of pebbles chiefly olive-gray,
 8 greenish-gray, and dark-gray, medium to coarse
 9 sand matrix with much silt and olive-gray and white
 10 clay, slightly limy in part, obscure bedding, no
 11 carbonaceous fragments, low porosity?
 12 13,625.1-13,627 Missing
 13 Tray 2 (1 ft. \pm core, rubble)
 14 13,627-13,628 Shale, dark-greenish-gray, partly silty, not limy,
 15 hard, brittle, obscure bedding, scattered poorly
 16 oriented carbonaceous fragments; includes at
 17 base(?) some dark-greenish-gray very finely sandy
 18 partly limy clayey siltstone
 19 13,628-13,637 Missing or not recovered
 20 13,637-13,638 Core 27; reported recovery 8 ft. (3 trays)
 21 Tray 1 (1.1 ft. \pm core)

13,637-13,638.5 Siltstone and sandstone; siltstone, medium-dark-gray, very finely sandy, some dark-gray grains, few reddish-brown grains, limy, hard, medium bedded(?), scattered small carbonaceous fragments, includes (5 in. above base) a bed (about 2 in. thick) of medium-dark-gray silty nonlimy hard shale with abundant carbonaceous fragments on bedding planes; sandstone (lower 5 in.), olive-gray, fine- to medium-grained, few coarse grains, some dark-gray grains, few reddish-brown grains, very silty, clayey, not limy, hard, very thin bedded, few carbonaceous fragments; includes some olive-gray silty shale and siltstone; low porosity?

13,638.5-13,639.7 Missing

Tray 2 (1.3 ft. \pm core, rubble in part)

- 1 13,639.7-13,641 Conglomerate and sandstone, interbedded(?); con-
 2 glomerate, olive-gray, subrounded to rounded gran-
 3 ules and pebbles (up to 1 in.) of many kinds of
 4 rock, medium to very coarse sand matrix with much
 5 silt and clay, some white clay in upper 3 in.,
 6 limy except in upper 3 in., obscure bedding, no
 7 carbonaceous fragments, low porosity(?); sand-
 8 stone, olive-gray, finely spotted moderate-brown,
 9 fine- to medium-grained, some coarse grains, many
 10 dark-gray to black grains, silty, limy to very
 11 limy, hard, very thin bedded(?), some carbonaceous
 12 films in part, low porosity(?); includes a bed
 13 (about 4 in. thick?) of medium-dark-gray very
 14 finely sandy limy hard siltstone with carbonaceous
 15 films
- 16 13,641-13,642.4 Missing
- 17 Tray 3 (0.7 ft. \pm core, rubble)
- 18 13,642.4-13,643.1 Conglomerate, similar to above, one loose cobble
 19 (3 in. +) of olive-gray hard tuff; includes some
 20 dark-olive-gray, very silty nonlimy hard shale
- 21 13,643.1-13,652 Missing or not recovered
- 22 13,652-13,690 Core 28; reported recovery 19 ft. (7 trays)
 23 Tray 1 (2 ft. \pm core, rubble in part)

- 1 13,652-13,654 Shale, medium-dark-gray, some dark-greenish-gray
 2 and olive-black, silty in part, not limy, hard,
 3 brittle, bedding not apparent, scattered carbo-
 4 naceous fragments and coal films randomly oriented
- 5- 13,654-13,654.7 Missing
- 6 Tray 2 (2.2 ft. \pm core, rubbly in large part)
- 7 13,654.7-13,656.9 Shale, olive-gray, some dark-gray, brown tint in
 8 part, mostly not silty or limy, small part in-
 9 cludes irregular "grainy" limy masses, hard,
 10- brittle, no apparent bedding, fairly common
 11 slickensides, carbonaceous fragments and very
 12 small coal fragments somewhat more abundant than
 13 in overlying shale
- 14 13,656.9-13,657.4 Missing
- 15- Tray 3 (1.5 ft. core, rubbly in small part)
- 16 13,657.4-13,658.9 Siltstone, medium-dark-gray, slight green tint in
 17 part, very finely sandy in small part, clayey,
 18 not limy, hard, obscure bedding, few slicken-
 19 sides, carbonaceous fragments and films randomly
 20- oriented; includes some shale similar to tray 1
- 21 13,658.9-13,660.1 Missing
- 22 Tray 4 (2.3 ft. core)
- 23 13,660.1-13,662.4 Shale and siltstone, similar to tray 3, shale most-
 24 ly silty
- 25 13,662.4-13,662.8 Missing

Tray 5 (1.9 ft. core)

13,662.8-13,664.2 Sandstone, medium-dark-gray, some olive-gray tint,
mostly fine- to medium-grained, some medium- to
very coarse grained (beds about 1 in.-3 in. thick)
near top and middle, rounded granules and small
pebbles fairly common in coarser parts, rather
wide variation of grain colors, silty, clayey,
limy in coarser parts to slightly limy in re-
mainder, fairly hard, mostly thin bedded(?),
possibly some cross bedding, few carbonaceous
films and fragments, one coal film (1/16 in.)
with white calcite "veins", low porosity?

13,664.2-13,664.7 Shale, medium-dark-gray to dark-greenish-gray, some
brownish-gray mottling ("bleaching"?), mostly
around carbonaceous fragments, partly silty, not
limy, hard, brittle, obscure bedding, some carbo-
naceous fragments

13,664.7-13,665.5 Missing

Tray 6 (1.1 ft. \pm core, mostly rubble)

1 13,665.5-13,666.6 Shale (three kinds); shale, medium-dark-gray, slight
 2 olive-gray tint, silty, not limy, hard, brittle,
 3 obscure bedding, few carbonaceous fragments and
 4 paper-thin coal lenses; shale, dark-gray, slight
 5 brown tint, not silty or limy, hard, brittle,
 6 bedding obscure, somewhat fissile or flaky "con-
 7 choidal" fracture, slickensides common, some
 8 carbonaceous fragments and very small coal frag-
 9 ments; shale, olive-gray to medium-gray and dark-
 10 yellowish-brown, clayey, few "floating" sand
 11 grains in part, not limy, fairly hard and brittle,
 12 one piece includes a gray mottled concretion(?)
 13 probably more than 1 in. long, dark-gray rounded
 14 clayey ironstone(?) grains (some with pyrite at
 15 center) abundant around the concretion(?) and
 16 mostly scattered in remainder, poorly bedded or
 17 nonbedded, many slickensides, some carbonaceous
 18 fragments, few very thin coal stringers, resembles
 19 underclay

20 13,666.6-13,668.2 Missing

21 Tray 7 (0.8 ft. \pm core, rubble)

1	13,668.2-13,669	Shale, olive-gray, spotted and mottled medium-dark-
2		gray, clayey, not silty or limy, hard, brittle,
3		obscure bedding or nonbedded, mostly smooth con-
4		choidal fracture, no carbonaceous fragments; in-
5		cludes some dark-gray to black carbonaceous shale
6		with bright to dull coal stringers and many coarse
7		rounded clay(?) grains
8	13,669-13,680	Missing or not recovered
9	13,680-13,705	Core 29; reported recovery 19 ft. (7 trays)
10	Tray 1	(0.4 ft. \pm core, rubble)
11	13,680-13,680.4	Shale (three kinds); shale, dusky-yellowish-brown to
12		brownish-gray, clayey, scattered to very abundant
13		light-gray fine to coarse angular to rounded clay
14		grains (altered volcanic material?), trace of black
15		magnetite crystals, some pin-point limy spots,
16		fair to poor fissile to platy bedding, abundant
17		carbonaceous films and very thin coal stringers in
18		part, to a minor extent slowly falls apart in
19		water; shale, dark-gray to dark-greenish-gray,
20		partly silty, not limy, hard, scattered small
21		carbonaceous fragments; shale, olive-gray, not
22		limy, poorly bedded or nonbedded, many carbonaceous
23		fragments weakly oriented; tray includes a few
24		fragments (1/2 in. thick) of black hard coaly shale
25		and a few small and large subrounded pebbles (as
26		much as 1-1 1/2 in. long) of mostly gray metamor-
27		phic(?) rock, also includes one piece of light-
28		olive-gray "clayey" somewhat bentonitic shale
29		(this may be from tray 2)

1 13,680.4-13,682.7 Missing

2 Tray 2 (0.9 ft. \pm core, rubble)

3 13,682.7-13,683.6 Shale (three kinds); shale, similar to brown shale

4 in tray 1, in water some falls apart with much

5 splintery or needle-like structure, some appears

6 nonbedded with randomly oriented carbonaceous

7 fragments; shale, dark-gray to black, many light-

8 to dark-gray smooth clay grains, abundant carbo-

9 naceous material, many very thin coal stringers;

10 shale, light-olive-gray, some dark-yellowish-brown,

11 clayey, slightly limy, "floating" very fine and

12 fine quartz grains, feels "soapy", to a moderate

13 extent falls apart in water, very few small carbo-

14 naceous fragments

15 13,683.6-13,685.4 Missing

16 Tray 3 (1.5 ft. \pm core, mostly rubble)

1 13,685.4-13,686.9 Shale (four kinds); shale, similar to brown shale
2 (tray 1) and dark-gray to black carbonaceous
3 shale; shale, pale-yellowish-brown to light-olive-
4 gray, clayey, pin-point limy spots, many "float-
5- ing" fine to medium quartz grains in part, trace
6 of magnetite crystals, some falls apart in water
7 to a moderate extent, many carbonaceous fragments,
8 few coaly fragments (1/8 in. thick); middle(?)
9 part of core has some black carbonaceous shale
10- with included contorted brownish-gray to yellow-
11 ish-brown shale and also some slickensided black
12 shale with one or two fracture fillings of
13 coarsely crystalline calcite as much as 1/4 in.
14 thick (faulted?)

15- 13,686.9-13,688.1 Missing

16 Tray 4 (1.6 ft. \pm core, rubble)
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13,688.1-13,689.7 Shale (two kinds); shale, dark-yellowish-brown to brownish-gray, clayey, very slightly limy in part, fairly brittle, in water falls apart into splintery fragments, bedding mostly obscure, some shale includes clay grains similar to shale in tray 1, one thin fracture filling(?) of light-greenish-gray clay, many randomly oriented carbonaceous fragments; shale, dark-gray to brownish-black, clayey, hard, brittle, few pin-point limy spots, scattered to abundant clay grains (altered volcanic material?), in water falls apart slowly and very incompletely into splintery fragments, poor platy bedding in part, many thin (<1/8 in.) coal lenses

13,689.7-13,690.8 Missing

Tray 5 (1.4 ft. \pm core, rubble)

13,690.8-13,692.2 Shale, mostly similar to brown shale above; some dark-gray shale as above; shale (probably a few inches thick), pale-yellowish-brown, clayey, finely sandy and limy in part, slightly limy in remainder, fairly brittle, in water falls apart to variable extent, very few carbonaceous fragments

13,692.2-13,693.5 Missing

Tray 6 (1.4 ft. \pm core, rubble)

- 1 13,693.5-13,694.5 Shale, dark-gray to black, brownish-gray in part,
 2 clayey, few pin-point limy spots, scattered to
 3 very abundant angular to subrounded clay grains
 4 (altered volcanic material?), few fragments of
 5-- amber (up to granule size), some carbonaceous
 6 fragments, coal films and lenses (up to 1/8 in.
 7 thick) fairly common to abundant in darker colored
 8 shale
- 9 13,694.5-13,696.2 Missing
- 10-- Tray 7 (0.8 ft. \pm core, mostly rubble)
- 11 13,696.2-13,697 Shale, mostly dark-gray to black and similar to
 12 above; some brownish-gray limy shale with "float-
 13 ing" sand grains and many carbonaceous fragments;
 14 one bed (3 in.) of hard black very bony coal or
 15-- bony shale with scattered amber fragments
- 16 13,697-13,705 Missing or not recovered
- 17 13,705-13,708 Drilled, no sample
- 18 13,708-13,733 Core 30; reported recovery 25 ft. (9 trays)
- 19 Tray 1 (1.3 ft. core)
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13,708-13,709.3 Shale, medium- to medium-dark-gray grading into and mottled with grayish-red, silty, pin-point limy spots, limy in some fractures, hard; includes scattered to fairly numerous medium-sand sized rounded concentrically color-banded (dark-gray, green, yellow, and at center reddish-brown) clayey grains (altered volcanic material?), also includes scattered angular clear and black glassy grains of quartz and obsidian(?) and a few angular fragments (up to 3/4 in. maximum dimension) of dark-greenish-gray silty shale (largest fragment includes many color-banded partly angular grains similar to above), bedding obscure, some fractures and irregular cracks(?) filled with grayish-red clayey shale, no carbonaceous fragments

13,709.3-13,710.8 Missing

Tray 2 (2.3 ft. \pm core, rubble in part)

13,710.8-13,713.1 Shale, similar to above except; some shale is mottled dark-greenish-gray and grayish-red to very dusky-red and appears conglomeratic, some shale in lower part is mottled medium-gray to grayish-brown and slightly silty, upper and middle parts are more limy and contain abundant color-banded grains (fine to coarse sand size) which mostly lack the reddish-brown centers and have limy centers, color-banded grains in lower part are mostly dark-gray with light-gray limy centers

1 13,713.1-13,713.6 Missing

2 Tray 3 (2.2 ft. core)

3 13,713.6-13,715.8 Shale, medium-gray, grayish-brown, and grayish-red,
4 mottled, spotted and streaked, silty in large
5 part, not limy, hard, fairly brittle, abundant
6 subrounded to rounded color-banded (dark-gray with
7 light-gray limy centers) grains similar to above
8 (altered volcanic material?) in upper 11 in. only,
9 some angular clear and black glassy grains of
10 quartz and obsidian(?), many dark-greenish-gray
11 subangular to rounded shale fragments (<1/4 in.)
12 in lower 8 in., no apparent bedding, some slick-
13 sides mainly in middle part, one long narrow brown
14 plant(?) fragment in lower part

15 13,715.8-13,716.4 Missing

16 Tray 4 (2.7 ft. core)

17 13,716.4-13,719.1 Shale, similar to lower part of tray 3, dominantly
18 grayish-red but extensively spotted and mottled
19 with dark-greenish-gray, medium-gray, and some
20 grayish-brown, no color-banded grains, scattered
21 glassy grains of quartz and obsidian(?), few pin-
22 point limy spots and limy fractures, two mud
23 cracks(?) in lower part filled with grayish-red
24 claystone, no slickensides, no plant fossils

25 Tray 5 (2.3 ft. core)

13,719.1-13,721.4 Shale, medium-gray to dark-greenish-gray, mostly silty, scattered pin-point limy spots in upper half, scattered to fairly numerous sharply angular fragments of glassy quartz and obsidian (?) in upper 13 in., trace of similar quartz in lower 15 in., many subrounded fragments of dark-greenish-gray shale in some gray shale giving a conglomeratic appearance, some irregularly curved brownish-gray clayey surfaces and very thin clay lenses (plant fillings?) with slickensides and calcite films in part, hard, brittle in large part, obscure bedding, long narrow carbonaceous fragments fairly numerous in lower 15 in. and absent in remainder

13,721.4-13,721.9 Missing

Tray 6 Missing

13,721.9-13,724.7

Tray 7 (2 ft. \pm core, rubbly in part)

13,724.7-13,726.7 Shale, dark-greenish-gray, mostly silty, conglomeratic appearance in large part, some shale fragments totally surrounded by very thin calcite rind, few to many pin-point limy spots, few brown calcite fragments(?) or cavity fillings in some of upper part, hard, brittle, obscure bedding, some slickensides, few very thin (1/16 in.) coal fragments in upper part, some carbonaceous streaks in lower part

1 13,726.7-13,727.5 Missing

2 Tray 8 (2 ft. \pm core, rubble)

3 13,727.5-13,729.5 Shale, upper 2 in. similar to above; shale, mostly

4 dark-greenish-gray, some medium-gray (slight

5- yellow-brown tint), mostly silty, not limy, few

6 subrounded shale fragments, hard, brittle, obscure

7 bedding, few slickensides, very few carbonaceous

8 fragments

9 13,729.5-13,730.3 Missing

10- Tray 9 (1.8 ft. \pm core, rubble)

11 13,730.3-13,732.1 Shale, similar to above, trace of volcanic(?) glassy

12 quartz, more conglomeratic appearance than above,

13 no carbonaceous fragments

14 13,732.1-13,733 Missing

15- 13,733-13,750 Core 31; reported recovery 15 ft. (5 trays)

16 Tray 1 (1.3 ft. \pm core, rubbly in large part)

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1	13,733-13,734.3	Shale (upper and middle parts), dark-greenish-gray,
2		partly silty, not limy, few calcite-filled frac-
3		tures, some shale fragments as above, obscure
4		bedding, slickensides, few carbonaceous frag-
5		ments; shale (lower part), some similar to above,
6		brownish-gray in part, many included "floating"
7		angular to rounded shale fragments (<1/2 in. long),
8		hard, brittle, fissile to platy somewhat wavy
9		bedded, many carbonaceous fragments, few coal
10		fragments, includes some brownish-gray to dark-
11		yellowish-brown brittle conchoidally-fracturing
12		claystone (about 1 in. thick?) with some carbo-
13		naceous fragments, also includes(?) a bed (1-1/4
14		in.) of olive-gray medium- to coarse-grained
15		silty conglomeratic sandstone with rounded gran-
16		ules and pebbles (up to about 1 in. long) of
17		quartz, hard dark-brownish-gray siltstone, dark-
18		gray chert(?), basalt(?), and other hard rock (re-
19		semblance to sandstones of the Hemlock Conglom-
20		erate suggests this sandstone may be erroneously
21		included in this tray), apparent dip in lower
22		part about 10 degrees?
23	13,734.3-13,736	Missing
24	Tray 2	(2 ft. \pm core, rubble)

1	13,736-13,738	Shale, dark-greenish-gray, olive-gray in small part,
2		silty, not limy, many subrounded to angular shale
3		fragments (up to 1 in. long), very few calcite-
4		filled fractures, hard, brittle, obscure bedding,
5		few carbonaceous fragments, one coal fragment
6	13,738-13,739	Missing
7	Tray 3	(2.8 ft. core)
8	13,739-13,739.5	Shale, dark-greenish-gray, silty, slightly limy to
9		limy, many shale fragments as above, few rounded
10		claystone fragments (one bentonitic), very few
11		angular glassy grains of volcanic(?) quartz and
12		obsidian(?), hard, brittle, obscure bedding, no
13		carbonaceous fragments
14	13,739.5-13,741.3	Siltstone, medium-dark-gray, light-olive-gray, and
15		dark-yellowish-brown, limy, hard, scattered to
16		very abundant subangular to rounded mostly limy
17		altered volcanic(?) grains (fine sand size) that
18		somewhat resemble oolites, few angular shale
19		fragments, few angular glassy grains of volcan-
20		ic(?) quartz and obsidian(?), one bed(?), few
21		small carbonaceous fragments in basal part

13,741.3-13,741.8 Shale, dark-greenish-gray, hard, brittle, not limy,
many granule-sized subangular shale fragments in
lower part, very few small angular grains of
volcanic(?) quartz, calcite-filled fractures in
part, obscure bedding, some slickensides, few
carbonaceous fragments

13,741.8-13,742 Missing

Tray 4. 2.3 ft. \pm core, rubbly in part

13,742-13,744.3 Shale, dark-greenish-gray to medium-gray, mostly
silty, very few "floating" sand grains, few small
shale fragments, trace of pin-point limy spots,
hard, brittle, obscure bedding, slickensides,
few carbonaceous fragments

13,744.3-13,745 Missing

Tray 5 (1.3 ft. \pm core, rubbly in part)

13,745-13,746.3 Shale, mostly conglomeratic, lithologically similar
to above, mottled olive-gray in part, abundant
subangular to rounded dark-greenish-gray and dark-
gray (some brown) shale fragments (mostly less
than 1/2 in. but up to 1-1/4 in.), obscure bedding,
slickensides, common to abundant carbonaceous
fragments, few coal films and lenses about 1/16
in. thick; tray includes one small piece of light-
gray fine- to medium-grained very clayey conglom-
eratic sandstone -- probably out of place

1	13,746.3-13,750	Missing or included in tray 1 of core 32
2	13,750-13,773	Core 32; reported recovery 25 ft. (2 ft. over re-
3		covery) (9 trays)
4	Tray 1	(1 ft. core) (basal part of core 31)
5	13,749-13,750	Shale, mostly conglomeratic, dark-greenish-gray to
6		medium-dark-gray, mostly silty, abundant small
7		(<1/2 in.) subangular to rounded shale fragments,
8		not limy, hard, brittle, obscure thin(?) bedding,
9		some slickensides, mostly abundant carbonaceous
10		fragments and paper-thin coal films partly ori-
11		ented at high angle to bedding
12	Tray 2	(2.1 ft. core)
13	13,750-13,752.1	Shale, mostly conglomeratic, similar to above, some
14		clusters of very finely crystalline pyrite in
15		part, not limy, "floating" fine to medium sand
16		grains in lower part, few calcite-filled frac-
17		tures, carbonaceous films and very small coal
18		lenses or fragments in basal part
19	13,752.1-13,752.8	Missing
20	Tray 3	(2.2 ft. \pm core, rubbly in lower part)
21	13,752.8-13,755	Shale, similar to above, mostly conglomeratic with
22		shale fragments up to 1-1/2 in. long, scattered
23		to many carbonaceous fragments, some medium-gray
24		shale (fragments?), some brownish-gray clayey
25		shale in lower part

1 13,755-13,755.6 Missing

2 Tray 4 (2.6 ft. \pm core, rubbly in part)

3 13,755.6-13,758.2 Shale, conglomeratic, dark-greenish-gray, some
4 brownish-gray and medium-dark-gray, partly silty,
5 abundant subangular to rounded granule- and pebble-
6 sized shale fragments, one shale cobble (1 in.
7 thick and more than 3 in. long) near base, abun-
8 dant disseminated very finely crystalline pyrite
9 in one shale fragment, very few pin-point limy
10 spots and "floating" sand grains, hard, brittle,
11 obscure bedding, some slickensides, scattered
12 to fairly abundant carbonaceous fragments, few
13 paper-thin coal fragments; apparent dip probably
14 less than 10 degrees

15 Cretaceous System

16 Upper Cretaceous Series

17 Rocks of Campanian age

18 13,758.2-13,758.4 Missing

19 Tray 5 (2.6 ft. \pm core, rubbly in part)

- 1 13,758.4-13,761 Shale, medium-dark-gray, some thin dark-gray
 2 streaks, silty, scattered "floating" angular very
 3 fine to fine quartz grains (volcanic?), abundant
 4 very finely crystalline pyrite mostly disseminated
 5- (few fracture fillings) in some shale, slightly
 6 micaceous, not limy, hard, brittle, obscure
 7 massive(?) bedding, some slickensides, "wavy"
 8 fracture generally parallel to well bore; includes
 9 a few laminae and thin lenses of partly limy silt-
 10 stone; few very scattered carbonized fragments
- 11 13,761-13,761.2 Missing
- 12 Tray 6 (2.5 ft. \pm core, rubbly in part)
- 13 13,761.2-13,763.7 Shale, similar to above, uppermost part (4 in.) is
 14 mostly medium-gray limy siltstone with many cal-
 15- cite-filled fractures (up to 1/8 in. thick) and
 16 thin medium-dark-gray shale lenses and some shale
 17 fragments, apparent dip near top about 26 degrees
- 18 13,763.7-13,764 Missing
- 19 Tray 7 (2.8 ft. \pm core, mostly rubble)
- 20- 13,764-13,766.8 Shale, similar to above, few fractures near top
 21 filled with pyrite and calcite, scattered slight-
 22 ly limy spots, no disseminated pyrite, few lami-
 23 nae and lenses (up to 1/2 in. thick) of medium-
 24 gray slightly limy siltstone
- 25- Tray 8 (2.3 ft. \pm core, rubbly in part)

- 1 13,766.8-13,769.1 Shale, similar to above, few calcite-filled frac-
 2 tures, no pyrite, few siltstone laminae as above,
 3 apparent dip near middle (siltstone laminae) about
 4 30 degrees
- 5 13,769.1-13,769.6 Missing
- 6 Tray 9 (1.6 ft. \pm core, rubble in part)
- 7 13,769.6-13,771.2 Shale, similar to above, few calcite-filled frac-
 8 tures, one small pyrite-filled carbonized plant(?)
 9 fragment
- 10 13,771.2-13,773 Missing
- 11 13,773-13,787 Core 33; reported recovery 13 ft. (5 trays)
- 12 Tray 1 (0.2 ft. core)
- 13 13,773-13,773.2 Shale, medium-dark-gray, silty, slightly micaceous,
 14 very slightly limy in parts, hard, brittle, ob-
 15 scure massive(?) bedding, few calcite-filled frac-
 16 tures, few very small limy pelecypod(?) fragments
- 17 13,773.2-13,775.6 Missing
- 18 Tray 2 (2.6 ft. core)
- 19 13,775.6-13,778.2 Shale, similar to above, very slightly limy in more
 20 clayey parts to limy in more silty parts, some
 21 thin lenses and beds of medium-gray limy siltstone
 22 with many small dark-gray rounded to curved lenses
 23 of shale, calcite-filled fractures abundant near
 24 top and scattered in remainder, trace of pyrite
 25 in part, few brownish-gray pelecypod(?) fragments,
 26 apparent dip near top about 25 degrees-30 degrees
 and probably much less in lower part

1	Tray 3	(2.6 ft. \pm core, rubbly in part)
2	13,778.2-13,780.8	Shale, similar to tray 1, few calcite-filled frac-
3		tures near middle, trace of pelecypod(?) frag-
4		ments, few small pyritic coal stringers ($<1/16$ in.
5		thick) in upper half
6	Tray 4	(2.6 ft. \pm core, rubbly in part)
7	13,780.8-13,783.4	Shale, similar to above, not limy, few pelecypod(?)
8		fragments in lower part, no coal stringers, few
9		calcite-filled fractures, few pyritized plant(?)
10		fragments in upper part
11	Tray 5	(2.6 ft. \pm core, mostly rubble)
12	13,783.4-13,786	Shale, medium-dark-gray, silty, slightly micaceous,
13		not limy, hard, brittle, obscure massive(?) bed-
14		ding, some slickensides in lower part, few medium-
15		gray siltstone stringers, trace of brownish-gray
16		pelecypod(?) fragments, few pyritized plant(?)
17		fragments, one pyritic coal stringer ($1/16$ in.)
18		near top and oriented at about 45 degrees to core
19		axis, few calcite-filled fractures
20	13,786-13,787	Not recovered
21	13,787-13,802	Core 34; reported recovery 14 ft. (6 trays)
22	Tray 1	(2 ft. \pm core, rubbly in part)
23	13,787-13,789	Shale, similar to above, many brownish-gray pelecyp-
24		pod(?) fragments in 1-in. \pm zone near base, no
25		coal stringers or calcite-filled fractures

1 13,789-13,789.3 Missing

2 Tray 2 (2.4 ft. \pm core, rubbly in part)

3 13,789.3-13,791.7 Shale, similar to above, few scattered pelecypod(?)

4 fragments in part, few clusters of very fine

5- grained pyrite, few siltstone stringers similar

6 to above, trace of pyritic carbonized plant(?)

7 fragments in part

8 Tray 3 (1.6 ft. \pm core, mostly rubble)

9 13,791.7-13,793.3 Shale, medium-dark-gray, silty, slightly micaceous,

10- not limy, hard, brittle, obscure massive(?) bed-

11 ding, many slickensides, fairly soft white non-

12 limy clay with fibrous needle-like structure on

13 some slickensides, much finely crystalline pyrite

14 in part, few thin siltstone stringers

15- 13,793.3-13,794 Missing

16 Tray 4 (1.7 ft. \pm core, mostly rubble)

17 13,794-13,795.7 Shale, similar to above, middle(?) part has abun-

18 dant slickensides with white clay as above and

19 also white talcite, considerable disseminated

20- finely crystalline pyrite, some pyrite in long

21 narrow masses (replacements of plant fragments?),

22 fault or shear zone?

23 13,795.7-13,796.4 Missing

24 Tray 5 (2.8 ft. \pm core, rubbly in part)

1 13,796.4-13,797.3 Shale, similar to above, limy in small part, few
2 fractures filled with brownish-gray and white
3 calcite, some finely crystalline pyrite, many
4 slickensides, lower(?) part includes a bed (about
5 1/4 in. thick) of olive-gray limy siltstone
6 (volcanic ash in part?), apparent dip (limy silt-
7 stone) about 30 degrees-40 degrees

8 13,797.3-13,798.8 Missing

9 Tray 6 (1.2 ft. \pm core, mostly rubble)

10 13,798.8-13,800 Shale, similar to above, few limy streaks in part,
11 several stringers of siltstone, few small pyriti-
12 zed plant(?) fragments, some small brownish-gray
13 pelecypod(?) fragments, no slickensides

14 13,800-13,802 Missing or not recovered

15 13,802-13,822 Core 35; reported recovery 20 ft. (8 trays)

16 Tray 1 (2 ft. \pm core, rubbly in lower half)

17 13,802-13,804 Shale, medium-dark-gray, silty, not limy, slightly
18 micaceous, trace of very fine grained pyrite (re-
19 placed plant fragments?), hard, brittle, fairly
20 "tough" in upper half, obscure massive(?) bedding,
21 no slickensides, very few calcite-filled frac-
22 tures, few stringers of siltstone, one nonlimy
23 ostracod(?), few small brownish-gray pelecypod(?)
24 fragments in lower part, apparent dip possibly
25 5 degrees-8 degrees

1	13,804-13,804.5	Missing
2	Tray 2	(2.5 ft. \pm core, partly rubble)
3	13,804.5-13,807	Shale, similar to above, few slickensides and calcite-filled fractures, few small brownish-gray
4		pelecypod(?) fragments, trace of carbonized
5		plant(?) fragments; apparent dip (thin siltstone
6		lense) possibly 32 degrees
7		
8	Tray 3	(2 ft. \pm core, partly rubble)
9	13,807-13,809	Shale, similar to above, some thin lenses of silt-
10		stone, few calcite-filled fractures, some slick-
11		ensides, "wavy" near-vertical fractures, trace of
12		partly pyritized carbonized plant(?) fragments;
13		middle(?) part includes medium-dark-gray limy
14		siltstone and shale with many brownish-gray
15		pelecypod(?) fragments in part
16	13,809-13,809.5	Missing
17	Tray 4	(1.8 ft. \pm core, mostly rubble)
18	13,809.5-13,811.3	Shale, medium-dark-gray, silty, slightly micaceous,
19		not limy, some very fine grained pyrite (replaced
20		plant fragments?), hard, brittle, obscure massive
21		(?) bedding, prominent slickensides (with calcite),
22		some thin lenses of siltstone, trace of
23		very small pelecypod(?) fragments in part
24	13,811.3-13,812	Missing
25	Tray 5	(2 ft. \pm core, mostly rubble)

- 1 13,812-13,814 Shale, similar to above, much very finely crystal-
 2 line pyrite on some fracture surfaces, several
 3 large brownish-gray pelecypod(?) fragments in
 4 upper half and small fragments scattered through-
 5 out, one pyritic coalified plant fragment in
 6 lower part, one short subcylindrical pyritized
 7 fragment (1/5 in. diameter) of a tree branch(?)
 8 in lower part, slickensides as above
- 9 13,814-13,814.5 Missing
- 10 Tray 6 (1.8 ft. \pm core, rubbly in part)
- 11 13,814.5-13,816.3 Shale, similar to above, no pyrite, few pelecypod
 12 (?) fragments (one costate)
- 13 13,816.3-13,817 Missing
- 14 Tray 7 (1.3 ft. \pm core, rubble)
- 15 13,817-13,818.3 Shale, similar to above, limy in lower(?) part,
 16 traces of very small pyritized plant(?) fragments
 17 and pelecypod(?) fragments, one piece includes
 18 one or two rounded fragments (medium or coarse
 19 sand size) of light-gray quartz which shows (wet)
 20 white very small hair-like inclusions, few
 21 slickensides
- 22 13,818.3-13,819.5 Missing
- 23 Tray 8 (1.7 ft. \pm core, rubble)

1	13,819.5-13,821.2	Shale, similar to above, not limy, traces of partly
2		pyritized carbonized plant(?) fragments and
3		pelecypod(?) fragments, few slickensides with
4		white calcite, few siltstone stringers with very
5		fine disseminated pyrite, trace of silt-filled
6		worm burrows(?)
7	13,821.2-13,822	Missing
8	13,822-13,847	Shale, medium-dark-gray, silty, poor samples
9	13,847-13,850	Siltstone, medium-dark-gray, slight brown tint,
10		limy, hard, caving?
11	13,850-13,868	Shale, as above
12	13,868-13,875	Shale, as above; interbedded medium- to medium-
13		dark-gray slightly micaceous siltstone
14	13,875-13,889	Shale, medium-dark-gray, silty
15	13,889-13,898	Core 36; reported recovery 9 ft. (3 trays)
16	Tray 1	(2 ft. \pm core, partly rubble)
17	13,889-13,891	Shale, medium-dark-gray, silty, slightly micaceous,
18		not limy, one thin (1 in. \pm) zone about 6 in. be-
19		low for includes angular grains (fine to medium
20		sand size) of light-gray altered feldspar(?)
21		possibly of volcanic origin, several very thin
22		somewhat distorted stringers and lenses of silt-
23		stone, hard, brittle, obscure massive(?) bedding,
24		some "heavy" near-vertical fractures, traces of
25		polished(?) fragments and scattered pyritic
26		plant(?) fragments. In parts, apparent dip near
27		base about 30 degrees-35 degrees

1	13,891-13,892	Missing
2	Tray 2	(3 ft. \pm core, partly rubble)
3	13,892-13,895	Shale, similar to above, siltstone lenses and
4		stringers more common, brownish-gray in lower 4
5		in., limy to very limy in lower 7 in., scattered
6		pelecypod(?) fragments in part, one crushed thin-
7		shelled pelecypod near top, trace of pyritic
8		plant(?) fragments, apparent dip about 20 degrees-
9		25 degrees
10	Tray 3	(2 ft. \pm core, rubble in lower half)
11	13,895-13,897	Shale, similar to above, some brownish-gray tint in
12		upper 6 in., limy to very limy in upper 1 ft.,
13		few siltstone stringers, much very finely crystal-
14		line disseminated pyrite about 8 in.-9 in. below
15		top, few scattered pelecypod(?) fragments, few
16		small (3/8 in.) pelecypods about 6 in. below top,
17		trace of pyritized plant(?) fragments in small
18		part
19	13,897-13,898	Missing
20	13,898-13,914	Shale, medium-dark gray, silty
21	13,914-13,916	Siltstone, medium-gray
22	13,916-13,937	Shale, as above
23	13,937-13,950	Core 37; reported recovery 4 ft. (2 trays)
24	Tray 1	(0.5 ft. core)

1	13,937-13,937.5	Shale, medium-dark-gray, silty, slightly micaceous,
2		not limy, many small (about 1/4 in. long) dark-
3		gray shale lenses in more silty parts, some
4		irregular thin siltstone stringers, hard, brittle,
5		obscure bedding, several calcite-filled fractures,
6		very few brownish-gray pelecypod(?) fragments,
7		apparent dip possibly 20 degrees-25 degrees
8	13,937.5-13,939	Missing
9	Tray 2	(1.3 ft. \pm core, mostly rubble)
10	13,939-13,940.3	Shale, similar to above, few siltstone stringers
11		and silt-filled burrows(?), trace pyritized
12		plant(?) fragments, no pelecypod(?) fragments; in-
13		cludes a thin bed (possibly about 2 in. thick) of
14		light-olive-gray to olive-gray partly silty shale
15		with dark-gray spots and a thin lense(?) of light-
16		olive-gray limy silty very fine grained sandstone
17		with scattered pyrite grains; apparent dip
18		possibly 15 degrees-20 degrees
19	13,940.3-13,950	Missing or not recovered
20	13,950-13,975	Shale, medium-dark-gray, silty
21	13,975-13,980	Siltstone, medium- to medium-dark gray, slightly
22		limy in part
23	13,980-13,998	Shale, as above
24	13,998, 14,000	Shale, medium-dark-gray, silty, limy
25	14,000-14,010	Shale, medium-dark-gray, silty

1 14,010-14,026 Core 38; reported recovery 11 ft. (4 trays)
 2 Tray 1 (0.9 ft. core)
 3 14,010-14,010.9 Shale, medium-dark-gray, silty, slightly micaceous,
 4 not limy, few thin lenses of siltstone, abundant
 5 mostly very small (1/16 in. x 1/4 in.) partly
 6 distorted lenses of dark-gray shale in 1-in. zone
 7 near base, hard, brittle, mostly obscure bedding,
 8 very few pyritized plant(?) fragments, trace of
 9 silt-filled burrows(?), no pelecypod fragments,
 10 apparent dip about 25 degrees-30 degrees
 11 14,010.9-14,012.7 Missing
 12 Tray 2 (1.9 ft. core)
 13 14,012.7-14,014.6 Shale, similar to above, scattered to abundant very
 14 small dark-gray shale lenses, few burrows(?) as
 15 above, few pelecypod(?) fragments near top, trace
 16 of pyritic carbonized plant(?) fragments, one
 17 nonlimy ostracod(?) in lower part, apparent dip near
 18 base about 25 degrees-30 degrees
 19 14,014.6-14,015.5 Missing
 20 Tray 3 (2.4 ft. ± core, rubble in part)

1 14,015.5-14,017.9 Shale, similar to above, abundant very small dark-
 2 gray shale lenses in part, few very thin some-
 3 what distorted medium-gray to olive-gray lenses
 4 and beds of siltstone, trace of pyritized plant(?)
 5 fragments, no pelecypod(?) fragments, apparent dip
 6 (near middle) about 35 degrees

7 14,017.9-14,018.2 Missing

8 Tray 4 (1.6 ft. core)

9 14,018.2-14,019.8 Shale, similar to above, limy in large part, many
 10 shale lenses as above, few thin lenses and beds
 11 of medium-gray limy siltstone, few pyritized
 12 plant(?) fragments, trace of pelecypod(?) frag-
 13 ments near base, apparent dip about 30 degrees-
 14 40 degrees

15 14,019.8-14,026 Missing or not recovered

16 14,026-14,039 Core 39; reported recovery 13 ft. (7 trays)

17 Tray 1 (2 ft. core)

18 14,026-14,028 Shale, medium-dark-gray, silty, slightly micaceous,
 19 not limy, trace of very thin lenses of siltstone,
 20 some very small dark-gray shale lenses, hard,
 21 brittle, obscure massive(?) bedding, few silt-
 22 filled burrows(?), few very small pyritized
 23 plant(?) fragments

24 Tray 2 (2.2 ft. core)

1 14,028-14,030.2 Shale, similar to above, lenses of siltstone and
 2 dark-gray shale more common in upper part,
 3 numerous very small pyritized plant(?) fragments,
 4 apparent dip possibly 30 degrees-40 degrees

5 Tray 3 (2.5 ft. \pm core, rubbly in part)

6 14,030.2-14,032.7 Shale, similar to above, very few siltstone lenses,
 7 many very small mostly distorted dark-gray shale
 8 lenses as above, few pyritic carbonized plant(?)
 9 fragments

10 Tray 4 (1.5 ft. \pm core, rubbly in part)

11 14,032.7-14,034.2 Shale, similar to above, few thin lenses of silt-
 12 stone, trace of silt-filled burrows(?), brownish-
 13 gray pelecypod(?) fragments at top and very scat-
 14 tered in remainder, tray includes one loose piece
 15 (1/4 in. thick) of medium-gray medium-grained
 16 micaceous silty clayey sandstone (out of place?),
 17 apparent dip about 30 degrees-35 degrees

18 Tray 5 (2 ft. \pm core, rubbly in large part)

19 14,034.2-14,036.2 Shale, similar to above, many very small dark-gray
 20 shale lenses in part, no pelecypod(?) fragments,
 21 few small pyritized plant(?) fragments in part,
 22 apparent dip possibly 30 degrees-35 degrees

23 Tray 6 (1.4 ft. \pm core, rubbly in part)

1 14,036.2-14,037.6 Shale, similar to above, prominent near-vertical
2 slickensides on few core pieces, one slightly
3 limy chitinous fossil (fish fragment?) near middle,
4 few small pyritized plant(?) fragments, few pelecypod(?) fragments near base
5
6 Tray 7 (1.4 ft. \pm core, rubbly in part)
7 14,037.6-14,039 Shale, similar to above, few thin (up to 1/4 in.
8 thick) somewhat distorted beds and lenses of
9 medium-gray partly limy siltstone, many very small
10 lenses of dark-gray shale in part, traces of
11 pyritized plant(?) fragments and pelecypod(?)
12 fragments, apparent dip about 30 degrees-35 degrees
13 14,039-14,108 Shale, medium-dark-gray, silty, very few, pelecypod
14 (?) fragments in some samples
15 14,108-14,116 Core 40; reported recovery 8 ft. (3 trays)
16 Tray 1 (1.8 ft. core)
17 14,108-14,109.8 Shale, medium-dark-gray, silty, slightly micaceous,
18 not limy, few small lenses of siltstone, some
19 very small lenses of dark-gray shale, hard,
20 brittle, obscure massive(?) bedding, scattered
21 silt-filled burrows(?), few pyritized plant(?)
22 fragments, few small pelecypod(?) fragments near
23 base
24
25 14,109.8-14,110.7 Missing
26
27 Tray 2 (1.4 ft. core)

1	14,110.7-14,112.1	Shale, similar to above, burrows(?) as above,
2		several pelecypod(?) fragments mostly in lower
3		part, few pyrite masses near base
4	14,112.1-14,113.4	Missing
5	Tray 3	(1.6 ft. \pm core, much rubble)
6	14,113.4-14,115	Shale, similar to above, few small siltstone lenses,
7		traces of carbonized plant(?) fragments and pelecyp-
8		pod(?) fragments in parts, very scattered pyrite,
9		apparent dip about 35 degrees
10	14,115-14,116	Missing
11	14,116-14,165	Shale, medium-dark-gray, silty
12	14,165-14,190	Electrical-log interpretation; no rotary samples
13		below 14,190; allowed 25-ft. sample lag
14	14,165-14,185	Shale
15	14,185-14,190	Siltstone
16	14,190-14,206	Core 41; reported recovery 1.6 ft. (8 trays)
17	Tray 1	(1.4 ft. \pm core, rubbly in part)
18	14,190-14,191.4	Shale, medium-dark-gray, silty, slightly micaceous,
19		not limy, many very small dark-gray shale lenses
20		in parts, obscure massive(?) bedding, some pyri-
21		tized plant(?) fragments, trace of very small
22		pelecypod(?) fragments
23	14,191.4-14,192	Missing
24	Tray 2	(2 ft. core)

1	14,192-14,194	Shale, similar to above, very silty, trace of
2		pelecypod(?) fragments in upper part, very scat-
3		tered small pyrite masses; middle part is medium-
4		dark-gray (few light-gray irregular streaks)
5		clayey hard siltstone with many angular fragments
6		(fine to medium sand size) of volcanic(?) glassy
7		quartz and feldspar(?), apparent dip possibly 25
8		degrees
9	Tray 3	(1.6 ft. core)
10	14,194-14,195.6	Siltstone, medium-dark-gray, clayey, micaceous, very
11		slightly limy in upper part to limy in lower part,
12		few fine angular grains of feldspar(?) in part,
13		many very small lenses of dark-gray shale, hard,
14		brittle, obscure bedding, some very fine grained
15		pyrite and pyritized plant(?) fragments, no
16		pelecypod fragments
17	14,195.6-14,196	Missing
18	Tray 4	(1.4 ft. core)
19	14,196-14,197.4	Siltstone, similar to above, mostly limy, scattered
20		fine angular grains of feldspar(?) and volcanic(?)
21		glassy quartz, very small shale lenses as above,
22		few small pyritized plant(?) fragments in part,
23		many pelecypod and frog teeth near base, apparent dip
24		about 50 degrees-55 degrees
25	14,197.4-14,198	Missing

1	Tray 5	(1.4 ft. \pm core, mostly rubble)
2	14,198-14,199.4	Siltstone, similar to above, limy in small part,
3		more pyritized plant(?) fragments than above,
4		trace of small pelecypod(?) fragments in part
5	14,199.4-14,200	Missing
6	Tray 6	(1.6 ft. core, partly rubble)
7	14,200-14,201.6	Siltstone, similar to above, some partly limy
8		clusters and stringers of very fine grained py-
9		rite, no pelecypod fragments
10	14,201.6-14,202	Missing
11	Tray 7	(1 ft. \pm core, mostly rubble)
12	14,202-14,203	Siltstone, similar to above, few pelecypod(?) frag-
13		ments, apparent dip probably about 30 degrees
14	14,203-14,204	Missing
15	Tray 8	(1.6 ft. \pm core, mostly rubble)
16	14,204-14,205.6	Siltstone, similar to above, few small dark-gray
17		shale lenses, very few small lenses of light-gray
18		very fine to fine-grained sandstone, no pelecypod
19		fragments; thin(?) bed of greenish-gray limy silt-
20		stone probably in lower part
21	14,205.6-14,206	Missing
22	14,206-14,221	Core 42; reported recovery 15 ft. (7 trays)
23	Tray 1	(1 ft. \pm core, partly rubble)

1	14,206-14,207	Siltstone, medium-dark-gray, clayey, slightly mica-
2		ceous, not limy, hard, brittle, obscure bedding,
3		few very thin lenses of finely sandy siltstone,
4		scattered pyrite
5	14,207-14,208	Missing
6	Tray 2	Missing
7	14,208-14,210	
8	Tray 3	(0.8 ft. \pm core, partly rubble)
9	14,210-14,210.8	Siltstone, similar to above, scattered small pelecyp-
10		pod(?) fragments
11	14,210.8-14,212	Missing
12	Tray 4	(2 ft. \pm core, partly rubble)
13	14,212-14,214	Siltstone, similar to above, few greenish-gray silty
14		shale laminae near middle, very limy in lower-
15		middle part with one small (1/4 in.) mass of
16		brownish-gray finely broken shell fragments
17		(possibly pelecypods), few slickensides
18	Tray 5	(1.5 ft. \pm core, mostly rubble)
19	14,214-14,215.5	Siltstone, medium-dark-gray, clayey, slightly mica-
20		ceous, slightly limy in upper part, few grains of
21		volcanic(?) glassy quartz, hard, brittle, obscure
22		bedding, scattered pyrite, few very small pelecyp-
23		pod(?) fragments, few slickensides
24	14,215.5-14,216	Missing
25	Tray 6	(0.8 ft. \pm core, partly rubble)

1	14,216-14,216.8	Siltstone, similar to above, not limy, few small
2		irregular lenses of sandy siltstone, no pelecypod
3		fragments, no slickensides
4	14,216.8-14,218	Missing
5	Tray 7	Missing
6	14,218-14,221	
7	14,221	Total depth, driller
8	14,222	Total depth, electrical log

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