DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF SCIENCE AND RESEARCH
NEW JERSEY GEOLOGICAL SURVEY

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U. S. GEOLOGICAL SURVEY
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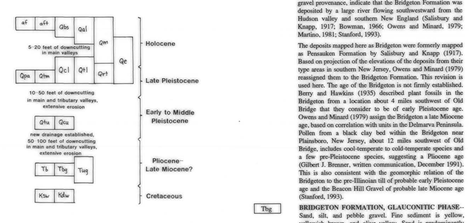
SURFICIAL GEOLOGY OF THE SOUTH AMBOY QUADRANGLE, MIDDLESEX AND MONMOUTH COUNTIES, NEW JERSEY

OPEN FILE MAP OFM 18

INTRODUCTION

Surficial materials in the South Amboy quadrangle include wetland, hillslope, windblown, estuarine, beach, and glacial deposits, several generations of fluvial deposits, and weathered bedrock materials. These materials discontinuously overlie Coastal Plain and bedrock formations. They are as much as 100 feet thick but are generally less than 30 feet thick. They occur within a landscape sculpted by three episodes of valley incision. The deposits are delineated on the map and sections and are described below. The temporal relationships of the deposits and the episodes of valley incision are shown on the correlation chart. Table 1 provides logs of wells and borings used to determine the thickness and subsurface distribution of the materials.

CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

af **ARTIFICIAL FILL**–Excavated sand, silt, clay, gravel, and man-made materials (bricks, cinders, ash, construction debris). Color is variable, but generally light gray to black. In railroad and road embankments, dams, and made land, including areas of dredge spoil along the Raritan River and Raritan Bay. As much as 40 feet thick. Many small areas of fill are not mapped. Extent of fill based on aerial photographs taken in 1979 and, in places, 1986.

afH **TRASH FILL**–Trash and construction debris mixed and covered with clay, silt, and sand. As much as 100 feet thick.

Qfo **BEACH DEPOSITS**–Sand, yellow to reddish yellow; gravel; shells and shell fragments. As much as 15 feet thick (estimated).

Qal **ALLUVIUM**–Sand, silt, pebble gravel, minor clay and peat. Contains variable amounts of organic matter in addition to peat. Fine sediment is yellowish brown to dark brown. The sand is predominantly quartz; with variable but minor amounts of glauconite, mica, and feldspar. The gravel consists of quartz, quartzite, ironstone; and minor chert, sandstone, and mudstone. As much as 15 feet thick (estimated). In places, particularly in headwater areas of the Cheesequake Creek, Cheesequake Creek, and Tennent Brook basins, and in parts of the valleys upstream from Lake Lefferts in the southeast corner of the map, stream channels are entrenched as much as 15 feet into the alluvium and streams are eroding into the underlying Coastal Plain formation. Wood in the alluvium in one such valley near Mt. Pleasant Road in the southeast corner of the map yielded a radiocarbon age of 2655±90 yrs B. P. (OS-19227), indicating that the entrenchment there has occurred within the past 2700 years.

Qm **ESTUARINE DEPOSITS**–Peat and organic-rich clay and silt; brown to dark gray, minor sand and shells. As much as 70 feet thick in the Cheesequake and Raritan marshes, 100 feet thick in Raritan Bay. Psoty (1986) reports 4 radiocarbon dates from the Cheesequake marsh. The oldest is 7735±195 yrs B.P. on peat at a depth of about 41 feet. Estuarine deposits at greater depths in both the Cheesequake marsh and in Raritan Bay are probably older.

Qe **EOLIAN DEPOSITS**–Fine-to-medium sand, yellow to reddish yellow. Sand is predominantly quartz, with some glauconite and minor mica. As much as 20 feet thick in dunes shown by a special symbol on the map); generally less than 6 feet thick elsewhere. The glauconite, and the occurrence of the deposits on uplands south and east of broad expanses of unit Qal, indicate that the eolian sediment was laid down by westerly to southwesterly winds entraining sand from the surface of unit Qal.

Qf **LOWER TERRACE DEPOSITS**–Sand and pebble gravel forming stream terraces with surfaces 5 to 20 feet above modern alluvial surfaces. Fine sediment is yellow, brownish yellow, and reddish yellow. Sand and gravel composition similar to Qal, although glauconite is more abundant and organic matter is absent. As much as 30 feet thick. These deposits were assigned to the Cape May Formation by Lewis and Kummel (1910) and Salisbury and Knapp (1917). The name is not used here because the Cape May has been subdivided and redefined in its type area (Newell and others, 1989) and correlation of Qf to the redefined Cape May deposits has not been established. Qf is on grade with Qm, which, in turn, is on grade with Qfm and with other glaciofluvial deposits of late Wisconsinan age upstream in the Raritan valley. These relationships indicate that Qf is, in part, of late Wisconsinan age.

Qu1 **LOWER COLLUVIUM**–Sand, silt, minor clay. May contain pebbles of quartz; quartzite; ironstone; and minor chert, sandstone, and mudstone; or rest on a pebble lag. Fine sediment is light gray, very pale brown, yellow, and yellowish brown. Texture and sand-and-gravel composition reflect that of the Coastal Plain formations and surficial deposits on the leeward slope. As much as 20 feet thick. Forms aprons with surfaces that grade distally to elevations 5 to 20 feet above modern alluvial surfaces. Contemporaneous with Qf1.

Qu2 **RARITAN TERRACE DEPOSIT**–Sand, silt, pebble gravel, minor clay and cobble gravel. Fine sediment is gray, brown, and reddish brown. Sand is predominantly quartz; some red shale and feldspar; and minor glauconite and mica. Gravel is predominantly quartz and quartzite; some red and gray mudstone and shale; and minor chert, granite, and sandstone. As much as 40 feet thick. This deposit was assigned to the Cape May Formation by Darton and others (1908) and Lewis and Kummel (1910). The name is not used here because the Cape May has been subdivided and redefined in its type area (Newell and others, 1989) and correlation of Qu to the redefined Cape May deposits has not been established. Qu is on grade with Qpa and with glaciofluvial deposits upstream in the Raritan valley and so is, in part, of late Wisconsinan age. It likely includes some glacially-derived sediment from bedrock to the north and east of the Raritan basin in addition to nonglacially-derived sediment from bedrock. Coastal Plain formations, and surficial deposits within the basin.

Qps **PERTH AMBOY OUTWASH**–Sand and pebble-to-cobble gravel. Sand is brown to reddish brown, and contains predominantly of quartz with some feldspar and red and gray shale. Gravel is predominantly red and gray sandstone and mudstone; some quartzite and quartz; and minor gneiss, diabase, chert, and conglomerate. As much as 70 feet thick. Crops out in Perth Amboy and extends beneath estuarine deposits in Raritan Bay. Qps is a glaciofluvial deposit of late Wisconsinan age, laid down while the ice front stood at the terminal moraine.

Qtm **TILL OF THE TERMINAL MORAINE**–Diamict sediment composed of a sandy to silty sand matrix with some (5 to 10% by volume) to many (10 to 40% by volume) pebbles and cobbles, and few (0 to 5% by volume) boulders. Matrix is reddish brown. Sand and gravel composition similar to unit Qps. Boulders are chiefly gneiss and conglomerate. Matrix and clast material were glacially transported from bedrock to the north, along the line of ice flow. As much as 40 feet thick (estimated). This is an ice-laid deposit marking the farthest advance of the late Wisconsinan glacier, which began to retreat from this position about 20,000 yrs B.P. (Stanford and Harper, 1991).

Qtu **UPPER TERRACE DEPOSITS**–Sand, yellow to reddish yellow, and pebble gravel capping terrace remnants with bases that are 20 to 50 feet above modern alluvial and salt-marsh surfaces. Sand and gravel composition as in Qtl. As much as 10 feet thick. Topographic position indicates that Qtu is older than Qtl, Qpa, and Qtm but younger than Th, Tbg, and Tsg, and so may be Early to Middle Pleistocene in age.

Qcu **UPPER COLLUVIUM**–Sand, silt, minor clay. May contain quartz, quartzite, ironstone; and minor chert, mudstone, and sandstone pebbles; or may rest on a pebble lag. Caps aprons like remnants with bases that are 20 to 50 feet above modern alluvial and salt-marsh surfaces. Fine sediment is yellow, reddish yellow, and yellowish brown. Texture and composition as in unit Qcl. As much as 10 feet thick. Age relations similar to unit Qtu.

Th **BRIDGETON FORMATION, ARKOSIC PHASE**–Sand, reddish yellow to yellow; pebble gravel; minor cobble gravel. Sand is predominantly quartz; some feldspar; and minor glauconite, mica, and red shale. Gravel is predominantly quartz, quartzite, and ironstone; some chert and rest to gray mudstone and sandstone; and minor gneiss, schist, and diabase. As much as 80 feet thick. Cobble-gravel channel deposits are common for several feet at the base of the deposit; here, they are commonly iron-cemented and contain abundant clasts of sandstone and mudstone, and scattered clasts of gneiss, schist, and diabase. These clasts generally have thick weathering rinds or are fully decomposed. Tabular, planar cross-bedded sand with minor pebble gravel dominates above the basal gravel. The pebble gravel is chiefly quartz, quartzite, and ironstone; some chert; and minor mudstone. Paleocurrent measurements on cross-bedding at 20 sites (plotted on map) show a southwesterly paleoflow. This flow direction, and the gravel provenance, indicate that the Bridgeton Formation was deposited by a large river flowing southwestward from the Hudson valley and southern New England (Salisbury and Knapp, 1917; Bowman, 1966; Owens and Minard, 1979; Martins, 1981; Stanford, 1993).

The deposits mapped here as Bridgeton were formerly mapped as Pensauken Formation by Salisbury and Knapp (1917). Based on projection of the elevations of the deposits from their type areas in southern New Jersey, Owens and Minard (1979) reassigned them to the Bridgeton Formation. This revision is used here. The age of the Bridgeton is not firmly established. Berry and Hawkins (1935) described plant fossils in the Bridgeton from a location about 4 miles southwest of Old Bridge that they consider to be of early Pleistocene age. Owens and Minard (1979) assign the Bridgeton a late Miocene age, based on correlation with units in the Delmarva Peninsula.

Figure from a black clay bed within the Bridgeton near Plainsboro, New Jersey, about 12 miles southwest of Old Bridge, includes cool-temperate to cold-temperate species and a few pre-Pleistocene species, suggesting a Pliocene age (Gilbert J. Brenner, written communication, December 1991). This is also consistent with the geomorphic relation of the Bridgeton to the pre-Illinoian till of probable early Pleistocene age and the Beacon Hill Gravel of probable late Miocene age (Stanford, 1993).

Tbg **BRIDGETON FORMATION, GLAUCONITIC PHASE**–Sand, silt, and pebble gravel. Fine sediment is yellow, yellowish brown, and olive yellow. Sand is predominantly quartz, with some glauconite and mica. Gravel is quartz, quartzite, and ironstone, with some chert. As much as 20 feet thick (estimated). The glauconite content, and paucity of feldspar and clasts of sedimentary and metamorphic rock, in this phase indicate that it was deposited, in part, by streams draining former Coastal Plain uplands to the east and southeast. Nomenclature and age correlations same as unit Th.

Tsg **UPLAND GRAVEL**–Pebble gravel and sand in mesa-like erosional remnants on hilltops and divides. Sand is reddish yellow to yellow, and is predominantly quartz with some glauconite and mica. Gravel is quartz, quartzite, and ironstone, with some chert. As much as 10 feet thick. Locally iron-cemented. Deposits at elevations above 120 feet may be on grade with, and so be contemporaneous with, the Bridgeton Formation. Deposits at lower elevations are younger than the Bridgeton. The glauconite and gravel, which are mostly absent in the underlying formations, indicate that Tsg was laid down by streams draining uplands to the southeast.

K **CRETACEOUS DEPOSITS, UNDIFFERENTIATED**–Sand, silt, and clay of the Raritan, Magothy, Cheesequake, Merchantville, Woodbury, and Englishtown formations. Surficial deposits generally absent, but small, patchy deposits of colluvium, alluvium, and eolian sediment, generally less than 3 feet thick, occur in places.

Kvw **WEATHERED SHALE AND MUDSTONE**–Clay, silt, some fragments of shale and mudstone. Red, reddish brown, light gray, olive. As much as 50 feet thick. Original rock structure preserved in places. Occurs beneath Cretaceous deposits. Chiefly of Cretaceous age but may range from Jurassic through Quaternary.

Kdw **WEATHERED DIABASE**–Clay, sand, silt, some fragments of diabase. White, red, gray, olive, brown. As much as 20 feet thick. In subsurface only (sections AA', BB'). Occurs beneath Cretaceous deposits. Chiefly of Cretaceous age but may range from Jurassic through Quaternary.

MAP SYMBOLS

- **Contact**–Dashed where approximate; short-dashed where featheredged, gradational, or interfingering; dotted where covered by fill or water or where concealed in excavated areas.
- **Limit of excavated area**–Line at perimeter, tick marks inside. Contacts within these areas are drawn to the base map topography, which in many places has been significantly altered since the date of the topographic survey (1938-39, revised 1954).
- **Paleocurrent measurement**–Arrow indicates paleocurrent direction, dot indicates location of measurement. Measurements made on tabular, planar cross-beds.
- **Crest of dune ridge**–Line along crest.
- **Dune field**–Low, small dunes shaped from underlying map unit.
- **Strath terrace**–Erosional stream-terrace surface underlain directly by Coastal Plain formations. A thin lag or remnant of unit Qtu may rest on these surfaces in places.
- **Boring, with log in table 1**–Location judged to be accurate to within 100 feet.
- **Boring, with log in table 1**–Location judged to be accurate to within 500 feet.
- **Well or boring, from Gronberg and others (1989)**–Log information used on section. Number is from Gronberg and others (1989).
- **Excavation or 5-foot hand-auger hole penetrating underlying Coastal Plain formation**–Number is thickness, in feet, of overlying surficial deposit.
- **Site of radiocarbon-dated sample**–Upper number is age, in years before present. Lower number is laboratory reference number.
- **Site of radiocarbon-dated sample, from Psuty (1986)**–First two numbers are dates and errors, respectively, in years before present. Numbers in parentheses are approximate depth, in feet, at which sample was collected.
- **Unit to left of slash overlies unit to right**–Indicates extent of natural materials beneath large areas of fill. Extent of natural materials is based, in part, on manuscript maps of G.N. Knapp (N.J. Geological Survey, 1905) on file at the N.J. Geological Survey.
- **Bodies of water**–Not shown on base map.

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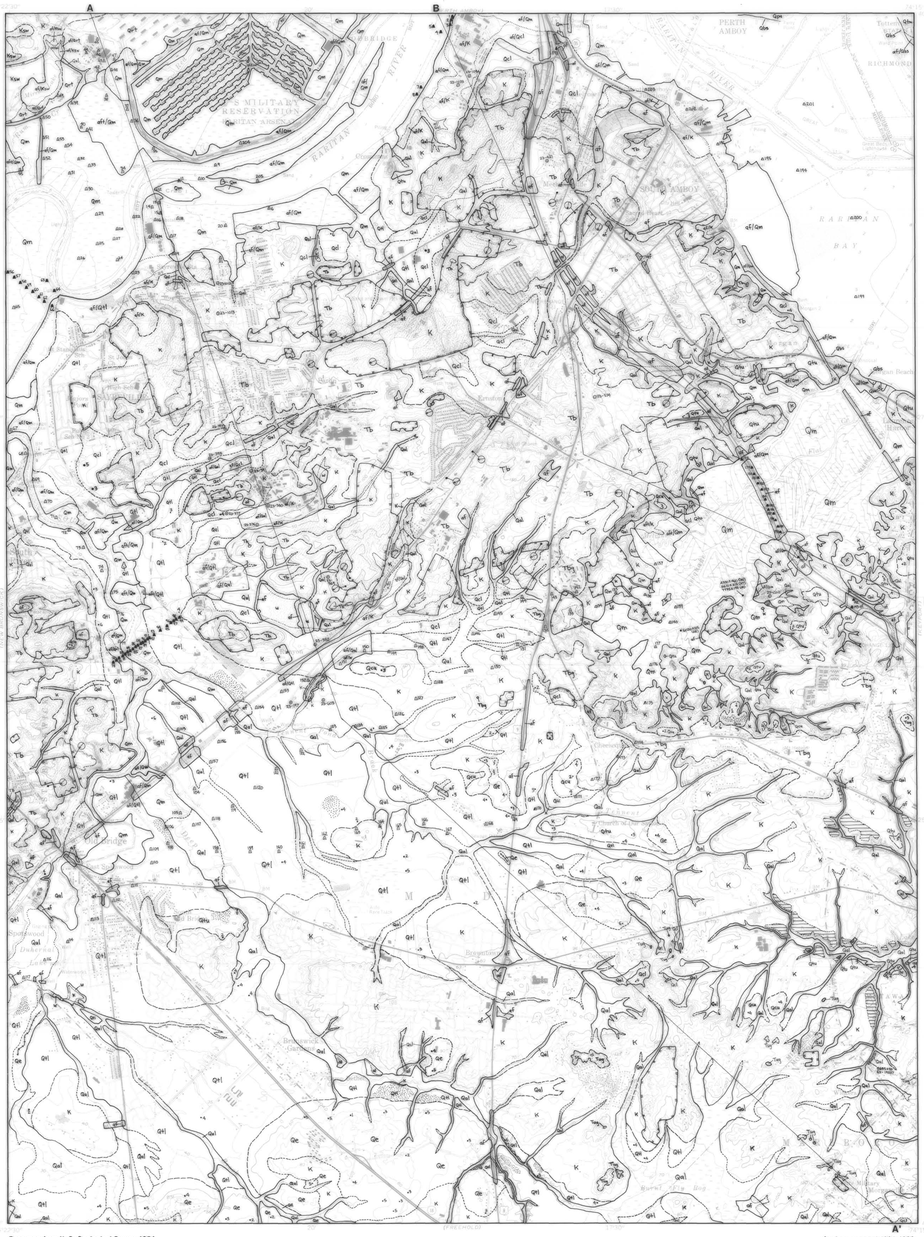

SURFICIAL GEOLOGY OF THE SOUTH AMBOY QUADRANGLE, MIDDLESEX AND MONMOUTH COUNTIES, NEW JERSEY

by
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1995

Table 1.–Selected well logs

Well/ Identifier[1] No.	Depth (ft)	Driller's Log Description[2]
1 NJGS files	0-10	water
	10-20	river sand
	20-25	sand and gravel (Qal)
	25-37	red clay (Kdw)
	37-42	red clay (Kdw)
2 NJGS files	0-8	water
	8-21	river sand (Qm)
	21-28	gray clay (Kdw)
	28-46	red clay (Kdw)
3 NJGS files	0-6	water
	6-16	river sand (Qm)
	16-18	sand and gravel (Qm)
	18-26	gray clay (Kdw)
	26-36	yellow and brown clay (Kdw)
	36-46	red clay (Kdw)
	46-47	weathered diabase (Kdw)
4 NJGS files	0-3	water
	3-14	sand (Qm)
	14-39	lignitic black clay (Kw)
	at 39	rock (diabase)
5 NJGS files	0-3	water
	3-27	sand (Qm)
	27-31	light gray silty micaceous fine-to-medium sand (Kw)
	31-37	black lignitic clay, some pyrite (Kw)
	37-47	gray clay (Kw or Kdw)
	at 37	rock (diabase)
6 well 23-850 (Gronberg and others, 1989, p.42)	0-4	silt, brown, black, organic, with roots (Qm)
	4-6	sand, gray, fine to medium, trace roots (Qm)
	6-45	silt, gray, organic, trace shells and fine plant matter (Qm)
	45-52	sand, light-gray, fine, layers of plant matter (Qm)
	52-60	silt, gray, organic, trace shells (Qm)
	60-64	silt, gray, with fine decayed wood (Qm)
	64-70	sand, gray, fine, trace silt (Qm)
	70-78	sand, gray, micaceous, some clay--weathered rock (Kbw)
	78-82	bedrock, gray and white (diabase)
7 NJGS files	0-1	water
	1-11	black silt (Qm)
	11-16	sand and gravel (Qm)
	16-21	black clay, some layers of sand (Kw)
	21-34	black clay, some layers of sand (Kw)
	34-43	black and gray clay, thin layers of very fine sand (Kw)
	43-49	gray medium sand, trace silt (Kdf)
	49-58	brown medium sand (Kdf)
	58-68	white medium sand (Kdf)
8 NJGS files	0-10	silt, black (Qm)
	10-17	black clay (Qm)
	17-20	stiff black clay (Kw)
	20-23	stiff black clay (Kw)
	23-31	stiff dark-gray clay (Kw)
	31-44	gray clay with some thin layers of fine sand (Kw)
	44-49	gray medium sand and clay (Kdf)
	49-64	gray medium sand (Kdf)
9 SC--RNR3	0-16	water
	16-21	sand (Qm)
	21-35	red and gray clay (Kw)
	35-36	clay (Kdw)
	at 36	rock (diabase)
10 SC--RNR2	0-6	water
	6-13	sand (Qm)
	13-34	sand and gravel (Qm)
	34-37	clay (Kw)
	at 37	rock (diabase)
11 SC--28E	0-9	soft brownish-gray clay and plant roots (Qm)
	9-21	soft sandy gray clay (Qm)
	21-32	soft greenish-gray clay with a few plant remains (Qm)
	32-42	red sandy and gravel (Kw)
	42-51	clayey brown medium-fine sand (Kw)
	51-52	weathered greenish-gray micaceous glauconite diabase (Kbw)
12 SC--27H	0-1	brown sand and gravel with bits of Triassic shale and diabase (Qm)
	1-17	soft brownish-gray clay and plant roots (Qm)
	17-35	sandy dark clay (Qm)
	35-46	sandy dark gray clay (Qm)
	46-50	speckled gray medium-to-coarse sand (Kw)
	50-54	soft weathered red diabase--top clay (Kbw)
	54-56	hard trap (diabase)
13 NJGS files	0-10	mud, remains of marsh (Qm)
	10-29	gray organic silt, vegetation (Qm)
	29-48	gray clay, with peat, shells and silt (Qm)
	48-58	gray silt and clay (Qm)
	58-59	brown and gray sand, gravel, and clay (Qm or Qe)
	59-60	red and brown clay (Kw)
	at 58	refusal (probably diabase)
14 NJGS files	0-12	soft brown silt, clay, mud, sand, gravel
	12-18	decomposed vegetation (Qm)
	18-36	gray clay and silt (Qm)
	36-48	gray fine-sand to fine sand layers of decomposed vegetation, some shells and gravel (Qm)
	48-55	gray clay and silt (Qm)
	55-600	schist rock (probably diabase)
	at 600	refusal (diabase)
15 NJGS files	0-24	gray organic silt (Qm)
	24-36	gray clay, some silt (Qm)
	36-38	gray organic silt, shells (Qm)
	38-43	gray clay, some silt (Qm)
	43-52	gray organic silt (Qm)
	52-56	brown coarse sand and gravel, some shells (Qt or Qm)
	56-63	talc (Kdw)
	at 63	refusal (diabase)
16 NJGS files	0-9	brown sand, gravel (fill)
	9-14	cinders sand, clay, meadow marsh (fill over Qm)
	14-26	gray clay (Qm)
	26-36	gray micaceous silt, shells (Qm)
	36-47	brown medium-to-coarse sand, gravel, and shells (Qt or Qm)
	47-57	brown coarse sand and gravel (Qt or Qm)
	57-64	red and gray sand, gravel, clay, and boulders (Qt over Kdw)
	at 64	refusal (diabase)
17 NJGS files	0-16	bog (Qm)
	16-50	gray clay and silt (Qm)
	50-50	gray organic silt, trace of shells (Qm)
	50-67	brown coarse sand, gravel, little silt (Qt)
	at 67	rock (diabase)
18 25-45-400 well 2 at 62	0-40	black river muck (Qm)
	40-62	black clay (Kw or Kwt?)
	at 62	trap rock (diabase)
19 NJGS files	0-16	bog (Qm)
	16-57	gray organic silt with trace of shells (Qm)
	57-62	brown coarse sand, gravel, little silt (Qt)
	at 62	rock (diabase)
20 25-45-400 well 2 at 63	0-12	black river muck (Qm)
	12-63	white clay (Kw or Kwt?)
	at 63	trap rock (diabase)
21 25-45-400 well 2a at 63	0-8	black river muck (Qm)
	8-50	blue clay (Kw)
	50-73	white clay (Kw)
	73-74	trap rock (diabase)
22 SC--RNR1	0-12	mud (Qm)
	12-17	mud (Qm)
	17-23	sand (Qm)
	23-43	mud and shells (Qm)
	43-46	sand, gravel (Qm)
	46-47	sand, gravel, and clay (Qm)
	at 47	rock (diabase)
23 SC--F29	0-12	sales, brick, sand, etc. (fill)
	12-20	light-gray clayey lignitic fine sand (Qtl or Kw)
	20-31	gray clay (Kw)
	31-34	sand, weathered diabase (Kdw)
	34-36	rock (diabase)
24 SC--30F	0-10	soft gray clay and plant roots (Qm)
	10-27	dark-gray clayey medium sand (Qm)
	27-37	brown slightly clayey medium sand (Qe)
	37-56	gray clay (Kw)
	at 56	greenish-brown weathered trap rock (Kbw)
25 SC--25E	0-20	soft gray clay and plant roots (Qm)
	20-32	medium sand, gray clay and plant roots (Qm)
	32-41	brown fine-to-medium sand (Qm)
	41-50	gray and brown slightly clayey medium sand (Qe)
	50-54	disintegrated trap (Kbw)
	54-56	coarse-grained trap (diabase)
26 SC--24E	0-19	soft gray clay and plant roots (Qm)
	19-33	gray micaceous medium sand containing fairly numerous grains of red and green clay (Qm)
	33-37	speckled brown fine-to-coarse sand and small gravel (Qe)
	37-56	light-gray clay, thin layers of very fine sand (Kw)
27 SC--31F	0-23	soft gray clay and plant roots (Qm)
	23-28	sandy slightly micaceous medium sand (Qe)
	28-30	coarse-grained diabase
28 SC--26E	0-24	soft gray clay and plant roots (Qm)
	24-28	speckled brown medium-to-coarse sand (Qe)
	28-31	stiff disintegrated trap (Kbw)
	31-55	coarse-grained diabase--cored
29 SC--32F	0-15	soft clay and plant roots (Qm)
	15-22	gray slightly clayey sand with a few grains of red clay (Qm)
	22-42	gray medium sand with shell fragments (Qe)
	42-44	coarse-grained diabase
30 SC--33F	0-5	red and gray clay, shale fragments, some plant roots (fill, Qm)
	5-18	reddish brown clayey sand and gravel (Qe)
	18-31	reddish brown clayey medium-to-coarse sand (Qe)
	31-40	black and gray clay, thin layers of sand (Kw)
	40-43	gray medium sand, trace silt (Kdf)
	43-49	brown medium sand (Kdf)
	49-68	white medium sand (Kdf)
31 22-21356	0-7	gray-brown clayey organic silt and vegetation (Qm)
	7-34	gray to red-brown medium-to-fine sand, some gravel, trace silt (Qm)
	34-52	dark gray-black shale
32 SC--34F	0-6	soft, dark-brown clay and plant roots (Qm)
	6-35	brown and reddish brown sand and gravel, slightly clayey (Qe)
	35-40	dark-gray baked shale
33 22-21359	0-6	black organic silt and roots (Qm)
	6-36	red-brown to gray sand and gravel, trace silt (Qe)
	at 36	refusal on bedrock
34 25-23432	0-6	fill and garbage (af)
	6-14	peat and muck (Qm)
	14-29	fine brown sand (Qe)
	at 29	brown sand and gravel and gravel with red shale (Qm)
35 25-22531	0-8	light-brown sand and gravel (af)
	8-16	peat and muck (Qm)
	16-40	fine to medium red sand with some clay (Qe)
	40-41	fine, medium, and coarse light-brown sand with gravel, cobbles, and red shale (Qt)
	41-60	brown decomposed rock (Kbw?)
	at 60	rock (probably diabase)
36 25-26139	0-10	fill
	10-19	black organic silt (Qm)
	19-42	gray fine-to-medium sand and gravel, trace silt and clay (Qe)
	42-47	gray clay, some clayey weathered shale (Kw)
	47-50	gray and black shale
37 25-23433	0-17	fill, garbage, and organic material (af over Qm)
	17-22	fine brown sand (Qe)
	at 22	red-brown and gray fine, medium, coarse sand and gravel with red shale (Qt)
38 25-23435	0-13	brown, red, and white sand, clay, and gravel (af)
	13-17	peat and muck (Qm)
	17-20	fine brown sand (Qe)
	20-33	gray clay (Kw)
	33-60	black to gray shale, decomposed to clay in places
39 25-23438	0-15	fill and garbage (af)
	15-20	gray fine-to-medium silty sand with silty clay layers (Qe)
	20-28	gray, brown, tan clay with wood (Qm and Kw?)
	28-32	decomposed black shale (Kw)
	32-52	gray to black shale
	52-65	brown shale
40 25-23434	0-8	fill and garbage (af)
	8-10	peat and muck (Qm)
	10-18	red sand and gravel, some silt (Qe)
	18-20	orange fine sand (Qe)
	20-31	greenish brown fine sand (Qe)
	31-32	reddish gray sand and gravel, some clay and red shale (Qt)
	32-33	hard green-gray weathered rock (Kw)
	at 33	hard rock
41 25-23436	0-5	fill and garbage
	5-10	peat and muck (Qm)
	10-28	brown and red sand and gravel, some silt and red shale chips (Qe)
	28-32	weathered gray-brown rock with clay and shale layers (Kw)
	32-67	black and gray bedrock with zones of weathered fractures
42 25-29610	0-6	fill
	6-8	dark-gray clay and silt (Qm)
	8-12	gray to red-brown sand, trace gravel and silt (Qe)
	12-15	light-gray clay, some sand and organic silt (Qm)
	15-20	dark-gray-green clay (Kw)
43 25-29611	0-20	browns to gray fine sand, silt, and clay, trace gravel and organic matter (fill over Qm)
	20-22	gray clay (Kw)
44 25-29612	0-5	sand and gravel fill
	5-35	brown to red-brown sand, some gravel (Qe)
	35-37	red and gray silt and clay, some shale fragments (Kw)
45 25-29614	0-35	brown to red-brown sand, some gravel, gravel includes shale and sedimented quartz (Qe)
	35-37	dark-gray clay (Kw)
	at 37	rock (diabase)
46 25-29613	0-8	sand and silt fill
	8-37	brown, red-brown, light-gray sand, some gravel; gravel includes sedimented quartz, shale, and argillaceous rock fragments (Qe)
	37-43	dark-gray to gray-green clay (Kw)
	at 43	finger refusal on red shale
47 25-29608	0-2	silt and sand fill
	2-11	gray, brown, red-brown sand and silt, some gravel (Qe)
	11-22	gray to gray-green clay (Kw)
48 25-29609	0-4	silt and gravel fill
	4-9	black organic silt and fine sand (Qm)
	9-22	brown to gray fine sand, gravel and silt (Qe)
	22-25	gray-green clay (Kw)
49 25-9376	0-34	clay, sand and gravel (Qm)
	34-36	top rock (probably gray baked shale)
50 C--36F	0-10	greenish-brown clayey sand and small gravel (Qm over Qe)
	10-16	gray clay (Kw)
	16-18	light-gray baked shale
51 22-21352	0-5	black organic silt (Qm)
	5-34	brown to red-brown sand and gravel; gravel includes shale bits (Qe)
	34-63	black shale
52 22-21354	0-6	brown-black organic silt, trace shells (Qm)
	6-29	red-brown, brown, gray sand, some gravel, trace silt; gravel includes shale bits (Qe)
	29-48	dark gray-black shale
53 SC--35F	0-5	fill and garbage
	5-11	gray fine-to-medium clay and plant roots (Qm)
	11-22	brown coarse sand and gravel, slightly clayey (Qe)
	22-29	fine-to-coarse sand and gravel with many red and gray shale fragments (Qe)
	29-39	gray baked shale
54 22-21358	0-6	brown-black organic silt (Qm)
	6-32	red-brown to gray sand and gravel, gravel mostly red and dark-gray shale fragments (Qe)
	32-48	dark-gray-black shale
55 25-19306	0-9	trash (af)
	9-11	silt (Qm)
	11-50	sand and dunes (Qd)
56 NJGS files	0-8	meadow bog (Qm)
	8-19	brown and green fine-to-medium sand and gravel, trace shells and clay (Qd)
57 NJGS files	0-9	meadow bog (Qm)
	9-26	brown and green fine-to-medium sand and gravel (Qd)
58 NJGS files	0-14	meadow bog (Qm)
	14-22	brown and green fine-to-medium sand and gravel (Qd)
59 NJGS files	0-7	meadow bog (Qm)
	7-26	green and brown fine-to-medium sand and gravel (Qd)
60 NJGS files	0-7	meadow bog (Qm)
	7-17	brown and green fine-to-medium sand and gravel (Qd)
	17-24	brown and green medium-to-coarse sand and coarse gravel (Qd)
61 NJGS files	0-8	meadow bog and river sand (Qm)
	8-19	brown and green fine-to-medium sand and gravel (Qd)
	19-20	brown medium-to-coarse sand and gravel (Qd)
62 NJGS files	0-7	river sand and meadow bog (Qm)
	7-24	brown and green fine-to-medium sand and gravel (Qd)
63 SC--27E	0-6	soft, brownish-gray clay and plant roots (Qm)
	6-18	soft gray clay and plant roots (Qm)
	18-23	light-gray and yellow sand (Qe)
	23-42	stiff gray clay with some pyrite and lignitic (Kf)
	42-56	stiff gray micaceous clay (Kw)
	at 56	gray clayey slightly lignitic sand (Kf)
64 NJGS files	0-18	soft brownish-gray sand and plant roots (Qm)
	18-43	greenish gray medium clayey sand (Qf)
	43-45	light-gray yellow sand (Kf)
	45-49	stiff gray clay with some pyrite and lignite (Kf)
	49-56	light-gray micaceous clay (Kw)
65 SC--22E	0-6	pinkish gray soft clay and plant roots (Qm)
	6-26	soft brownish-gray clay and plant roots (Qm)
	26-36	brown sand and gravel, some clay, many tiny black grains (Qe)
	36-38	speckled brown fine-to-medium sand (Qf)
	38-54	light-greasy gray fine sand (Kf)
66 NJGS files	0-6	cinder, brick, sand, crushed rock (af)
	6-8	black sand and river mud (Qm)
	8-33	brown fine-to-medium sand, coarse gravel (Qf)
67 SC--E16	0-13	brown and gray sand and gravel (af)
	13-19	dark brown-gray peat (Q