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

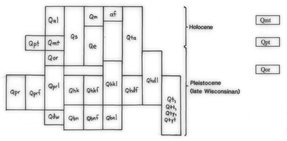
SURFICIAL GEOLOGY OF THE WEEHAWKEN AND CENTRAL PARK QUADRANGLES, BERGEN, HUDSON, AND PASSAIC COUNTIES, NEW JERSEY

OPEN FILE MAP OFM 13
SHEET 1 OF 2

INTRODUCTION

Surficial deposits in the Weehawken and Central Park quadrangles include alluvial, swamp and marsh, estuarine, windblown, talus, and stream terrace deposits, all of postglacial age, and glacial lacustrine deposits and till of late Wisconsinan age. These deposits are delineated on the accompanying map and sections and are described below. The glacial and postglacial events that the deposits record are also discussed below. Well and boring data used to construct bedrock-surface contours and to infer the subsurface distribution of the deposits are provided in table 1. The temporal relationships of the deposits are shown on the correlation chart.

CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

af — **ARTIFICIAL FILL**—Artificially emplaced sand, gravel, silt, clay, and rock, and man-made materials including cinders, ash, construction materials, and trash. As much as 100 feet thick in landfills, generally less than 20 feet thick elsewhere. Many small areas of fill are not mapped. Extent of fill is based on airphotos taken in 1979 and, in places,1986.

Postglacial Deposits—These deposits include stream deposits in terraces (Qor, Qyt, Qmt) and in younger channels and floodplains (Qal), wetland deposits in swamps (Qs) and estuaries and salt marshes (Qe), windblown deposits blanketing some slopes adjacent to terraces and lake plains (Qe), and talus deposits forming aprons at the base of cliffs (Qta).

The stream terrace deposits are subdivided into three units. The Oradell terrace deposit (Qor) is the oldest. It was laid down by the Passaic and Saddle Rivers immediately after glacial lakes Passaic and Hackensack drained, but before glacioisostatic rebound elevated northward parts of the Hackensack lowland (Stanford and Harper, 1991). During this time the Passaic River, following the isostatically-depressed valley gradient to the north, adopted an easterly course from the Garfield area to the Hackensack area, and then flowed northerly in the Hackensack valley to discharge into the Hudson valley through Sparkill Gap, about 10 miles north of Hackensack.

As rebound raised northerly parts of the valley relative to southerly parts, drainage gradually adopted its present southward flow (Stanford and Harper, 1991). The Passaic and Saddle Rivers were diverted southward from the Garfield area, and laid down the lower Passaic terrace deposit (Qpt). The Hackensack River established a southerly course in its valley, and laid down the Moonachie terrace deposit (Qmt). These deposits were later entrenched, and unit Qal was, and continues to be, deposited in the entrenched floodplains and channels. Borings indicate that alluvial sand also occurs in channels incised as much as 20 feet into the former glacial Lake Hackensack plain in the Hackensack and Overpeck valleys before rise of sea level created tidal conditions. These deposits are now covered by salt-marsh peat.

Wetland deposits include freshwater swamp and marsh sediments (Qs) and estuarine and salt-marsh sediments (Qe). The freshwater swamp deposits occur in several glacially-excavated rock basins on the Palisades ridge, and in the Teterboro area (Vernooski, 1977; Merrill and others, 1902; Darton and others, 1908). Freshwater peat also occurs beneath, and interbedded with, the surface salt-marsh peat in places in the Hackensack and Overpeck marshes (Merrill and others, 1902; Darton and others, 1908; Waksman and others, 1943; Heusser, 1963). These deposits, which are included with unit Qs, overlie lake clay that was subaerially exposed and desiccated prior to rebound (Lovegreen, 1974; see also driller's logs in table 1 describing stiff or hard clay over soft clay). This stratigraphic indicates that ponding occurred in this area of the Hackensack valley as postglacial rebound flattened the former northward-sloping valley gradient. This process was contemporaneous with deposition of the Moonachie terrace deposit. The Moonachie deposit locally prograded over swamp deposits, as indicated by a section described by Salisbury (1902, p. 610) that was formerly exposed in one of the clay pits in Little Ferry. This section showed 8 feet of sand of the Moonachie terrace deposit overlying 2 to 3 feet of organic silt, sand, and clay with fragments of leaves and stems, in turn overlying varved lake clay.

A minimum age for the reversal is provided by a radiocarbon date of 12,870 ± 200 yrs B.P. (QC-297, Averill and others, 1980) on basal peat overlying stream deposits with north-flowing paleocurrent features, in the Hackensack valley near Norwood, about 14 miles north of Secaucus. A radiocarbon date of 2025 ± 300 yrs B.P. (I-510, Heusser, 1963) on basal freshwater peat in the salt marsh at Secaucus, near the intersection of N. J. Route 3 and the New Jersey Turnpike, indicates that the 10-foot sea level rise creating the present Hackensack salt marsh occurred within the past 2000 years (Heusser, 1963).

In the Hudson valley the glacial valley-fill sediment was not as thick as in the Hackensack valley. Sea level thus entered the Hudson valley as long ago as 12,000 yrs B.P. (Newman and others, 1969), long before it entered the Hackensack valley. As a result, the estuarine deposits in the Hudson valley have been accumulating much longer than in the Hackensack valley, and are as much as 200 feet thick (sections AA', BB', wells 180, 183, 184 in table 1).

The windblown deposits (Qe) occur principally along the base of the west slope of the Palisades ridge, and on several west- and northwest slopes of low uplands within the Hackensack valley. Some of the sand beneath the salt-marsh deposits in the Hackensack and Overpeck valleys, mapped as Qsl, may also be windblown. Patchy, thin, windblown loam also is common on upland surfaces, but is not mapped. Low, faint dunes are visible on the deposit in Hackensack in the Maple Grove Cemetery, and may have been present elsewhere before urbanization, but a blanketing morphology is more common. The morphology and distribution of these deposits indicates that sand and silt were entrained from the surface of unit Qmt and, before rebound and ponding, from the exposed bottom sediments of Lake Hackensack, and moved by westerly and northwesterly winds to the base of adjacent uplands. Most of this deposition likely occurred shortly after deglaciation, before ponding and vegetation stabilized surfaces.

The talus deposits form steep aprons at the base of cliffs on the east slope of the Palisades ridge. Most of the talus was probably deposited shortly after deglaciation, as the unstable parts of the glacially-plucked cliffs failed. The cliffs still shed small amounts of rock to the aprons.

Qal — **ALLUVIUM**—Silt, sand, minor clay and gravel. Contains variable amounts of organic matter. Color of fine sediment is brown, dark brown, and gray. As much as 20 feet thick.

Qs — **SWAMP DEPOSITS**—Freshwater peat and organic silt and clay, black to dark brown. As much as 10 feet thick.

Qm — **ESTUARINE AND SALT-MARSH DEPOSITS**—Organic silt and clay, and salt-marsh peat. Black, dark brown, and gray, on tidal flats. Brown to gray silt, sand, and minor gravel in tidal channels. As much as 200 feet thick in the Hudson valley. As much as 20 feet thick, but generally less than 10 feet thick, including underlying and interbedded freshwater swamp deposits, in the Hackensack and Overpeck valleys.

Qta — **TALUS**—Angular blocks of diabase with little or no matrix, forming a steep, continuous apron along the base of cliffs at and north of Fort Lee. As much as 50 feet thick (estimated). Small, discontinuous deposits of talus occur at the base of the cliffs south of Fort Lee. These are not mapped.

Qe — **EOLIAN DEPOSITS**—Fine sand, minor silt, very pale brown. As much as 10 feet thick. Extent of eolian deposits along the west base of the Palisades ridge and in the Secaucus area is based on mapping in Merrill and others (1902), and in Darton and others (1908). In places these deposits may have been removed during urbanization.

Qmt — **MOONACHIE TERRACE DEPOSIT**—Sand and minor pebble gravel and silt, very pale brown to yellowish brown. As much as 20 feet thick.

Qpt — **LOWER PASSAIC TERRACE DEPOSIT**—Sand and minor pebble gravel and silt, very pale brown to yellowish brown. As much as 20 feet thick.

Qor — **ORADELL TERRACE DEPOSIT**—Sand and minor pebble gravel, very pale brown to yellowish brown. As much as 30 feet thick.

Glacial Deposits—These deposits include till--a poorly-sorted, nonstratified sediment containing gravel clasts and boulders, deposited directly from glacial ice (Qt, Qty), and well-sorted, stratified sediments. The stratified sediments include sand and gravel laid down by glacial meltwater in glacial-lake deltas (Qdw, Qbs, Qbl, Qgv) and fans (Qfsf, Qhkf, Qgvf, Qbdf), and varved silt, clay, and fine sand deposited on glacial-lake bottoms (Qbsl, Qbkl, Qgvl, Qbdl). All of these deposits are of late Wisconsinan age.

Before these deposits were laid down, the underlying bedrock surface was shaped by glacial erosion. The topography of the bedrock surface (plotted at 50-foot contour interval on the map) shows that there are narrow, deep, glacially-scoured troughs that extend to more than 100 feet below sea level beneath the Passaic valley, more than 250 feet below sea level along the west edge of the Hackensack valley, more than 200 feet below sea level along the east edge of the Hackensack valley, and more than 300 feet below sea level in the Hudson valley. To the south and to the north the bedrock surface in these troughs rises, and the trough-forms die out (Parrillo, 1959; Stanford and others, 1990), indicating that they are glacial-scour features rather than buried fluvial valleys. The rock surface on uplands, particularly on roubaione and sandstone bedrock in and west of the Hackensack and Overpeck valleys, was also glacially eroded into streamlined forms. Till on these uplands is as thick as 70 feet in a few places, where it contributes a depositional component to the streamline form, but in most places it is less than 30 feet thick and blankets the streamlined rock surface.

The distribution and composition of till reflect ice-flow directions during the late Wisconsinan glaciation. Regionally, striation and drumlin orientations indicate that late Wisconsinan ice advanced southerly to southwesterly across northeastern New Jersey as a lobe channelled between the Watchung Mountains on the west and the Palisades ridge on the east, and centered on the Hackensack valley (Salisbury, 1902; Stanford and Harper, 1991). In the map area, this flow pattern is indicated by the southerly to slightly southwesterly striations on Laurel Hill in the center of the valley, and a southerly-to-southeasterly sweep of the striation pattern on the Palisade ridge. Reddish brown silty sand to sandy silt till ("Ridgewy till," Qt) derived from roubaione and sandstone bedrock, forms a nearly-continuous blanket, averaging about 20 feet thick, on the surface of roubaione to sandstone bedrock west of the Palisade ridge, except in the axes of glacially-scoured troughs, where it either was never deposited or was later eroded by subglacial meltwater. Boring logs in the trough on the west side of the Hackensack valley (wells 105, 120, 174, and 230 in table 1) suggest that till locally is interlayered with lacustrine deposits, due either to small readvances or to subglacial deposition of the lacustrine deposits just behind the ice margin. Reddish brown till also occurs on most of the Palisades ridge, except for the highest, easternmost part of the ridge north of the Cliffside Park area. This distribution indicates that ice entrained material from roubaione and sandstone bedrock in the Hackensack valley, and deposited it on the diabase bedrock of the Palisades while moving southerly to southeasterly across the ridge. North of Cliffside Park, the reddish brown till grades into a more yellow, silttier till ("Rahway till, yellow phase," Qty) that reflects incorporation of the underlying diabase and weathered diabase. This yellow till likely underlies unit Qt in places elsewhere on the ridge to the south and west.

Late Wisconsinan ice had advanced to a southernmost position at Perth Amboy, about 22 miles southwest of Secaucus, before 20,000 yrs B.P., based on radiocarbon dates on basal organic sediments in western New Jersey (Harrison, 1968; Cotter and others, 1986), on concretions in glacial Lake Passaic sediments in the upper Passaic basin west of the Watchung Mountains (Stone and others, 1989), and on organic sediments on Long Island (Sirkin, 1988). A continuous, prominent terminal moraine was deposited at the position of maximum advance (fig. 1). As the ice front retreated, a series of glacial lakes formed, dammed to the south by the moraine. One of these, Lake Bayonne, occupied the Arthur Kill, Newark Bay, and Upper New York Bay lowlands, and had an outlet over the moraine at Perth Amboy (fig. 1) (Stanford and Harper, 1991). This outlet was gradually lowered by erosion, and therefore the level of Lake Bayonne steadily declined. The map area includes deposits in the last, lowest phases of Lake Bayonne (Qbs, Qb, Qbsf, Qbsl). Deltas at Lyndhurst and New Durham indicate that, when the retreating ice front was at those locations, Lake Bayonne had a level of between 20 and 30 feet above sea level. Adjusting for rebound, these altitudes indicate that the spillway at Perth Amboy had been eroded to about 30 feet below sea level (Stanford and Harper, 1991). Continued erosion of the outlet at Perth Amboy, along the Arthur Kill to the north, uncovered diabase bedrock at an elevation of 30 feet below sea level in the Arthur Kill about 7 miles north of Perth Amboy. The diabase prevented further downcutting and formed the stable spillway for Lake Hackensack (fig. 1). An auxiliary spillway was also established across diabase in the Kill van Kull, about 12 miles southwest of Secaucus. This spillway drained eastward into Lake Hudson. The remainder of glacial-lake deposition in the Hackensack and Overpeck valleys was in Lake Hackensack (Qbk, Qbkf, Qbkl).

The lake-bottom deposits of Lake Hackensack (Qbkl) were formerly well-exposed in several clay pits in Hackensack, Little Ferry, and Moonachie (indicated by dotted contacts on the map), and near New Durham (Reeds, 1933). Antevs (1928) counted 1950 varves in the Little Ferry pits; Reeds (1933) counted 2550. If these are all true annual couplets deposited in glacial Lake Hackensack, they indicate that retreat of the ice margin from the Little Ferry area to north of Sparkill Gap, through which Lake Hackensack drained, took between 2000 to 2500 years. This, in turn, implies that the retreating ice margin was in the Little Ferry area at about 20,000 yrs B.P., or somewhat earlier, if the proposed timing for the drainage of Lake Hackensack is correct (see below).

In the Hudson valley, Lake Bayonne, which had extended into the valley as the ice front retreated around the north end of Staten Island, lowered to form Lake Hudson when the retreating ice front uncovered the Hell Gate area in the East River between Manhattan and Queens, about 6 miles east of Secaucus (fig. 1). This event likely occurred when the ice front in the map area was just north of the Hoboken area, because deltaic sand (Qbs) at the Lake Bayonne level occurs in Hoboken but not north of there. Gneiss bedrock at Hell Gate formed a stable spillway for Lake Hudson at an elevation of about 30 feet below sea level, which, when corrected for rebound, is 40 feet lower than the Lake Hackensack outlets. Units Qbdl and Qbdf, which are likely deeply eroded by later meltwater floods, were deposited in Lake Hudson.

In the Passaic valley, in the northwest corner of the map area, there are deposits of two glacial lakes (fig. 1). Lake Dalawanna was dammed by an ice-contact Lake Bayonne delta that formerly crossed the Passaic valley at Newark, about 8 miles southwest of Passaic. The map area includes the eastern, ice-contact edge of a large delta deposited in this lake (Qdw). This delta formerly crossed the Passaic valley at Rutherford and formed the dam for Lake Paramus, which extended up the Passaic and Saddle River valleys as the ice margin retreated. Units Qpr, Qprl, and Qprf were deposited in Lake Paramus.

A radiocarbon date of 17,950 ± 620 yrs B.P. (I-4935; Weiss, 1971) from Lake Hudson-sediment core Zee area, if accurate, indicates that the ice front had retreated north of the map area by at least 18,000 yrs B.P. Glacial deposition ended slightly later, when glacial lakes drained. Lake Paramus drained eastward into Lake Hackensack when the retreating ice front uncovered the Mesopozpisk Brook valley near Westwood, 12 miles northeast of Rutherford. Lake Hackensack drained eastward into Lake Hudson when the retreating ice front uncovered Sparkill Gap through the Palisade ridge, about 20 miles north of Secaucus (Stanford and Harper, 1991). Lake Hudson extended up the Hudson valley, and is likely equivalent to Lake Albany. This lake persisted until the terminal moraine dam at the Narrows, between Brooklyn and Staten Island, about 10 miles south of Hoboken, was breached, probably by a meltwater flood down the Hudson valley sourced from glacial lakes in the Great Lakes basin (Newman and others, 1969). The timing of this event is uncertain, but the earliest time at which the retreating ice front makes this drainage possible is about 15,500 yrs B.P. (Ridge, 1991).

GLACIAL LAKE HUDSON DEPOSITS—Lake-bottom and lacustrine-fan deposits locally preserved beneath thick estuarine deposits in the Hudson valley. In subsurface only (section AA', well 207 in table 1); more extensive deposits occur in the Hudson valley north of the map area (Newman and others, 1969).

Qbdl — **Lake-bottom deposits**—Varved silt and clay, probably less than 50 feet thick.

Qbdf — **Lacustrine-fan deposits**—Sand and gravel, probably less than 30 feet thick.

GLACIAL LAKE HACKENSACK DEPOSITS—Deltaic, lake-bottom, and lacustrine-fan deposits. Deltas include fluviodeltas in Rogota and in the Wolf Creek valley in Ridgefield, and partially collapsed deltas west of Ridgefield and in Teaneck and Englewood. Lake-bottom deposits are continuous beneath unit Qm in the Hackensack and Overpeck valleys. Locally, the uppermost parts of these deposits may have been laid down in postglacial ponds that formed after drainage of glacial Lake Hackensack, particularly as rebound reversed northward drainage. Lacustrine-fan deposits occur in the axes of the scour troughs on either side of the Hackensack valley, but not elsewhere. This distribution suggests that subglacial meltwater channels, which fed the fans, followed the axes of the troughs.

Qbk — **Deltaic deposits**—Sand, yellow to reddish-yellow, some pebble gravel and cobble gravel. As much as 50 feet thick.

Qbkl — **Lake-bottom deposits**—Varved silt and clay, reddish brown to gray. As much as 150 feet thick. Where lower contact is on unit Qbsf the contact is an approximate timeline marking the transition from the Lake Bayonne level to the Lake Hackensack level, not a physical discontinuity. In places it is drawn where boring logs indicate a transition from gray to brown or red clay. This color change may reflect the transition from thicker, redder, more proximal varves to thinner, gray-tan, more distal varves.

Qbkf — **Lacustrine-fan deposits**—Sand, brown to reddish brown, some gravel. As much as 80 feet thick. In subsurface only (sections AA', DD', EE').

GLACIAL LAKE PARAMUS DEPOSITS—Deltaic, lake-bottom, lacustrine-fan, and minor deltaic deposits in the Passaic and Saddle River valleys north of Rutherford.

Qpr — **Deltaic deposits**—Sand, yellow to reddish-yellow, minor gravel. As much as 50 feet thick.

Qprl — **Lake-bottom deposits**—Silt, clay, fine sand, varved in part, reddish brown to gray. As much as 80 feet thick. In subsurface only (section CC').

Qprf — **Lacustrine-fan deposits**—Sand, brown to reddish brown, and gravel. As much as 30 feet thick. In subsurface only (section CC').

GLACIAL LAKE BAYONNE DEPOSITS—Deltaic, lake-bottom, and lacustrine-fan deposits in the Hackensack valley south of the Moonachie-Ridgefield area, and in the Hudson valley south of the Weehawken area. Include partially collapsed deltas at Lyndhurst, East Rutherford-Carlstadt, New Durham, and Hoboken. Lake-bottom deposits are continuous beneath unit Qbkl in the Hackensack valley, and occur as erosional remnants beneath unit Qm in the Hudson valley south of Weehawken. Lacustrine-fan deposits are continuous with those of Lake Hackensack in the axes of the troughs on either side of the Hackensack valley, and also occur in the axis of the Hudson trough.

Qbs — **Deltaic deposits**—Sand, yellow to reddish yellow, some pebble gravel, minor cobble gravel. As much as 50 feet thick.

Qbsl — **Lake-bottom deposits**—Varved silt and clay, reddish brown to gray. As much as 160 feet thick. In subsurface only (sections BB', DD', EE').

Qbsf — **Lacustrine-fan deposits**—Sand, brown to reddish brown, some gravel. As much as 200 feet thick. In subsurface only (sections BB', DD', EE').

Qdw — **DELAWANNA DEPOSITS**—Deltaic sand, yellow to reddish yellow, and pebble-to-cobble gravel. As much as 80 feet thick.

Qt — **RAHWAY TILL**—Reddish brown to reddish yellow silty sand, sandy silt, and sand, with some to many subrounded and subangular pebbles and cobbles and few subrounded boulders. Gravel includes, in approximate order of abundance, red and gray roubaione and sandstone, gneiss, conglomerate, quartzite, and quartz. Boulders are chiefly gneiss and conglomerate. The clasts are derived from bedrock formations to the north and northeast, along the line of ice flow. The quartz pebbles are derived from the Bridgeton Formation, a preglacial fluvial gravel that formerly covered much of the region. Diabase clasts occur in the till on the Palisades and Laurel Hill. In a few places, till may overlie stratified sand and gravel deposited in front of the advancing glacier (for example, wells 26-28, 105, 120, 174, 230 in table 1), but nearly everywhere it lies directly on bedrock. As much as 70 feet thick. Qt delineates areas where till is continuous and generally more than 10 feet thick; Qb delineates areas where till is discontinuous and generally thinner. The extent of unit Qt is based, in part, on Salisbury and Peet (1895), Merrill and others (1902), and Darton and others (1908).

Qty — **RAHWAY TILL (YELLOW PHASE)**—Till as above, except fine sediment is a reddish yellow to yellow sandy silt to clayey silt, and diabase clasts are more abundant. Derived from incorporation of diabase and weathered diabase of the Palisades ridge. Gradational contact with unit Qt. As much as 40 feet thick (estimated). Qty delineates areas where till is continuous and generally more than 10 feet thick. Qtyt delineates areas where till is discontinuous and generally thinner. The extent of unit Qtyt is based, in part, on Salisbury and Peet (1895) and Merrill and others (1902).

MAP SYMBOLS

- Contact—Solid where well-defined by landforms, dashed where approximate, gradational, or feathered, dotted where exposed by excavation or concealed by fill. Some contacts are modified from Merrill and others (1902), Darton and others (1908), and unpublished manuscript maps of C. E. Peet and R. D. Salisbury on file at the N.J. Geological Survey.
- Excavation limit—Line at edge of excavation, ticks within excavation. Shown only for quarries and large sand pits.
- Fluvial scarp—Line at top of scarp, ticks on slope.
- Striation—Observation at dot. Flag indicates data from Salisbury and Peet (1895).
- ■ (-47) Elevation of bedrock surface in well or boring—Data from Parrillo (1959). "Less-than" sign (<) indicates elevation of bottom of boring that did not reach bedrock.
- ▲ (-147) Elevation of bedrock surface in well or boring—Data from Lovegreen (1974). Values are inferred from a bedrock topography map with a contour interval of 20 feet.
- □ (-95') Elevation of bedrock surface in well or boring—Data from files of the N. J. Geological Survey.
- ★167 (+342') Well with log in table 1—Location judged to be accurate within 100 feet. Elevation of bedrock surface in parentheses.
- ★247 (+47') Well with log in table 1—Location judged to be accurate within 500 feet. Elevation of bedrock surface in parentheses.
- Elevation of bedrock surface—Contour interval 50 feet. Shown only where depth to bedrock generally exceeds 50 feet.
- Large bedrock outcrop—Many small outcrops, particularly on the Palisades ridge, are not shown.
- 47 Well with log in table 1—On sections, projected to line of section.
- Depth to bedrock in well or boring—On sections, projected to line of section. Dot indicates bedrock surface penetrated, no dot indicates bedrock not reached.
- af/Qw Unit to left of slash overlies unit to right—Shows extent of underlying map unit beneath large areas of artificial fill and eolian deposits. Extent of units Qw, Qe, and Qal beneath fill based, in part, on Merrill and others (1902) and Darton and others (1908).

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Qprl

Table 1.--Selected Well Logs and Notes

Well No.	Permit No. [1]	Driller's Log: Depth (feet)	Description [2]
1	26-14	0-20	fill
		20-80	sand (Qpt over Qprl)
		80-100	clay (Qprl)
		100-112	small gravel, dry (Qprf)
		112-501	bedrock
2	26-5149	0-5	fill, cobbles
		5-16	silt and sand (Qpt)
		16-18	sand (Qpt)
		18-21	silt (Qprl)
3	26-4010	0-61	glacial fill (Qpt over Qprl)
		61-276	rock
4	26-6602	0-9	fill
		9-17	hard-packed red stone (Qt)
		17-20	rocks (Qt)
		20-21	rock, red shale
5	26-2067	0-18	clay (Qt)
		18-303	red shale
6	26-1010	0-2	sand and fill
		2-5	yellow sand (Qor)
		5-10	red sand (Qor)
		10-19	hardpan and boulders (Qt or Qpr)
		19-459	red shale and sandstone
7	26-3410	0-30	hardpan (Qt)
		30-130	red rock
8	26-4169	0-20	hardpan (thin Qor over Qt)
		20-650	red rock and shales
9	N 26-3-485	0-86	sand and clay (Qpt over Qprl)
		86-200	red sandstone
10	26-3608	0-10	fill
		10-40	fine sand (Qpt)
		40-118	clay (Qprl)
		118-138	fine gravel (Qprf)
		138-400	red rock
11	26-2954	0-20	overburden (Qpt)
		20-80	clay (Qprl)
		80-121	silt and sand (Qprl, Qprf)
		121-300	red sandstone
12	26-2602	0-90	fill (af) over sand (Qal over Qpt) over clay (Qprl)
		90-500	red rock
13	26-3027	0-20	fill (af)
		20-80	clay (Qpt over Qprl)
		80-101	hardpan (Qdw? or Qt)
		101-400	red rock
14	26-2953	0-21	yellow sand (Qal over Qpt)
		21-75	gray clay (Qprf)
		75-95	gray clay, some gravel (Qprl)
		95-101	sand and gravel (Qdw or Qprf)
		101-117	sand with silt (Qdw or Qprf)
		117-130	red hardpan (Qt)
		130-300	red shale
15	26-1761	0-83	sand and gravel (Qal over Qdw)
		83-320	red rock
16	26-4524	0-52	sand (Qpt over Qprl)
17	26-4382	0-6	fill
		6-90	sandy silt (Qpt over Qprl)
		90-95	sand and gravel (Qprf)
		95-115	dark brown sand (Qprf)
		115-136	red sand and gravel (Qprf)
		136-470	red rock
18	26-2952	0-88	gray clay (Qpt over Qprl)
		88-98	sand and gravel (Qprf or Qt)
		98-300	red rock
19	26-5112	0-10	sand (Qpt)
		10-90	clay (Qprl)
		90-135	broken rock (Qprf or Qt)
		135-308	sandstone
20	26-4469	0-110	sand, silt (Qpt over Qprl)
		110-?	red rock (total depth not reported)
21	26-3705	0-45	hardpan (Qt)
		45-370	red rock
22	26-3934	0-4	yellow clay (Qt)
		4-20	red hardpan (Qt)
		20-32	red hardpan with big chunks of shale (Qt)
		32-400	red shale
23	26-4698	0-8	fill
		8-41	red stony hardpan (Qt)
		41-375	red shale
24	26-10621	0-27	sand and gravel (Qt)
25	26-3021	0-41	hardpan (Qt)
		41-191	redrock and shale
26	26-3457	0-63	sand (thickness not reported, 63 feet of casing) (Qt?)
		63-117	red sandstone
27	26-8060	0-2	red-brown fine sand, little medium to fine gravel, trace silt (Qt)
		2-14	red-brown medium to fine sand, little fine gravel, trace silt (Qt)
		14-48	brown coarse to fine sand, little medium to fine gravel (Qt)
28	26-883	0-76	fill soil (Qt)
		76-275	red rock
29	26-10732	0-14	fill
		14-33	red-brown sand and gravel (Qbn)
		33-56	red-brown glacial till (Qt)
		56-61	red sandstone
30	26-5150	0-30	overburden (Qt)
		30-205	trap rock
31	26-3207	0-15	clay (Qt)
		15-138	red shale
32	26-7891	0-4	stony fill (Qt)
		4-28	red hardpan (Qt)
		28-120	red shale
33	26-3284	0-4	fill
		4-12	garbage
		12-32	fine sand (Qbn)
		32-115	clay (Qbnl)
		115-225	very fine sand (Qbnl)
		225-238	hardpan (Qt)
		238-255	red sandstone and shale
34	26-4668	0-36	stony hardpan (Qt)
		36-70	red shale
		70-142	red sandstone very hard
35	26-3804	0-9	overburden (Qt)
		9-17	broken shale (Qt)
		17-352	shale and sandstone
36	26-3700	0-18	hardpan, clay, and stones (Qt)
		18-56	shale and sandstone
37	26-3665	0-21	hardpan and stones (Qt)
		21-55	red sandstone
38	26-493	0-31	overburden (Qt)
		31-113	red sandstone
39	26-7181	0-12	red hardpan (Qt)
		12-251	red shale
40	26-8352	0-13	red clay and sand (Qbn)
		13-32	red shale
41	26-8188	0-19	red clay and sand (Qbn)
		19-32	red shale
42	26-11503	0-5	fill
		5-46	grey silty sand (Qbn)
43	26-4448	0-7	overburden (Qt)
		7-147	red shale and sandstone
44	26-4343	0-70	silt (Qm over Qhkl)
		70-100	sand (Qbnl)
		100-150	red clay (Qbnl)
		150-160	red sand (Qbnl)
		160-170	gray clay (Qbnl)
		170-180	red sand (Qbnl)
		180-198	gravel and water, 70 gallons per minute (Qbnf)
45	26-2059 well 46-81	0-8	yellow sandy clay (Qmt)
		8-78	dark gray clay, sticky (Qhkl)
		78-85	dark brown clay (Qhkl)
		85-100	red clay (Qhkl)
		100-105	red hardpan and shale (Qt)
		105-404	red shale
46	26-2059 well 46-82	0-6	light brown sand (Qmt)
		6-10	gray sand (Qmt)
		10-90	gray clay (Qhkl)
		90-110	brown clay (Qhkl)
		110-120	red clay (Qhkl)
		120-140	brown clay (Qhkl)
		140-143	red hardpan (Qt)
		143-300	red shale
47	26-2059 well 46-83	0-6	brown sand (Qmt)
		6-10	gray sand (Qmt)
		10-110	brown clay (Qhkl)
		110-120	red clay (Qhkl)
		120-140	brown clay (Qhkl)
		140-143	red hardpan (Qt)
		143-435	red shale
48	26-2172	0-133	clay, sand (Qm over Qhkl)
		133-288	red shale
49	26-2996	0-10	clay (Qm over Qhkl)
		10-27	hardpan (Qhkl or Qt)
		27-153	red shale
50	26-11682	(abbreviated log)	
		0-20	brown fine sand and silt, few boulders (Qt)
		20-38	red-brown sandstone
51	26-5536	0-4	red-brown silt and coarse to fine shale fragments (Qt)
		4-13	red-brown shale and sandstone
52	26-5626	0-5	brown medium to fine sand, little silt, some medium to fine gravel and a few boulders (Qt)
		5-21	red-brown shale and sandstone
53	26-3649	0-7	sand, clay, and gravel (Qt)
		7-170	sandstone
54	26-8757	0-13	red-brown medium to fine sand, some silt, some coarse to fine gravel (Qt)
		at 13	shale
55	26-4652	0-61	stony hardpan (thin Qm over Qt)
		61-130	hard grey rock
		130-136	softer grey rock
		136-145	red rock--shale
56	26-1178	0-14	fill
		14-25	fine sand and clay (Qmt over Qhkl)
		25-30	clay, sand, and gravel (Qhkl over Qt)
		30-38	fine sand and gravel, some clay (Qt)
		at 38	ledge (bedrock)
57	26-5211	0-12	fill sand (af)
		12-85	gray silty clay (Qm over Qhkl)
		85-155	red-brown sand and gravel (Qhkf)
		155-164	red-brown sand and clay (Qhkf or Qt)
		164-570	sandstone
58	26-240	0-15	fill (af)
		15-95	marsh land (Qm over Qhkl)
		95-117	clay (Qhkl)
		117-350	red rock
59	26-7266	(abbreviated log)	
		0-18	fill (af)
		18-19	black peat (Qm)
		19-23	gray silty medium-fine sand (Qal)
		23-97	gray silty clay, varved (Qhkl)
		97-110	red-brown fine sand and silt (Qhkl)
		110-127	dense red-brown sand, trace silt and gravel (Qt or Qhkf)
60	26-9316	0-7	fill dirt (af)
		7-19	gray soil (Qm over Qal)
		19-20	gray clay (Qhkl)
61	26-9318	0-8	fill dirt (af)
		8-17	gray silty sand, gravel (Qm over Qal)
		17-20	clay (Qhkl)
62	26-9319	0-3	fill dirt (af)
		3-10	black soil (Qm over Qal)
		10-21	silty sand, gravel, some clay (Qmt over Qhkl)
		at 21	gray clay (Qhkl)
63	26-9308	0-4	fill dirt (af)
		4-26	sand, gravel, clay, swamp mud (Qm over Qal over Qhkl)
64	26-9309	0-8	fill dirt (af)
		8-16	dark sandy soil (Qm over Qal)
		at 16	clay (Qhkl)
65	26-9310	0-3	meadow mat (Qm)
		3-9	swamp mud (Qm)
		9-20	gray clay (Qhkl)
66	26-9327	0-8	dark soil (Qm)
		8-19	dark soil, gravel (Qal)
		at 19	rock? (refusal on Qhkl?)
67	26-9328	0-3	black dirt (Qm)
		3-8	gray soil (Qm)
		8-18	soil, gravel, silty clay (Qal over Qhkl)
		18-20	gray clay (Qhkl)
68	26-5340	(abbreviated log)	
		0-35	red-brown coarse to fine sand, some gravel, trace silt (Qt)
69	26-4331	0-10	fill (af)
		10-15	meadow mat (Qm)
		15-45	fine silt and sand (Qhkl)
		45-60	fine sand (Qhkl)
		60-70	red hardpan (Qt)
		70-280	red sandstone
70	26-3503	0-26	overburden, gravel (af over Qm over Qt?)
		26-291	shale and sandstone
71	26-5560	0-55	gravel and sand (Qt)
		55-300	gray granite
72	26-7	(log by H. Herpers, NJGS)	
		0-40	gray and brown clay (thin Qm over Qhkl)
		40-45	fine-grained red clayey sand (Qhkl)
		45-65	medium- to coarse-grained slightly clayey sand (Qhkf)
		65-358	red shale
73	26-3512	0-30	hardpan (Qt)
		30-40	red shale
		40-95	trap rock
74	26-3783	0-42	sand (Qhk)
		42-50	red clay (Qhkl)
		50-75	gravel and sand (Qhkf)
		75-88	sand (Qhkf)
		88-315	red sandstone
75	N 26-4-788	0-6	decayed vegetation (Qm)
		6-9	stiff blue clay (Qm)
		9-11	brown sand (Qal)
		11-37	soft gray clay (Qhkl)
		37-58	soft red sand (Qhkf)
		58-59	red clay (Qhkf)
		59-69	fine red sand (Qhkf)
		at 69	hardpan (Qt)
76	NJGS files (I-80 boring HC 68)	0-5	meadow mat (Qm)
		5-10	gray fine silty sand, trace silty clay (Qal)
		10-36	gray to red-brown silty clay, layers of brown fine sand spaced 2-5 inches (Qhkl)
		36-45	red fine-medium sand, gravel (Qhkf)
		at 45	refusal (bedrock)
77	NJGS files (I-80 boring HC 67)	0-5	meadow mat (Qm)
		5-11	gray silty sand, a few layers of silty clay (Qal over Qhkl)
		11-15	red-brown silty clay, layers of sand (Qhkl)
		15-33	red-brown silty clay, layers of brown sand spaced 2-3 inches (Qhkl)
		33-37	red fine to medium sand, gravel (Qhkf or Qt)
		37-40	red decomposed sandstone
78	NJGS files (I-80 boring HC 66)	0-5	meadow mat (Qm)
		5-13	brown silty clay varved with silty sand (Qhkl)
		13-19	red fine sand, fine to medium gravel (Qhkf or Qt)
		at 19	refusal on soft red sandstone
79	NJGS files (I-80 boring HC 65)	0-5	meadow mat (Qm)
		5-16	red-brown clayey silt varved with silty sand (Qhkl)
		16-25	red decomposed sandstone
80	NJGS files (I-80 boring HC 75)	0-5	meadow mat (Qm)
		5-9	blue, gray, yellow silty clay, plant remains, fine sand partings (Qm over Qal)
		9-29	gray silty clay, thin layers of silty sand, 1 foot apart (Qhkl)
		29-41	red fine to medium sand, gravel (Qhkf or Qt)
81	NJGS files (I-80 boring HC 76)	0-7	meadow mat
		7-15	gray fine to medium sand, plant remains (Qm over Qal)
		15-32	gray to gray-brown silty clay, layers of sand (Qhkl)
		32-66	gray to red-gray to red-brown clay, layers of sand (Qhkl)
		66-67	red fine to medium sand, gravel (Qhkf)
		at 67	refusal (bedrock)
82	NJGS files (I-80 boring HC 77)	0-6	meadow mat (Qm)
		6-9	gray clay (Qm over Qhkl)
		9-19	brown and gray silty clay, partings of fine sand (Qhkl)
		19-46	red silty clay, sand partings to thin silty sand layers (Qhkl)
		46-51	red fine to medium sand, gravel (Qhkf)
83	NJGS files (I-80 boring HC 79)	0-3	meadow mat (Qm)
		3-8	dark silt, sand layers, plant remains (Qm)
		8-16	gray silty clay, gravel, layers of fine sand (Qm over Qal)
		16-35	red-gray silty clay (Qhkl)
		35-45	red-gray silty clay, layers of red silty sand (Qhkl)
		45-65	red-brown silty clay, varved, with red silty sand (Qhkl)
		65-75	red-brown fine to coarse silty sand, gravel (Qhkf or Qt)
		at 75	refusal (bedrock)
84	NJGS files (I-80 boring X 583)	0-10	fill--cinders, sand, gravel (af)
		10-13	red-brown silty sand (af or Qal)
		13-19	gray and red-brown silty clay varved with fine sand (Qhkl)
		19-25	gray silty clay (Qhkl)
		25-36	red-brown silty clay (Qhkl)
		36-44	red-gray silty clay, few layers of fine sand (Qhkl)
		44-58	red-brown silty clay, few layers of fine sand (Qhkl)
		58-68	red-brown sandy silt (Qhkl or Qt)
		68-76	red sandstone
85	NJGS files (I-80 boring HC 81)	0-4	meadow mat (Qm)
		4-10	gray fine silty sand (Qal)
		10-39	gray silty sand (Qhkl)
		39-59	red-brown silty clay varved with red sandy silt (Qhkl)
		59-66	red-brown silt, trace clay (Qhkl)
		66-68	red brown silty sand, gravel (Qt)
		at 68	refusal (bedrock)
86	NJGS files (I-80 boring HC 83)	0-4	meadow mat (Qm)
		4-7	gray fine silty sand (Qal)
		7-13	red-brown silty sand, trace clay (Qal)
		13-17	blue-gray silt, clay, layers of sand (Qhkl)
		17-27	gray-brown silty clay, a few sand layers (Qhkl)
		27-39	gray silty clay varved with red silty sand (Qhkl)
		39-63	red-brown silty clay varved with silt, sand (Qhkl)
		63-68	red-brown silt, sand (Qhkl or Qt)
		at 68	refusal (bedrock)
87	NJGS files (I-80 boring HC 85)	0-3	peat (Qm)
		3-7	gray fine silty sand (Qal)
		7-15	blue-gray silty clay varved with fine silty sand (Qhkl)
		15-23	red-brown silty clay (Qhkl)
		23-33	red-gray silty clay (Qhkl)
		33-58	red-brown silty clay varved with sandy silt (Qhkl)
		58-62	red-brown silty clay, trace fine sand (Qhkl)
		62-69	red-brown silty sand, gravel (Qt)
		69-74	red-brown silty sand, sandstone fragments (Qt on bedrock)
88	NJGS files (I-80 boring HC 87)	0-2	meadow mat (Qm)
		2-8	gray fine silty sand (Qal)
		8-23	blue-gray silty clay, varved with fine silty sand (Qhkl)
		23-37	red-brown silty clay varved with fine silty sand (Qhkl)
		37-54	red-brown sandy silt (Qhkl)
		54-71	red-brown sand, trace silt (Qhkf)
		71-98	red-brown fine-to-coarse sand, trace silt, gravel (Qhkf)
		98-98.5	red decomposed shale
89	N 26-4-782	0-5	black bog (Qm)
		5-11	gray fine sand (Qal)
		11-16	gray fine sand and clay (Qal over Qhkl)
		16-80	gray to red-brown soft silty clay (Qhkl)
		80-136	red fine sand (Qhkf)
90	N 26-4-775	0-63	clay (Qhkl)
		63-74	sand and gravel (Qhkf)
		at 74	sandstone
91	Salisbury, 1902, p. 617	0-85	clay (Qhkl)
		at 85	bedrock
92	N 26-13-333	0-7	muck (Qm)
		7-20	gray clay, trace organic matter (Qm)
		20-33	medium to fine sand (Qal)
		33-71	brownish gray clay, becoming reddish brown at 63 feet (Qhkl)
		71-76	red clay, gravel (Qt)
		76-87	red shale
93	Parillo, 1959 well 9B	0-7	marsh (Qm)
		7-20	gray clay and organic matter (Qm)
		20-31	fine sand (Qal)
		31-70	clay (Qhkl)
		70-75	sand and gravel (Qhkf)
		75-82	gray sandstone
		82-87	red shale
94	N 26-3-939	former clay pit exposed 3 to 7 feet of yellow-brown sand (Qmt) overlying 10 feet of horizontally-bedded light-gray- brown fat clay (Qhkl)	
95	Parillo, 1959 well 9A	0-5	soil (Qmt)
		5-48	red clay and sand (Qhkl)
		at 48	red shale
96	Parillo, 1959 well 8A	0-10	soil (Qmt)
		10-60	clay (Qhkl)
		60-75	gravel and sand (Qhkf)
		at 75	sandstone
97	Parillo, 1959 well 5A	0-NR	varved clay (Qmt over Qhkl)
		NR-160	sand and gravel above bedrock (Qhkf)
		160-NR	Triassic sandstone and shale
98	NJGS files (I-80 boring HC 51)	0-5	fill
		5-15	gray fine sand, silt, trace clay, layered (Qmt)
		15-35	gray silt, clay, little sand in a few spots (Qhkl)
		35-50	gray-brown silty clay (Qhkl)
		50-55	red-medium-coarse sand, gravel (Qhkf)
		at 55	refusal (bedrock)
99	NJGS files (I-80 boring HC 52)	0-6	fill
		6-12	gray clayey silt, layers of fine sand (Qmt over Qhkl)
		12-30	gray to gray-brown clayey silt, layers of fine sand (Qhkl)
		30-43	gray-brown to red-brown silty clay (Qhkl)
		43-47	red decomposed shale
100	N 26-3-699	0-10	mud and sand (Qmt)
		10-22	quick sand (Qmt)
		22-30	light sandy clay (Qhkl)
		30-40	red sticky clay (Qhkl)
		40-50	clayey red sand and gravel (Qt)
		at 50	sandstone
101	Parillo, 1959 well 7A	0-67	sandy clay (Qmt over Qhkl)
		67-NR	Triassic sandstone and shale
102	N 26-3-912	0-3	fine brown sand (Qmt)
		3-7	sandy clay (Qhkl)
		7-40	brown and gray clay, thin layers of sand (Qhkl)
		40-130	NR
		at 130	red sandstone
103	N 26-3-916 boring 2	0-10	silt (Qmt)
		10-190	soft clay (Qhkl)
		190-220	fine to coarse sand (Qhkf)
		at 220	red sandstone
104	N 26-3-916 boring 1	0-10	silt (Qmt)
		10-160	soft clay (Qhkl)
		160-168	hardpan (Qt)
		at 168	red sandstone
105	Parillo, 1959 well 3B	0-1	fill
		1-4	muck
		4-28	gray sand and clay (Qmt over Qhkl)
		28-60	gray clay (Qhkl)
		60-79	light brown clay (Qhkl)
		79-106	sandy brown clay (Qhkl)
		106-110	gravel, sand, and clay (Qbnf)
		110-113	gravel and sand (Qbnf)
		113-115	medium-to-coarse sand, active (Qbnf)
		115-120	sand and gravel (Qbnf)
		120-126	clay with sand and gravel (Qbnf or Qt)
		126-130	clay with gravel (Qbnf or Qt)
		130-137	red hardpan (Qt or Qbnl)
		137-139	sand and gravel (Qbnf or Qt)
		139-146	red hardpan (Qt or Qbnl)
		146-154	NR
		154-170	silty red-brown and gray clay (Qbnl)
		170-182	red silty sandy clay (Qbnl)
		182-188	coarse sand and clay (Qbnl or Qt)
		188-208	red hardpan (Qt or Qbnl)
		208-214	red clay and sand (Qbnl or Qt)
		214-237	red hardpan (Qt or Qbnl)
		237-238	red sands (Qt or Qbnl)
		238-243	red rock
106	Parillo, 1959 well 4B	(abbreviated log)	
		0-2	fill (af)
		2-7	muck (Qm)
		7-25	gray clay (Qhkl)
		25-27	red clay (Qhkl)
		27-87	sand and gravel, active (Qbnf)
		87-130	fine sand and clay (Qbnl)
		130-150	red clay, sand with gravel (Qbnl)
		150-167	brown sand and clay (Qbnl)
		167-174	brown sand (Qbnf)
		174-179	red sandy clay (Qbnf)
		179-192	red sand with gravel (Qbnf)
		192-251	red clay sand and little gravel (Qbnl or Qt)
		251-263	red clay and sand (Qbnl or Qt)
107	Parillo, 1959 well 5B	0-82	gray clay (Qmt over Qhkl)
		82-90	red sand (Qbnf)
		90-96	hardpan (Qt)
		96-160	red shale
108	Parillo, 1959 well 6B	0-80	gray clay (Qmt over Qhkl)
		80-90	red sand (Qhkf)
		90-113	hardpan (Qt)
		113-190	red shale
109	Parillo, 1959 well 4G	0-4	marsh muck (Qm)
		4-110	clay with some sand (Qhkl)
		110-130	sand and gravel (Qbnf)
		130-137	clay (Qbnl)
		137-154	sand, gravel, and clay (Qbnf)
		154-237	mostly clay (Qbnl)
		237-238	sand (Qt or Qbnl)
		238-243	red rock
110	Parillo, 1959 well 5G	0-7	marsh mud (Qm)
		7-27	clay (Qhkl)
		27-109	sand and gravel (Qbnf)
		109-150	clay (Qbnl)
		150-192	sand and gravel (Qbnf)
		192-263	clay, sand, and gravel (Qbnl and Qbnf)
		263-271	sandstone
111	Parillo, 1959 well 7C	0-5	bog (Qm)
		5-8	gray clay (Qhkl)
		8-16	brown clay (Qhkl)
		16-60	gray clay (Qhkl)
		60-64	red clay (Qhkl)
		64-75	clay and gravel (Qt)
		75-78	clay, gravel, and sand (Qt)
		at 78	rock
112	Parillo, 1959 well 8C	0-3	fill (af)
		3-7	meadow bog (Qm)
		7-14	gray clay (Qhkl)
		14-40	gray clay with sand (Qhkl)
		40-43	clay, sand, and gravel (Qt)
113	Agron, 1980 boring E	0-6	fill (af)
		6-12	meadow mat (Qm)
		12-14	silty sand (Qal)
		14-31	varved clay and silt (Qhkl)
		31-39	till (Qt)
		39-53	shale
114	N 26-13-375 boring 3	0-12	mud (Qm)
		12-20	clay and sand (Qhkl)
		20-32	sand (Qhkl)
		32-38	clay and sand (Qhkl)
		38-39	dark brown sand (Qt)
		at 39	rock
115	N 26-13-359	storage tank excavation exposes 45 feet of mostly gray clay (Qhkl) over 120 feet of red shale	
116	N 26-13-375 boring 1	0-13	mud (Qm)
		13-37	fine sand (Qal)
		37-39	white clay (Qhkl?)
		39-41	clay and sand (Qhkl or Qt)
		at 41	rock
117	N 26-13-396	0-11	organic silt, some clay (Qm)
		11-25	clay (Qhkl)
		25-44	silt (Qhkl)
		44-50	greasy gray clay (Qhkl)
118	N 26-13-399	0-4	water
		4-8	silty muck (Qm)
		8-10	gray silty clay (Qhkl)
		10-19	brown silty clay (Qhkl)
		19-84	soft silty clay with thin layers of fine sand ranging from gray at top to red at bottom (Qhkl)
		84-90	red stiff clay, fine sand, some small gravel (Qbnl)
		90-135	red-brown plastic silty clay with some sand and gravel (Qbnl)
		135-146	silty sand and layers of red and gray silty clay (Qbnl)
		146-156	red fine to silty sand (Qbnl)
		156-159	red coarse gravel and boulders (Qbnf)
		159-165	red silty sand and coarse gravel (Qbnf)
119	N 26-14-116b	0-8	cinders and wood (af)
		8-14	fine brown silty sand (Qm over Qal)
		14-69	gray to brown clay with thin layers of fine sand (Qhkl)
		69-80	very fine reddish-brown silty sand (Qhkl)
		80-100	reddish-brown clay with fine sand and very small gravel (Qhkl)
		100-108	reddish-brown sand with clay binder and gravel (Qhkl)
		108-122	reddish-brown clay with fine sand and a little gravel (Qhkl)
		122-143	fine to medium reddish-brown sand and a little gravel (Qhkf)
		143-170	coarse red compact sand (Qt or Qhkf)
120	N 26-14-116a	0-14	cinder fill (af)
		14-18	gray silty fine sand (Qm over Qal)
		18-119	gray to brown silty clay (Qhkl)
		119-130	red-brown silty sand (Qhkl)
		130-140	red-brown clay with a little gravel (Qhkl)
		140-151	red-brown clay with medium-to-coarse sand and gravel (Qt or Qhkl over Qhkf)
121	N 26-14-127	0-5	decayed vegetation (Qm)
		5-10	gray sand (Qal)
		10-11	gray sandy clay (Qal or Qhkl)
		11-68	gray, minor brown, clay (Qhkl)
		68-69	blue sand (Qhkf)
122	N 26-14-132	quarry formerly exposed 5 feet of till (Qt) over 5 to 6 feet of rotten sandstone over unweathered sandstone	
123	N 26-14-143	0-9	decayed vegetation (Qm)
		9-76	blue, tan, gray clay (Qhkl)
		76-80	red clay (Qhkl or Qt)
124	N 26-14-145	0-11	decayed vegetation (Qm)
		11-13	soft gray clay (Qm)
		13-14	soft gray sand (Qal)
		14-78	gray, brown, blue clay (Qhkl)
125	N 26-14-148a	0-12	decayed vegetation (Qm)
		12-15	stiff fine gray sand (Qal)
		15-24	stiff tan clay (Qhkl)
		24-72	soft gray clay (Qhkl)
126	N 26-14-148b	0-18	mud and muck (Qm)
		18-25	bluish-green clay (Qhkl)
		25-113	sand and gravel, coarser near bottom (Qbnf)
		at 113	rock
127	N 26-14-171	0-10	muck (Qm)
		10-21	stiff blue and tan clay (Qhkl)
		21-82	soft, plastic, tan and gray clay (Qhkl over Qbnl)
128	N 26-14-173b	0-9	muck (Qm)
		9-14	stiff gray clay (Qhkl)
		14-36	soft tan clay, gray at base (Qhkl)
		36-43	red sand (Qbnf)
		43-49	soft red sandy clay (Qbnf)
		49-51	stiff sand and gravel (Qbnf)
129	N 26-14-173a	0-40	fill and soft clay (af over Qm over Qhkl)
		40-350	rock
130	N 26-14-154b	0-2	fill (af)
		2-9	soft muck, wood, sand (Qm over Qal)
		9-21	soft brown clay (Qhkl)
		21-29	medium hard sand, gravel, boulders (Qt)
		29-37	sandstone rock
131	N 26-14-154a	0-8	muck and soft blue clay (Qm)
		8-11	medium hard yellow clay and stones (Qt)
		11-14	medium hard red clay (Qt)
		14-21	hard sand and boulders (Qt)
		21-28	sandstone rock
132	N 26-14-182a	0-56	red sand, gravel, stones, boulders, clay (Qt)
		56-61	trap rock
133	N 26-14-182b	0-43	till (Qt)
		43-48	sandstone
134	N 26-14-181	0-45	sand, gravel, boulders, clay (Qt)
135	N 26-14-178a	0-5	muck (Qm)
		5-9	stiff gray clay (Qhkl)
		9-13	very stiff brown clay (Qhkl)
		13-16	soft red clay (Qhkl)
		16-16.5	coarse red sand (Qbnf)
		16.5-22	plastic red clay and sand (Qbnf)
		22-32	red sand (Qbnf)
		32-42	red sand and gravel (Qbnf)
136	N 26-14-178b	0-11	decayed vegetation (Qm)
		11-21	hard-packed red sand (Qbn)
		21-22	soft sand and clay (Qbn)
		22-38	hard-packed red sand (Qbn)
		38-40	red sand and gravel (Qbn)
137	N 26-14-176	0-3	cinder fill (af)
		3-10	medium soft silt (Qm)
		10-20	red sandy clay (Qhkl)
		20-28	medium soft red sandy clay and stones (Qhkl)
		28-38	medium hard red sandy clay (Qhkl)
		38-51	medium hard red sandy clay, with small stones (Qhkl)
		51-64	hard fine sand, gravel, stones, some clay (Qt or Qbn)
		64-67	hard sand, gravel, boulders (Qt or Qbn)
		67-75	gravel and stones (Qt or Qbn)
138	N 26-14-179	0-1	muck (af)
		1-6	sand, cinders, wood (af)
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