NEW JERSEY GEOLOGICAL SURVEY

CORRELATION OF MAP UNITS

MAP UNITS

MORRIS. PASSAIC. ESSEX. AND BERGEN COUNTIES. NEW JERSEY

SURFICIAL GEOLOGY OF THE POMPTON PLAINS QUADRANGLE

Pamphlet containing tables 1 and 2 accompanies map

NORTH AMERICAN

Surficial deposits in the Pompton Plains quadrangle include artificial fill, alluvial, alluvial-fan, eolian, swamp, talus, and stream-terrace sediments, all of postglacial age; glacial-lake and glacial-stream deposits of late Wisconsinan age; and till of late Wisconsinan and possible Illinoian age. Postglacial sediments are generally less than 30 feet thick. Glaciofluvial sand and gravel are also generally less than 30 feet thick. The glaciolacustrine deposits include stratified sand, gravel, silt, and clay and are as much as 300 feet thick. Till is as much as 150 feet thick.

INTRODUCTION

The accompanying map and sections show the surface extent and subsurface relations of these deposits. Their composition and thickness, and the glacial and postglacial events they record, are described in the Description of Map Units. Figure 1 shows recessional glacier margins, the extent of glacial lakes, and other glacial features in the quadrangle and surrounding areas. Figure 2 shows the texture at the land surface of glacial-lake, glacial-stream, and postglacial alluvial sediments. Well and boring data used to construct bedrock-surface elevation contours and to infer the subsurface distribution of the deposits are provided in table 1 (in pamphlet). The composition of pebbles in the surficial sediments is shown in table 2 (in pamphlet). The chronologic relationships of the deposits are shown in the Correlation of Map Units. Aquifer properties are briefly described

AQUIFER PROPERTIES

Surficial deposits in the quadrangle yield ground water to public-supply and domestic wells in several areas and affect the movement of water and pollutants into lakes, streams, and underlying bedrock and glacial aquifers. Yields and screened intervals for wells tapping glacial deposits are provided in table 1. Glacial-lake sand and gravel deposits are productive aquifers in several places. Public-supply wells, and some domestic wells, in the Towaco Valley section of Montville (fig. 1) and in the northern end of the Pompton Plain lowland, and numerous domestic wells in the Fairfield lowland, draw water from lacustrine-fan sand and gravel deposits (unit Qpmf and, in Fairfield, parts of unit Qsp), with yields of as much as 2000 gallons per minute. The lacustrine-fan sands and gravels are mostly covered by silt, clay, and fine sand (unit Qpml) and, in places, till (unit Qr). These sediments are less permeable than the sands and gravels and act as confining or semi-confining layers. In places, wells drilled through the clay and into the sand and gravel flowed at the surface, demonstrating confined conditions and artesian pressure in the sand and gravel aquifer. In some places, the lacustrine fans extend to the surface, or are overlain by permeable deltaic or fluvial sand and gravel (units Qpmd and Qst) rather than clay and till, and so are not confined.

In much of the Pompton Plain lowland, in most of the Rockaway Valley, and in parts of the Fairfield lowland, lacustrine-fan deposits are absent and the valley fill consists entirely of lake clay overlying till atop bedrock. In these areas there is no valley-fill aquifer, although the clays may act as a confining layer for the bedrock aquifer. Undiscovered lacustrine-fan aquifers may be present beneath the lake clay in the overdeepenings in the western part of the Fairfield lowland and beneath the Pompton Plain lowland, but these areas have not been explored by test drilling.

On the upland west of the Highland escarpment, deltaic and lacustrine-fan sand and gravel (unit Qfy) is tapped by public-supply wells at Fayson Lakes. There is little to no fine-grained sediment in this deposit, so the aquifer is unconfined.

Hydraulic conductivities of the surficial deposits may be estimated from statewide glacial aquifer-test data (Mennel and Canace, 2002) and published aquifer-test and laboratory data (Stanford, 2000). Sand and gravel deposits (units Qst, Qstl, Qstu, Qaf, Qrm1, Qpq, Qpp, Qpg, Qbu3, Qbu2, Qbu1, Qml, Qbr, Qfy, Qpmd, Qpmf, and parts of Qal and Qsp) are highly permeable, having estimated hydraulic conductivities that range from 10^1 to 10^3 feet per day (ft/d). Sandy till and silty sand till (Qn, Qnu, parts of Qr and Qry) are also permeable, having estimated hydraulic conductivities from 10⁻¹ to 10² ft/d. Silt and clay lake-bottom deposits (parts of units Qpml, Qppl, and Qsp) are of low permeability, having estimated hydraulic conductivities of 10⁻⁵ to 10⁻³ ft/d. Fine sand and silt lakebottom, alluvial, and wetland deposits (parts of units Qpml, Qpp, Qal, Qsp, Qst, and Qs) and sandy silt till (parts of units Qr and Qry) are somewhat more permeable, having estimated hydraulic conductivities of 10⁻³ to 10⁻¹ ft/d. Swamp deposits (Qs) and fill have varied hydraulic conductivities that depend on the clay and silt content of the material. Peat with little mineral soil, and fill composed of sand, cinders, gravel, demolition debris, slag, and trash, may be highly permeable.

DESCRIPTION OF MAP UNITS

Postglacial Deposits--These include man-made fill, stream deposits in fans (Qaf), terraces (Qst, Qstu, Qstl), and modern channels and floodplains (Qal), talus (Qta), windblown sand (Qe), and wetland deposits in swamps (Qs). They were all deposited since retreat of the late Wisconsinan glacier about 18,000 yrs B. P. (years before present).

- ARTIFICIAL FILL--Artificially emplaced sand, gravel, silt, clay, and rock fragments, and man-made materials including cinders, ash, brick, concrete, wood, slag, asphalt, metal, glass, and trash. Color varied but generally dark brown, gray, or black. As much as 100 feet thick in large highway fills but generally less than 20 feet thick. Many small areas of fill, especially along drainages in urban and suburban areas, are not mapped. Some areas of fill are inferred from the extent of swamps and alluvial deposits shown on archival topographic maps on file at the N. J. Geological Survey.
- ALLUVIUM--Fine-to-medium sand, silty fine sand, silt, clayey silt, pebbly sand, pebble-to-cobble gravel; dark brown, brown, yellowishbrown, reddish-brown, gray; moderately to well sorted, stratified to massive. Contains variable amounts of organic matter. As much as 20 feet thick. Deposited in modern floodplains and channels. Pebbly sand and pebble-to-cobble gravel are chiefly channel deposits. Sand and silty sand are deposited in levees along channels and on overbank areas of floodplains. Silt and clay accumulate in backswamp areas distant from active channels.
- ALLUVIAL FAN DEPOSITS--Cobble-to-boulder gravel, sand, minor silt; brown to yellowish-brown; moderately sorted, stratified. As much as 10 feet thick (estimated).

STREAM-TERRACE DEPOSITS--Sand, pebbly sand, minor pebble-to-cobble gravel; very pale brown, yellowish-brown, light gray. These are nonglacial stream deposits laid down after draining of the Moggy Hollow and Great Notch stages of glacial Lake Passaic (see below). In the Rockaway Valley, stream-terrace deposits are divided into two units. The upper stream terrace deposits (Qstu) were laid down as a shallow-water delta in the Totowa stage of Lake Passaic (see below). The lower stream terrace deposits (Qstl) were laid down after the Totowa stage drained. Similarly, most of the stream terrace deposit in the Fairfield lowland was laid down as a shallow-water delta in the Totowa stage. Stream terraces in the Towaco Valley and the west edge of the Pompton Plain lowland generally are on grade with the Pompton Plain deposit (Qpp) and so are also mostly Totowa-stage deposits. Stream terraces along the Pequannock, Wanaque, Pompton, and Ramapo rivers are inset into the Pompton Plain deposit and so were laid down after the

STREAM-TERRACE DEPOSITS, UNDIVIDED--Fine-to-medium sand, silty fine sand, pebbly sand, pebble gravel, minor cobble gravel. As much as 30 feet thick. Forms terraces 5 to 15 feet above modern

Totowa stage drained.

- LOWER STREAM-TERRACE DEPOSITS--Fine-to-medium sand, pebbly sand, minor pebble-to-cobble gravel. As much as 15 feet thick. Forms terraces 5-10 feet above modern floodplain in the Rockaway
- pebbly sand, minor pebble-to-cobble gravel; very fine sand and silt in lower part of deposit. As much as 15 feet thick. Forms terraces 10-20 feet above modern floodplain in the Rockaway Valley.

UPPER STREAM-TERRACE DEPOSITS--Fine-to-medium sand,

- SWAMP DEPOSITS--Peat and organic silt, clay, and fine sand; black, dark brown, and gray. As much as 15 feet thick.
- TALUS--Angular chips, flagstones, cobbles, and, locally, boulders, of basalt, and a few subrounded erratic cobbles and boulders of gneiss, with little or no matrix material. Forms aprons at base of cliffs on south side of Hook Mountain. As much as 10 feet thick (estimated). Many small talus deposits not mapped.
- EOLIAN SAND--Fine sand, yellowish-brown to very pale brown. Forms dune ridges on surface of stream terrace in Fairfield. As much Forms dune ridges on surface of stream terrace in Fairfield. As much as 15 feet thick.

Glacial Deposits--These include till and stratified sediments. Till is a poorly sorted, nonstratified sediment containing gravel clasts and boulders, deposited directly from glacial ice (units Qn, Qnu, Qr, Qry, Qb). The stratified sediments are generally well sorted. They include sand and gravel laid down by glacial meltwater in river plains (Qpq) and in glacial-lake deltas and fans (Qpmd, Qpmf, Obu1, Obu2, Obu3, Ofy, Obr, Oml, Omld, Opp, Opg, Osp). The stratified sediments also include silt, clay, and fine sand deposited on the bottoms of glacial lakes (Qpml, Qppl). All of these deposits are of late Wisconsinan age except Qb, and part of Qsp, which may be of Illinoian age.

The orientation of striations and distribution of till indicate that late Wisconsinan ice advanced as two lobes across the Pompton Plains quadrangle. To the east of the Highland escarpment (fig. 1), ice in the Passaic lowland (the lowland between the Highland escarpment and Second Watchung Mountain) advanced to the southwest. In the Highlands (the upland west of the Highland escarpment), ice advanced in a more southerly direction. The Highlands presented more of a topographic barrier to the advancing glacier than did the Watchung Mountains. Thus, the Highlands ice lobe lagged behind the Passaic ice lobe, and the Passaic lowland was already glaciated when ice overtopped the Highlands. One exception to this sequence is in the Riverdale-Jacksonville area, where striations and till distribution indicate that Highland ice advanced into the west edge of the Passaic lowland before Passaic ice, perhaps because the Wanaque valley to the north provided an unobstructed route for the south-flowing Highlands lobe.

During ice advance the land surface was shaped by glacial erosion. Throughout the quadrangle, except for the southeast part of the Fairfield lowland, older glacial deposits and soils were stripped off and the underlying bedrock was eroded. Elevation contours of the bedrock surface, plotted at 50-foot interval on the map, show the resulting topography. In the Pompton Plain lowland, Towaco Valley, and Fairfield lowland, erodible shale, sandstone, and weathered conglomerate bedrock

VERTICAL EXAGGERATION 10X

were scoured to form south-to-southwest-trending troughs with more than 200 feet of overdeepening. On ridges and uplands of resistant basalt and gneiss bedrock, glacial abrasion smoothed the north slopes that faced advancing ice and glacial plucking formed cliffs on the south-facing slopes. Preservation of earlier glacial deposits (Qb, Qsp) beneath till in the southeast part of the Fairfield lowland (fig. 1), above bedrock-surface elevations of about 80 feet, indicates that ice did not erode deeply there.

The deep glacial erosion erased most remnants of preglacial drainage. Drainage

in the Passaic lowland before the Illinoian glaciation was controlled by a baselevel at an elevation of about 70 feet in the Short Hills gap in Second Watchung Mountain, about 10 miles south of Fairfield (Stanford, 1991, 2005). Today the Short Hills gap is filled with glacial deposits of both Illinoian and late Wisconsinan age to an elevation higher than 360 feet. Drainage in the Passaic lowland is now controlled by a base level at 160 feet in elevation in the gap in Second Watchung Mountain at Little Falls, 2 miles east of Fairfield (fig. 1). Buried stream valleys of pre-Illinoian age in the Passaic lowland south of the Pompton Plains quadrangle, where ice did not erode deeply, show a dendritic network of streams draining through the Short Hills gap. The northern end of one of these valleys, the Montville buried valley of Canace and others (1993), extends beneath the Rockaway Valley in the southwestern part of the quadrangle. The bedrock surface here is not much lower than about 100 feet in elevation, above the Short Hills base level. Likewise, the rock surface beneath the earlier glacial deposits in the Fairfield lowland is at 80 to 140 feet in elevation and so is also likely a remnant of the pre-Illinoian valley floor. Because this floor is below the base level in the Little Falls gap, it is likely that the Pompton River, including the combined discharge of the Pequannock, Wanaque, and Ramapo valleys, also drained southward to the Short Hills gap in pre-Illinoian time. The Pompton surely crossed Hook Mountain through the gap at Mountain View, and the Ramapo likely flowed through a now-filled valley in Pompton Lakes, just north of the quadrangle, rather than the gap in Packanack Mountain through which it now flows (Stanford, 1993). The deep scouring in the Pompton Plain lowland, the Towaco Valley, and western and northern parts of Fairfield lowland removed

During advance of the late Wisconsinan glacier, till was deposited discontinuously on the bedrock surface. It is thickest in the drumlin north of Lionhead Lake. It is also thick on some north-facing slopes in the Highlands and some northeast-facing slopes in the Passaic lowland. On these slopes, pressuremelting at the base of the glacier released more debris than in other locations. Till is also thick on most of the sandstone upland west and northwest of Packanack Lake, where it contributes to the streamlined form of some of the ridges. The late Wisconsinan till includes three varieties: a yellowish-brown to gray silty sand till (Netcong till, Qn, Qnu) derived mostly from the gneiss bedrock of the Highlands, a reddish-brown silty sand to sandy silt till (Rahway till, Qr) derived from red shale and sandstone bedrock, and a yellow to reddish-yellow sandy silt till (Rahway till, yellow phase, Qry) derived from basalt and weathered

all other evidence of the pre-Illinoian valley network.

Late Wisconsinan ice advanced to its southernmost position in the Passaic lowland at the terminal moraine at Madison, about 12 miles south of Fairfield. The ice front began to retreat from this position before 20,000 yrs B. P., and had likely retreated north of the quadrangle by 18,000 yrs B. P. The retreating ice margin maintained the lobate form established during advance, with the ice front in the Passaic lowland extending farther south than that in the Highlands (fig. 1). Recessional ice margins, which are marked by ice-contact glacial-lake deposits, trend northwest-southeast in the Passaic lowland and more westerly in the Highlands (fig. 1). The retreating ice margin dammed east- or north-draining valleys, including the main Passaic Valley, to form the glacial lakes in which most of the recessional deposits were laid down. Glacial-stream deposits were laid down in one valley after lakes drained. Details of the history of glacial lakes and glacial streams are provided in the following description of map units. Elevations of the Moggy Hollow and Great Notch stages are based on spillway altitudes and an uplift value of 2.1 feet per mile to the N21° E, from Stone and others (1989, 2002).

include sand and gravel laid down in deltas and lacustrine fans; and clay, silt, and fine sand laid down on lake-bottom plains and in the basal parts of deltas. Bedding in the deltas includes inclined foreset beds of sand, pebbly sand, and minor pebble-to-cobble gravel, overlain at the surface of some deltas by horizontal topset beds of sand and pebble-to-cobble gravel. Lacustrine fans contain gently dipping beds of sand and pebble-to-cobble gravel. Bedding in deltas and fans may be deformed locally by collapse, slumping, or shoving by glacial ice. Bedding in lake-bottom deposits is generally horizontal, laminated to thin-bedded, and undeformed. Nongravel sediment is yellowish-brown, very pale brown, and light gray. Sand consists chiefly of quartz, feldspar, mica, and fragments of gray gneiss, gray and red-brown sandstone and mudstone, and gray basalt. Gravel is chiefly white-to-gray gneiss and gray mudstone and sandstone, with some reddish-brown sandstone and conglomerate, purple quartzite, and

Glacial-Lake Deposits--These are stratified and generally well sorted. They

BUTLER DEPOSITS--Deltaic, lacustrine-fan, and ice-contact deposits laid down in three lake stages in the ice-dammed north-draining Stone House Brook valley and two unnamed north-draining valleys to the east of Stone House Brook. An initial spillway draining southward into the Rockaway basin at 680 feet (Qbu1) was succeeded by two lower spillways, first at 530 feet (Qbu2) and then at 410 feet (Qbu3), draining eastward into the Passaic lowland. The lowest lake drained when the Pequannock valley north of Riverdale was deglaciated. Drainage from lowering of the intermediate (Qbu2) to the low (Qbu3) stage cut across a lacustrine fan deposited in the Moggy Hollow stage of Lake Passaic south of Riverdale and redeposited the eroded sediment in a delta at the Great Notch stage. These relationships indicate the Great Notch was deglaciated at about the same time as the Qbu3 stage was established (fig. 1)

- Qbu3 Fine-to-coarse sand and pebble-to-cobble gravel. As much as 30 feet
- Pebble-to-cobble gravel, fine-to-coarse sand. Includes some poorly stratified deposits (referred to as diamicton) consisting of pebbles stratified deposits (referred to as diamicton) consisting of pebbles and cobbles and a few boulders embedded in clean, structureless to faintly layered fine-to-medium sand. These may be collapsed lacustrine-fan and deltaic deposits. As much as 120 feet thick.
- Pebble-to-cobble gravel, very fine-to-coarse sand. Includes cobble and boulder diamicton deposits as in unit Qbu2. As much as 100 feet
- MAPLE LAKE DEPOSIT--Deltaic (Qml) and ice-contact (Qmld) deposits laid down in a lake in the ice-dammed north-draining valley around Maple Lake (a quarter-mile north of the northwest corner of the quadrangle). Spillway (in the Boonton quadrangle) drained into the Stone House Brook valley at 730 feet.
- Qml Pebbly sand, fine-to-coarse sand. As much as 30 feet thick. Pebbles, cobbles, and some boulders in fine-to-medium sand. As much as 30 feet thick. These are collapsed lacustrine deposits as in

units Qbu1 and Qbu2.

- Qbr BUTLER RESERVOIR DEPOSIT--Pebble-to-cobble gravel and fine-to-coarse sand. As much as 20 feet thick. Deposited in three lake stages in the ice-dammed north-draining Stone House Brook valley. High and intermediate spillways were in the Boonton quadrangle, draining southward into the Rockaway Valley at 770 feet, then at 750 feet. Low spillway drained eastward into the Fayson Lakes valley at 700 feet. Deposits in the Pompton Plains quadrangle were laid down chiefly in the low stage.
- FAYSON LAKES DEPOSIT--Pebble-to-cobble gravel, pebbly sand, fine-to-coarse sand. As much as 110 feet thick. Deltaic and lacustrine-fan deposits laid down in the glacially scoured valley containing Fayson Lakes and Taylortown Reservoir. Spillway location is uncertain but may have been across till in the valley south of Taylortown Reservoir in the Boonton quadrangle, at an elevation of about 620 feet. The spillway has since been lowered by stream

GLACIAL LAKE PASSAIC DEPOSITS--Deltaic, lake-bottom, and lacustrinefan deposits laid down in three stages of glacial Lake Passaic. Lake Passaic filled the Passaic lowland between Second Watchung Mountain and the Highlands. The high, or Moggy Hollow, stage (Qpmd, Qpmf, Qpml) was controlled by a spillway at Moggy Hollow near Far Hills, 22 miles southwest of Fairfield. Elevation of the lake level at this stage in the Pompton Plains quadrangle was 380 to 395 feet. The Great Notch stage (Qpg) was established when the retreating ice front uncovered Great Notch, a gap in First Watchung Mountain 4 miles east of Fairfield. The Great Notch spillway is at an elevation of about 305 feet, and the elevation of the lake level at this stage in the Pompton Plains quadrangle ranges from 300 to about 315 feet. The Great Notch stage lowered to the Totowa stage when the north end of Garrett Mountain at Paterson, 6 miles northeast of Fairfield, was deglaciated.

The Totowa stage was dammed by a lacustrine-fan deposit in Totowa that clogged a narrow reach of the Passaic Valley (Stanford, 2003). The initial spillway across this dam was at an elevation of about 190-195 feet. Erosion lowered this spillway and eventually breached the dam. Elevation of the initial Totowa-stage lake level in the Pompton Plains quadrangle ranges from 185 to 200 feet. Units Qpp and Qrm1 were laid down in, or on grade to, the Totowa

- Deltaic deposits--Fine-to-coarse sand, pebbly sand, and silty fine sand overlain by pebble-to-cobble gravel. As much as 150 feet thick. Includes deltas deposited at Waha Lane near Lake Valhalla, near Jacksonville, and two small deltas near Riverdale, deposited in the Moggy Hollow stage of Lake Passaic.
- Notch and Totowa stages.
- Notch and Totowa stages.
- Includes a delta at Riverdale deposited by drainage from stage 3 of the Butler glacial lake, which eroded an adjacent deposit laid down in the Moggy Hollow stage.
- (Qppl) deposits laid down in, or graded to, the Totowa stage of Lake Passaic. Deposited from an ice margin just north of the quadrangle in the Wanaque quadrangle (Stanford, 1993).
- beds as much as 50 feet thick.
- Qrm1 RAMAPO DEPOSIT--Pebble gravel, pebbly sand, fine-to-coarse
- Qsp PRE-ADVANCE STRATIFIED DEPOSITS--Sand, pebble-tocobble gravel, minor silt and clay. As much as 40 feet thick. In subsurface only, beneath late Wisconsinan till in the southeast part of the Fairfield lowland and at the east base of Hook Mountain south of Horseneck Road (fig. 1, sections BB', DD'), and in isolated places elsewhere. These are lacustrine deposits laid down either during retreat of Illinoian ice or in front of advancing late Wisconsinan ice. During both times, with ice blocking the gaps through the Watchung Mountains at Paterson and Little Falls, a lake formed in the Passaic lowland, dammed by Illinoian deposits in the Short Hills gap (see discussion under "Glacial Deposits" above). These deposits fill the gap to an elevation between 150 and 200 feet (Stanford, 1991), which would provide a lake level at or above the highest elevation of unit Qsp in the Fairfield lowland and Hook
- (oxidized) to grayish-brown and brown (unoxidized) silty sand to Qnt sandy silt with many (10-40 percent by volume) subrounded to subangular pebbles and cobbles, and few (less than 5 percent) to some (5-10 percent) boulders. Depth of oxidation ranges from 10 to about 50 feet. Till matrix is generally compact, nonplastic, nonsticky, nonjointed, and may have subhorizontal fissility. As much as 80 feet thick. Gravel is chiefly gray-to-white gneiss and gray mudstone and sandstone, with a little purple-to-gray quartzite, and, in the Passaic lowland, red sandstone and conglomerate, and basalt. Boulders are chiefly gneiss and some purple conglomeratequartzite. Clast composition reflects southerly glacial transport from the Wallkill Valley and Green Pond Mountain belt, both underlain by Paleozoic sedimentary rock, and from the Proterozoic gneiss of the Highlands. Unit Qnt delineates areas where Qn is discontinuous and generally less than 20 feet thick.
- Qnu NETCONG TILL, UPLAND BASIN PHASE--Netcong till as above, but matrix is sandier and noncompact. As much as 100 feet thick. Forms ridge, knoll, basin, and bench topography in two valleys south of Fayson Lakes and a valley north of Turkey Mountain. The topographic form and loose matrix indicate that these deposits are superglacial till. They may have been laid down from masses of stagnant ice that became separated from the main glacier by bedrock ridges as the glacier surface melted down. Some of the deposits may have been laid down along active recessional
- RAHWAY TILL--Reddish-brown, light reddish-brown, reddishyellow silty sand to sandy silt containing some to many subrounded **Qrt** and subangular pebbles and cobbles and few subrounded boulders. Matrix is compact, nonsticky, nonplastic to slightly plastic, nonjointed, and may have subhorizontal fissility. Gravel clasts include chiefly red and gray sandstone and siltstone, gray gneiss, and a little white quartz, purple quartzite, and basalt. Boulders are chiefly gneiss; a very few are quartzite, gray and red sandstone, or basalt. As much as 30 feet thick. Unit Qrt delineates areas where Qr is discontinuous and generally less than 10 feet thick.

ice margins of the main glacier.

- Qry RAHWAY TILL, YELLOW PHASE--Reddish-yellow, yellow, very
- Qb BERGEN TILL--Reddish-brown to reddish-yellow sandy clayey silt to sandy clay. Gravel content and composition similar to Rahway till. Matrix is compact, moderately sticky and plastic, and weakly jointed. Gneiss, sandstone, and mudstone clasts have weathering rinds or are fully decomposed. As much as 20 feet thick. In subsurface only (section DD'). Inferred from water-well logs. Of

- Qpmf Lacustrine-fan deposits--Fine-to-coarse sand and pebble-to-cobble gravel; minor silt and very fine sand. As much as 200 feet thick. Deposited in the Moggy Hollow stage of Lake Passaic, except for fans in the subsurface in the northernmost part of the Pompton Plain lowland (section CC'), which may have been laid down in the Great
- **Lake-bottom deposits**--Silt, clay, very fine-to-fine sand. As much as 260 feet thick. Deposited chiefly during the Moggy Hollow stage. Uppermost parts may have been laid down in the Great
- **Deltaic deposit**--Fine-to-coarse sand as much as 60 feet thick overlain by pebble-to-cobble gravel as much as 10 feet thick.
- POMPTON PLAINS DEPOSIT--Deltaic and fluvial (Qpp) and lake-bottom
- Qpp Deltaic and fluvial deposits--Cobble gravel and pebble-to-cobble gravel to north, grading southward to pebble gravel, pebbly sand, fine-to-coarse sand, and silty fine sand. Deposit includes fluvial topset beds of gravel and pebbly sand as much as 30 feet thick overlying sand and silty fine sand in deltaic foreset and bottomset
- Lake-bottom deposits--Very fine-to-fine sand, silt, and clay. As much as 80 feet thick Days it. much as 80 feet thick. Deposit includes deltaic bottomset beds and lake-bottom sediment.
- sand, minor pebble-to-cobble gravel. As much as 50 feet thick (estimated). Includes fluvial and deltaic sediment as in unit Qpp laid down in Totowa stage of Lake Passaic. Deposited from an ice margin near Oakland, about 4 miles northeast of Riverdale.

Glacial Stream Deposits--These are stratified and generally well sorted sand and gravel forming a valley-bottom plain in the Pequannock Valley, which was exposed after Butler lake, stage 3 and the Totowa stage of Lake Passaic drained. Color and sand and gravel composition similar to that of glacial-lake deposits. Qpq PEQUANNOCK DEPOSIT--Cobble gravel, cobble-to-boulder

gravel, pebbly fine-to-coarse sand. As much as 20 feet thick.

Till--Poorly sorted, nonstratified sediment deposited directly by glacial ice or by sediment flows from glacial ice. Sediment is matrix-supported and is generally compact (except in unit Qnu) below the soil zone due to consolidation by the weight of overlying ice. The matrix may show a coarse subhorizontal platy structure. Five tills are distinguished on the basis of color, grain size, and age. The late Wisconsinan tills are in gradational contact with each other.

- NETCONG TILL--Yellow, yellowish-brown, very pale brown (oxidized) to gravish brown and the
- pale brown silty sand, sandy silt, and sandy clayey silt with some to Qryt many subangular and subrounded pebbles and cobbles and few subrounded boulders. Matrix is compact, nonsticky to slightly sticky, slightly plastic, nonjointed, and may have subhorizontal fissility. Gravel clasts include chiefly gray (weathering reddishyellow) basalt and gray gneiss, with some gray and red sandstone and siltstone, and purple quartzite. Boulders are chiefly gneiss and basalt, fewer are quartzite and sandstone. As much as 150 feet thick on south side of east end of Hook Mountain but generally less than 50 feet thick elsewhere. Unit Qryt delineates areas where Qry is discontinuous and generally less than 20 feet thick. On steep slopes on Hook Mountain, Packanack Mountain, and Second Watchung Mountain, Qryt includes thin rubbles of angular basalt cobbles and flagstones with little or no till cover. These rubbles were formed by both postglacial mechanical weathering and glacial deformation of finely jointed basalt.
- pre-Wisconsinan (probable Illinoian) age.

- water or removed by excavation. **Drumlin-**Line along crest, symbol on summit.
 - Striation-Observation at dot. Single flag indicates striation from Stone and others (2002), double flag indicates striation from N. J. Geological Survey permanent note 25-5-149, location

Contact--Long-dashed where approximately located, short-dashed

where gradational or featheredged, dotted where concealed by

MAP SYMBOLS

- approximate Meltwater channel--Line in base of channel, arrow indicates flow
- Scarp cut by glacial meltwater--Line at top, ticks on slope. Scarp cut by postglacial stream--Line at top, ticks on slope.
- Excavation perimeter--Outlines quarries and former sand and gravel pits. Topography within these areas may differ from that on the base map.
- **Active quarry** (in 2006)
- **✓ Inactive quarry** (in 2006) X Inactive sand and gravel pit (in 2006)

and others (1993).

- Spillway for glacial lake--Symbol in spillway area. Arrow
- indicates direction of drainage, lettering indicates associated • 401 Well with log in table 1--Location accurate within 100 feet.
- 388 Well with log in table 1--Location accurate within 500 feet.
- e70 Elevation of bedrock surface from seismic survey--From Lacombe and Duran (1988).
- -30\(\triangle \) Elevation of bedrock surface from seismic survey--From Nichols (1968).

□138 Elevation of bedrock surface from seismic survey--From Canace

▲-24 Elevation of bedrock surface from seismic or resistivity survey--From Hoffman and others (in review). ≥ 26-1-282 Elevation of bedrock surface in well or boring--From N. J.

Geological Survey permanent notes. Upper number is N. J. Atlas

Sheet coordinate of note, lower number is elevation of bedrock

Elevation of bedrock surface in well or boring--From Nichols (1968). Shown only where other data are sparse.

Large gneiss boulder--Noteworthy erratic boulder or group of

- \triangle 30 Site of pebble lithology count--Data in table 2.
- <u>-150</u> Elevation of bedrock surface--Contour interval 50 feet. Shown only where depth to bedrock generally exceeds 20 feet. Bedrock outcrop--Surficial material generally absent. Many small outcrops within units Qnt and Qryt are not shown.

Well on sections--Some wells are projected to line of section.

- Depths of contacts in these wells may differ from those on the section owing to projection. Body of water--Conceals geologic units.
- (Qal)/Qpp Unit in parentheses formerly present--Removed by excavation, exposing unit to right of parentheses.
- Esker--Ridge of gravel deposited in subglacial tunnel. Arrows
- point in direction of meltwater flow. Bedrock ridge--Line along crest. Low ridge or scarp formed on
- weathered conglomerate bedrock. Surficial deposits thin or absent. Fluvial channel--Line in center of overflow channel or
- abandoned meander on modern floodplain. Fluvial channel--Line in center of active overflow channel cut into stream terrace, arrow shows drainage direction.
- Boulder lag--Surface concentration of boulders formed by water washing the underlying till. Thermokarst basin--Line on rim, pattern within basin. Formed
- from melting of ground ice. Some may be of eolian origin. **Topographic features of ice-contact deposits**
- Glacial ridge--Line along crest of ridge of glacial sediment.
- Asymmetric glacial ridge--Line along crest, barbs on gentle
- Glacial knoll--Symbol on summit, line at base. **Kettle hole**--Line on rim, lettering in basin.

REFERENCES

Canace, Robert, Stanford, S. D., Hall, D. W., 1993, Hydrogeologic framework of the middle and lower Rockaway River basin, Morris County, New Jersey: N. J. Geological Survey Geologic Report Series GSR 33, 68 p. Hoffman, J. L., Hall, D. W., Stanford, S. D., Ghatge, S. L., Stone, B. D., in review, Hydrogeology of the central Passaic River basin, New Jersey: N. J. Geological Survey Open-File Report. Lacombe, P., and Duran, P. B., 1988, Map of bedrock-surface topography in parts of the Paterson and Pompton Plains quadrangles, New Jersey: U. S. Geological Survey Water-Resources Investigations Report 88-4061, 1 map sheet, scale

Mennel, W. J., and Canace, Robert, 2002, New Jersey Geological Survey hydro

database: N. J. Geological Survey Digital Geodata Series DGS 02-1, www.state.nj.us/dep/njgs/geodata/dgs02-1.zip Nichols, W. D., 1968, Bedrock topography of eastern Morris and western Essex counties, New Jersey: U. S. Geological Survey Miscellaneous Investigations Series Map I-549, scale 1:24,000. Stanford, S. D., 1991, Surficial geology of the Roselle quadrangle, Union, Essex, and Morris counties, New Jersey: N. J. Geological Survey Open File Map 8, scale 1:24,000. Stanford, S. D., 1993, Surficial geologic map of the Wanaque quadrangle, Bergen, Morris, and Passaic counties, New Jersey: N. J. Geological Survey Geologic Map Series 93-1, scale 1:24,000 Stanford, S. D., 2000, Glacial aquifers of New Jersey, in Harper, D. P., and Goldstein, F. R., eds., Glacial geology of New Jersey: field guide and proceedings for the seventeenth annual meeting of the Geological Association of New Jersey: Trenton, N. J., Geological Association of New Jersey, p. IV.1-

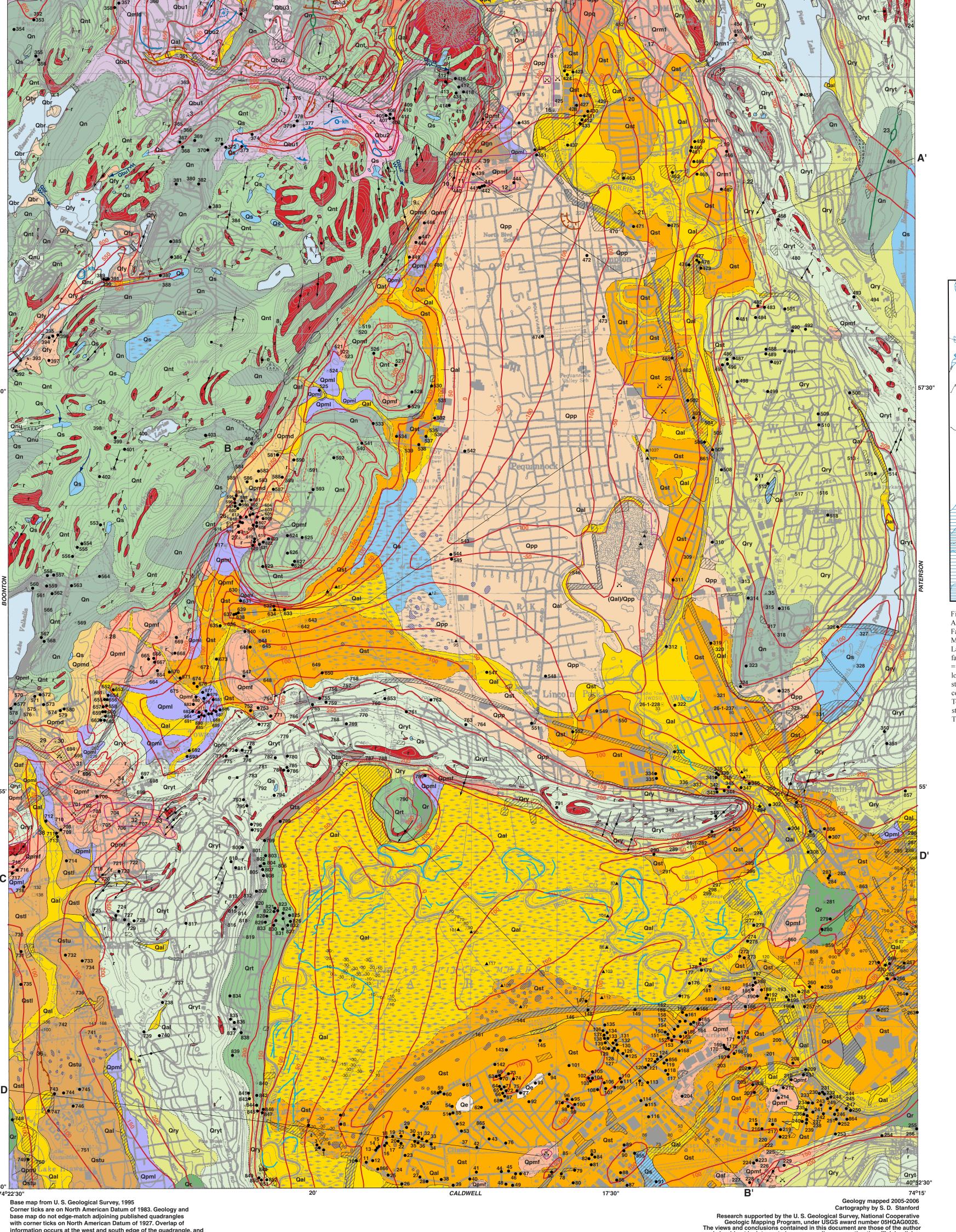
Stanford, S. D., 2003, Surficial geology of the Paterson quadrangle, Passaic, Bergen, and Essex counties, New Jersey: N. J. Geological Survey Open File Map 54, scale 1:24,000. tanford, S. D., 2005, Surficial geology of the Caldwell quadrangle, Essex and Morris counties, New Jersey: N. J. Geological Survey Open File Map 66, scale Stone, B. D., Reimer, G. E., and Pardi, R. R., 1989, Revised stratigraphy and history of glacial Lake Passaic, New Jersey: Geological Society of America Abstracts with Programs, v. 21, p. 69. Stone, B. D., Stanford, S. D., and Witte, R. W., 2002, Surficial geologic map of

Map I-2540-C, scale 1:100,000.

northern New Jersey: U. S. Geological Survey Miscellaneous Investigations

a gap of information occurs at the east and north edge.

Bedrock



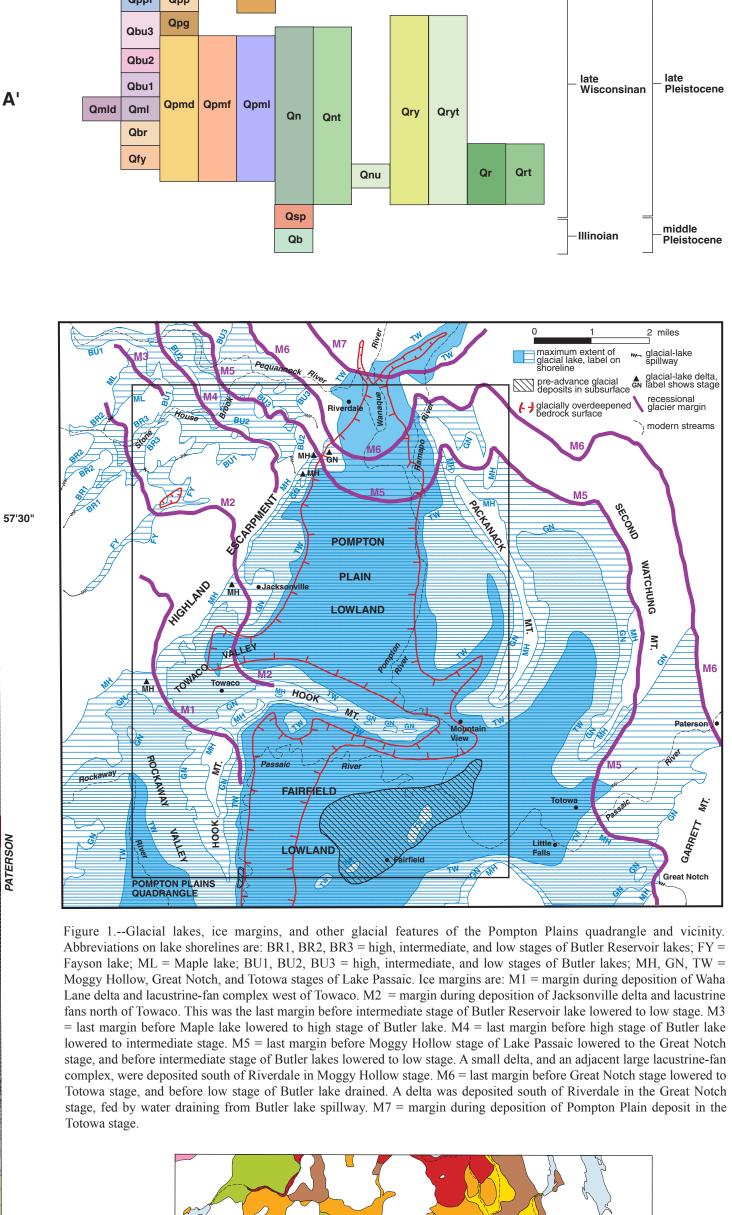
SURFICIAL GEOLOGY OF THE

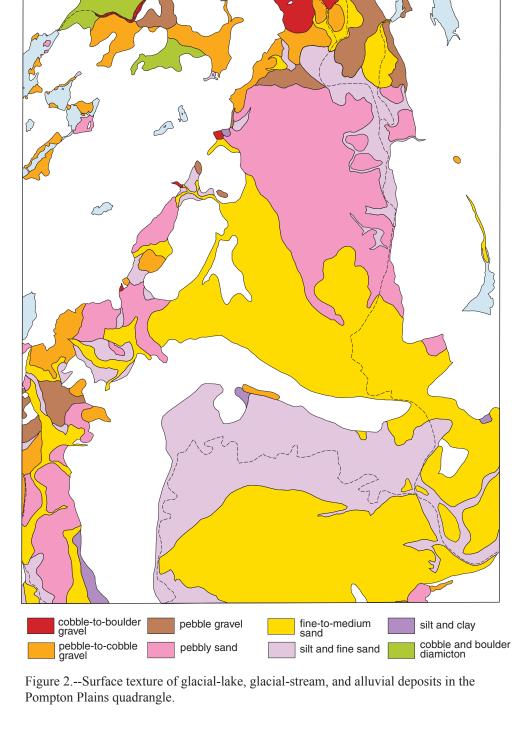
POMPTON PLAINS QUADRANGLE

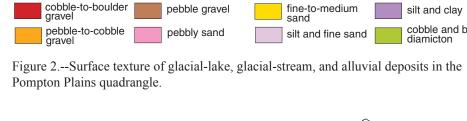
MORRIS, PASSAIC, ESSEX, AND BERGEN COUNTIES, NEW JERSEY

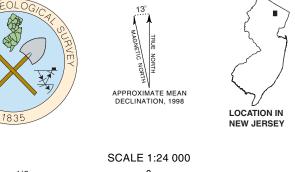
Scott D. Stanford

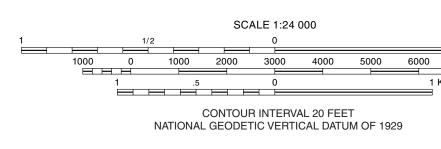
VERTICAL EXAGGERATION 10X

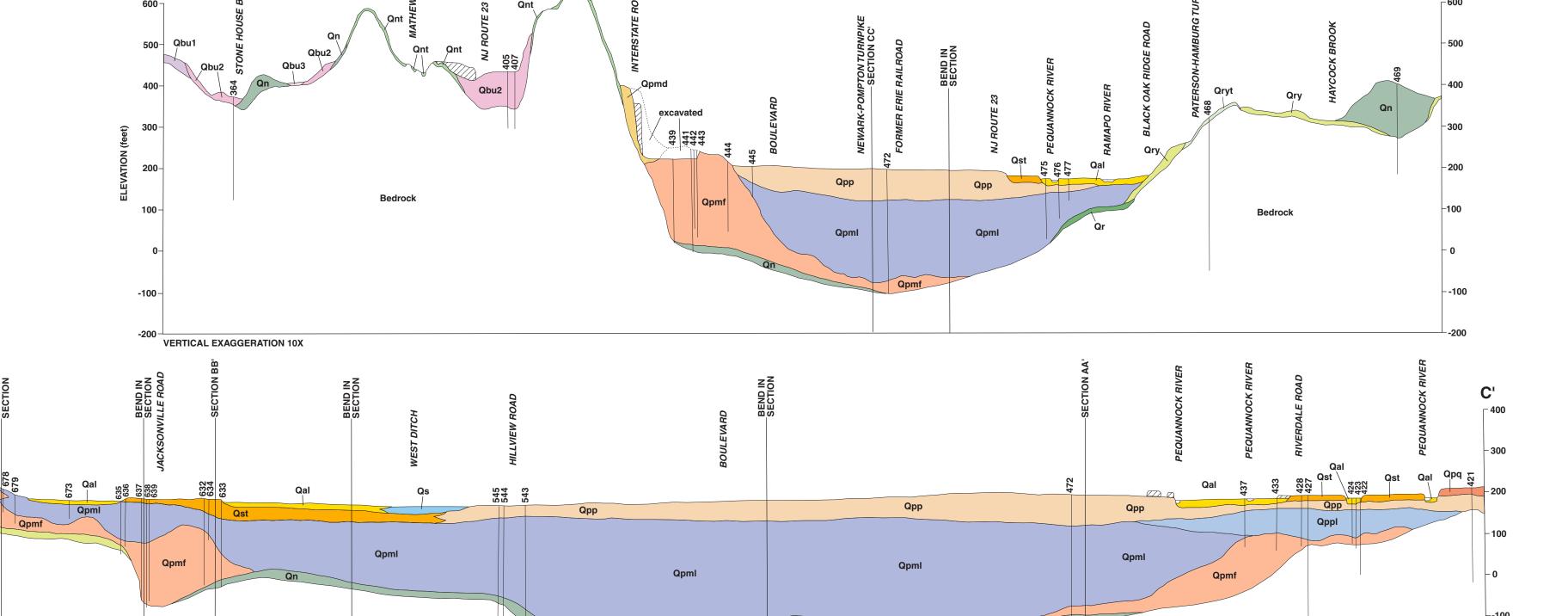


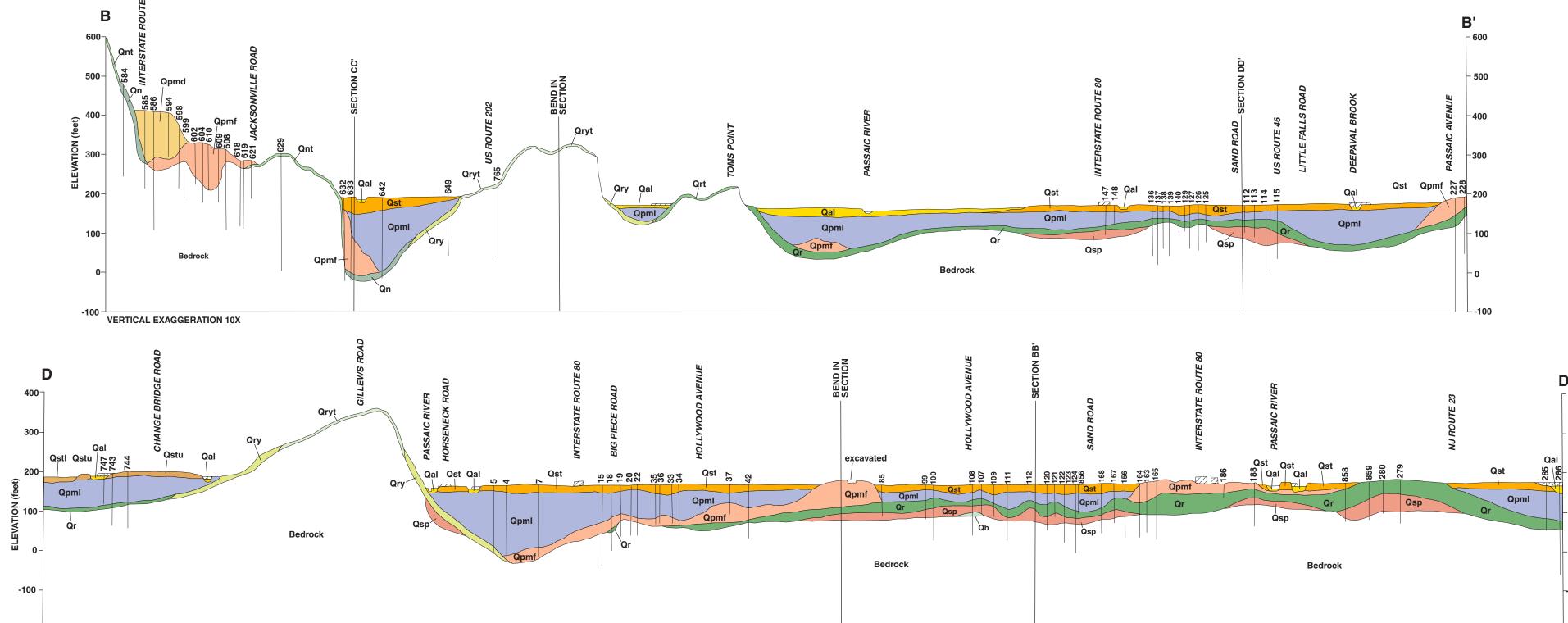












and should not be interpreted as necessarily representing the official policies either expressed or implied, of the U. S. Government

Surficial Geology of the Pompton Plains Quadrangle Morris, Passaic, Essex, and Bergen Counties, New Jersey

New Jersey Geological Survey Open-File Map 68 2007

pamphlet to accompany map

Table 1.--Selected well and boring records.

Well	Identifier ¹	Depth to be	edrock or driller's log with depth and description ²
1	26-4595	0-18 18-177 177-198 198-245	sandy (Qst) clay (Qpml) hardpan and stones (Qr) red shale
2	26-4490	0-3 3-21 21-167 167-173 173-178 Cased to 1	fill sandy (Qst) clay (Qpml) hardpan and stones (Qr or Qpmf) sand and gravel (Qpmf) 78, yield 30 gpm
3	26-11469	0-18 18-179 179-190 190-235	sandy (Qst) clay (Qpml) water-bearing silty sand and gravel (Qpmf) red shale
4	26-51898	0-20 20-180 180-190 Cased to 1	fine sand (Qst) gray clay (Qpml) sand and gravel (Qpmf) 90, yield 15 gpm
5	25-13645	0-5 5-20 20-25 25-150 150-160 160-173	yellow clayey sand (Qst) gray clayey silt (Qst) gray clayey sand (Qst) gray clay and silt, clay becoming very plastic (Qpml) gray clay, very fine sand and pebbles (Qr or Qpmf) red shale
6	26-1022	0-175 175-214	sand, clay (Qst over Qpml) red rock
7	26-3781	0-16 16-155 155-175 Cased to 1	sandy (Qst) clay (Qpml) heaving water-bearing sand and gravel (Qpmf) 75, yield 15 gpm
8	25-44425	0-70 70-122 122-201 201-223	sand (Qst over Qpml) silt (Qpml) red shale trap rock
9	26-4709	0-21 21-145 145-165 165-171 171-210	sandy (Qst) clay (Qpml) silty sand (Qpmf) hardpan and stones (Qr) red shale
10	DOT L-21	abbreviated	i

		0-18 18-38 38-93 93-97 97-105	brown and gray sand and gravel (Qst) fine gray sand, trace silt (Qst) layers of clay and silt, trace fine sand (Qpml) fine-to-coarse gray sand, trace gravel (Qpmf) fine brown sand, trace silt (Qpmf)
11	26-4015	0-19 19-108 108-135 135-148 148-155 Cased to 1	sandy (Qst) clay (Qpml) heaving sand (Qpmf) hardpan (Qr) water-bearing sand and gravel (Qsp) 155, yield 15 gpm
12	26-2192	0-19 19-93 93-109 109-140 140-207	sand (Qst) clay (Qpml) silty water-bearing sand (Qpmf) hardpan and stones (Qr) red and gray shale
13	26-4582	0-17 17-108 108-119 119-125 Cased to	sandy (Qst) clay (Qpml) hardpan and stones (Qr) water-bearing sand and gravel (Qsp) 125, yield 20 gpm
14	26-4178	0-23 23-98 98-136 136-148 148-153	sand (Qst) clay (Qpml) hardpan and stones (Qr) silty sand and gravel (Qsp) gray shale
15	26-2110	0-21 21-93 93-136 136-201	sand (Qst) clay (Qpml) water-bearing silty sand (Qpmf) red and gray shale
16	25-31582	95	
17	26-4222	0-18 18-84 84-96 Cased to 9	sand (Qst) clay (Qpml) water-bearing sand and gravel (Qpmf) 26, yield 25 gpm
18	26-4202	0-18 18-97 97-109 109-119 119-165	sandy (Qst) clay (Qpml) silty water-bearing sand (Qpmf) hardpan and stones (Qr) red shale
19	26-2243	0-5 5-75 75-85 85-129	sand (Qst) clay (Qpml) sand (Qpmf) shale
20	26-2423	0-7 7-77 77-87 87-127	sand (Qst) clay sand (Qpmf) shale
21	26-2424	0-10 10-80 80-95 95-130	sand (Qst) clay (Qpml) sand (Qpmf) shale
22	26-2422	0-10 10-85 85-95 95-125	sand (Qst) clay (Qpml) sand (Qpmf) shale
23	26-2727	0-15	sand (Qst)

		15-90 90-108	clay (Qpml) sand (Qpmf)
		Cased to	108, yield 20 gpm
24	26-2662	0-10 10-80 80-115	sand (Qst) clay (Qpml) sand (Qpmf)
		115-138	shale
25	26-4338	0-24	sandy (Qst)
		24-96 96-114	clay (Qpml) silty water-bearing sand and gravel (Qpmf)
		114-126 126-132	clay (Qpml) water-bearing sand and gravel (Qpmf)
		Cased to	132, yield 20 gpm
26	26-2760	0-10	sand (Qst)
		10-60 60-90	clay (Qpml) sand (Qpmf)
		90-130	shale
27	26-2943	0-2	fill
		2-21 21-52	sandy (Qst) clay (Qpml)
		52-78	hardpan and stones (Qr)
		78-89	water-bearing silty sand and gravel (Qsp)
		89-92	red shale
28	26-4231	0-23	sandy (Qst)
		23-38 38-74	silt (Qpml)
		74-94	clay (Qpml) hardpan and stones (Qr)
		94-131	gray and red shale
29	26-4462	0-18	sandy (Qst)
		18-78	clay (Qpml)
		78-84 84-90	hardpan and stones (Qr) water-bearing sand and gravel (Qsp)
			90, yield 30 gpm
30	26-2342A	0-19	sandy (Qst)
		19-78	clay (Qpml)
		78-97	hardpan and stones (Qr)
		97-147 147-161	gray shale red shale
31	26-4216	0-21	candy (Oct)
31	204210	21-97	sandy (Qst) clay (Qpml)
		97-108	water-bearing sand (Qpmf)
		108-136	red shale
32	26-4350	0-19	sandy (Qst)
		19-83 83-89	clay (Qpml) hardpan and stones (Qr)
		89-96	silty sand and gravel (Qsp)
		96-151	gray and red shale
33	26-4305	0-29	sandy (Qst)
		29-81 81-95	clay (Qpml)
			water-bearing sand and gravel (Qpmf) 95, yield 7 gpm
34	26-2515	0-5	sand (Qst)
	- -	5-90	clay (Qpml)
		90-102	sand (Qpmf)
		Cased to	102, yield 9 gpm
35	26-2624	0-21 21-81	sandy (Qst) clay (Qpml)
		81-91	hardpan and stones (Qr)

		91-97 water-bearing sand and gravel (Qsp) Cased to 97, yield 15 gpm	
36	26-2623	0-21 sandy (Qst) 21-73 clay (Qpml) 73-89 hardpan and stones (Qr) 89-90 water-bearing sand and gravel (Qpmf)	
		Cased to 90, yield 9 gpm	
37	26-3082	0-21 sandy (Qst) 21-39 clay (Qpml) 39-56 hardpan and stones (Qr) 56-67 water-bearing silty sand (Qsp) 67-72 water-bearing sand and gravel (Qsp) Cased to 72, yield 20 gpm	
38	26-2238	0-21 sand (Qst) 21-48 clay (Qpml) 48-87 hardpan (Qr) 87-96 gray slate	
39	26-2556	0-20 sand (Qst) 20-40 clay (Qpml) 40-80 hardpan (Qr) 80-140 red sandstone	
40	26-4040	0-12 sandy (Qst)	
40	20-4040	12-22 clay (Qpml)	
		hardpan and stones (Qr)	
		41-63 silty heaving water-bearing sand (Qsp) 63-66 choice water-bearing sand and gravel (Qsp)	
		Cased to 66, yield 42 gpm	
41	26-2987	0-16 sandy (Qst)	
		16-29 clay (Qpml)	
		29-37 hardpan with some large boulders (Qr) 37-58 silty water-bearing sand (Qsp)	
		58-66 clay (Qsp)	
		66-85 water-bearing sand and gravel (Qsp)	
		At 85 shale Cased to 85, yield 15 gpm	
42	26-2788	0-11 sandy (Qst)	
		11-58 clay (Qpml)	
		58-88 silty water-bearing sand and gravel, some boulders at 82 (Qpn	nf)
		88-95 hardpan (Qr) 95-138 red shale	
43	26-4413	0-40 existing well	
43	20-4413	40-55 water-bearing sand and gravel (Qpmf)	
		55-79 hardpan (Qr)	
		79-86 water-bearing sand and gravel (Qsp) Cased to 86, yield 15 gpm	
44	26-4246	0-64 hardpan and stones (Qst over Qr)	
		64-79 heaving sand (Qsp)	
		79-82 choice water-bearing sand and gravel (Qpmf) Cased to 82, yield 10 gpm	
4.5			
45	26-4557	0-19 sandy (Qst) 19-157 clay (Qpml)	
		157-173 silty sand (Qpmf)	
		173-176 water-bearing sand and gravel (Qpmf) Cased to 176, yield 30 gpm	
	26.441=		
46	26-4417	0-18 sandy (Qst) 18-72 hardpan and stones (Qr)	
		72-82 water-bearing sand and gravel (Qsp)	
		Cased to 82, yield 20 gpm	

47	26-13734	0-54 54-90 90-122	gravel, sand (Qpmf) red clay (Qpml and Qr) shale
48	26-2618	0-2 2-18 18-44 44-81 81-85 Cased to 8	fill clay (Qpml) hardpan and stones (Qr) heaving sand and gravel (Qsp) water-bearing sand and gravel (Qsp) 5, yield 30 gpm
49	26-2616	0-3 3-9 9-16 16-42 42-71 71-76 76-82 Cased to 8	fill sandy (Qst) clay (Qpml) hardpan with some boulders (Qr) silty sand (Qsp) hardpan (Qsp or Qb) water-bearing sand and gravel (Qsp) 2, yield 30 gpm
50	26-2453	0-14 14-19 19-41 41-61 61-69 69-85	sand (Qst) clay (Qpml) hardpan (Qr) water-bearing silty sand (Qsp) hardpan (Qb) red shale
51	26-1915	0-24 24-79 79-90 At 90 Cased to 9	sand (Qst) clay (Qpml) water-bearing very silty sand (Qpmf) water-bearing sand and gravel 0, yield 9 gpm
52	26-4373A	0-27 27-54 54-78 78-105 105-113 Cased to 1	sandy (Qst) clay (Qpml) hardpan and stones (Qr) silty sand (Qsp) water-bearing sand and gravel (Qsp) 13, yield 15 gpm
53	25-4518	0-110 110-250	sand, loam red shale
54	26-6146	0-24 24-63 63-79 79-87 87-150	silty fine sand and gravel with some clay (Qst) gray clay (Qpml) water-bearing very fine sand and gravel (Qpmf) hardpan and stones (Qr) red and gray shale
55	26-4950	0-13 13-33 33-71 71-81 81-107 107-181	brown sand (Qst) water-bearing gray sand (Qst) gray clay (Qpml) water-bearing silty fine sand with some gravel (Qpmf) water-bearing sand and gravel (Qpmf) brown, gray, red shale
56	26-4185	0-19 19-69 69-80 80-83 Cased to 8	sandy (Qst) clay (Qpml) hardpan and stones (Qr) water-bearing sand and gravel (Qsp) 3, yield 6.5 gpm
57	26-4497	0-21 21-74 74-96 96-155	sandy (Qst) clay (Qpml) hardpan (Qr) gray and red shale
58	26-2747	0-87 Cased to 8	sand (Qst over Qpml over Qpmf) 7, yield 15 gpm

59	26-4215	0-16 16-54 54-71 71-77 Cased to 7	clay and sand (Qst) clay (Qpml) hardpan and stones (Qr) water-bearing gravel (Qsp) 77, yield 30 gpm	
60	26-4280	0-3 3-16 16-86 86-92 Cased to 9	fill sandy (Qst) clay (Qpml) water-bearing sand and gravel (Qpmf) 92, yield 10 gpm	
61	26-4121	0-18 18-70 70-76 76-81 81-84 84-200	sand (Qst) gray clay (Qpml) hardpan (Qr) red hardpan (Qr) red sand (Qsp) red and gray shale	
62	26-4840	0-21 21-71 71-117 117-171	sand and gravel (Qst) hardpan with some large stones (Qr) water-bearing sand and gravel with lenses of very fine sand (Qs red and gray shale	p)
63	26-2210	0-10 10-40 40-60 60-120	sand (Qst) clay (Qpml) sand (Qpmf) shale	
64	26-2318	0-10 10-40 40-75 Cased to 7	sand (Qst) clay (Qpml) sand (Qpmf) 75, yield 20 gpm	
65	26-2317	0-10 10-40 40-80 80-125	sand (Qst) clay (Qpml) sand (Qpmf) shale	
66	26-2254	0-10 10-50 50-91 Cased to 9	sand (Qst) clay (Qpml) sand and gravel (Qpmf) 01, yield 15 gpm	
67	26-2390	0-10 10-50 50-80 80-121	sand (Qst) clay (Qpml) sand (Qpmf) shale	
68	26-4146	0-21 21-58 58-81 81-90 90-136	hardpan and stones (Qst) clay (Qpml) hardpan and stones (Qr) silty sand and gravel (Qsp) red shale	
69	26-2257	0-10 10-40 40-70 70-122	sand (Qst) clay (Qpml) sand (Qpmf) shale	
70	26-2255	0-10 10-40 40-80 80-118	sand (Qst) clay (Qpml) sand (Qpmf) shale	
71	26-2272	0-10 10-40 40-80 80-125	sand (Qst) clay (Qpml) sand (Qpmf) shale	

72	26-2282	0-10 10-50 50-70 70-121	sand (Qst) clay (Qpml) sand (Qpmf) shale
73	26-2157	0-10 10-40 40-70 70-125	sand (Qst) clay (Qpml) sand (Qpmf) shale
74	26-2103	0-30 30-70 70-115	clay (Qpml) sand (Qpmf) shale
75	26-2158	0-40 40-70 70-122	sand (Qst) clay (Qpml) shale
76	26-5869	0-31 31-44 44-54 54-71 71-80 Cased to	existing well water-bearing sand and gravel (Qpmf) hardpan and stones (Qr) clay and some large boulders (Qr or Qsp) water-bearing sand and gravel (Qsp) 80, yield 6 gpm
77	26-2875	0-15 15-41 41-48 48-57 57-62 Cased to	dug well (Qe and Qst) hardpan with stones (Qr) clay (Qsp) hardpan and stones (Qsp or Qb) water-bearing sand and gravel (Qsp) 62, yield 15 gpm
78	26-4165	0-16 16-47 47-69 69-86 86-136	sandy (Qst) clay (Qpml) hardpan and stones (Qr) silty sand and gravel (Qsp) red shale and sandstone
79	26-2763	0-21 21-49 49-67 67-84 84-126	sandy (Qst) clay (Qpml) hardpan and stones (Qr) silty sand and gravel (Qsp) red shale
80	26-2307	0-21 21-32 32-74 74-89 89-140	sand (Qst) clay (Qpml) hardpan and large stones (Qr) silty sand and gravel (Qsp) red and gray shale
81	26-2064	0-18 18-31 31-84 84-179	sand (Qst) clay (Qpml) hardpan and large stones (Qr) red and gray shale
82	26-2526	0-10 10-60 60-80 80-152	sand (Qst) clay and hardpan (Qpml over Qr) sand (Qsp) shale
83	26-2527	0-10 10-50 50-80 80-150	sand (Qst) clay (Qpml) sand (Qpmf) shale
84	26-4024	0-17 17-58 58-67 67-84 84-147	sandy (Qst) clay (Qpml) hardpan and stones (Qr) silty water-bearing sand (Qsp) gray and red shale

85	26-4435	0-4	fill
		4-17	sandy (Qst)
		17-36	clay (Qpml)
		36-63	hardpan and stones (Qr)
		63-78	water-bearing sand and gravel (Qsp)
		Cased to	78, yield 30 gpm
86	25-17986	0-14	sandy (Qst)
		14-31	clay (Qpml)
		31-69 69-145	hardpan, stones, boulders (Qr) red shale
			ieu shale
87	26-2968	0-18	sand (Qst)
		18-50	clay (Qpml)
		50-85 85-235	hardpan (Qr) red rock
88	26-24514	abbreviate	
		0-13	sand (Qst)
		13-37 At 37	gray clay (Qpml) basalt bedrock
		At 37	Dasait Dediock
89	26-820	0-80	clay, hardpan and boulders (Qpml over Qr)
		80-185	red rock
90	26-2940	0-35	yellow sand and clay over gray clay (Qst over Qpml)
		35-49	gravel with clay and sand mixed (Qpmf)
		49-66	yellow and red hardpan (Qr)
		66-279	red and gray shale
91	ACE FL-10	abbreviate	rd
	11021210	0-3	sand (Qst)
		3-12	silty sand (Qst)
		12-20	clay (Qpml)
92	26-5357	0-22	existing well
		22-38	sand and gravel with some large boulders (Qpmf)
		38-86	hardpan and stones (Qr)
		86-102	water-bearing heaving silty sand and gravel (Qsp)
		102-138	red shale
93	26-5444	0-28	existing well
		28-34	brown sand and gravel (Qpmf)
		34-57	brown hardpan, stones, some large boulders (Qr)
		57-63	gray clay (Qsp)
		63-68	water-bearing sand and gravel (Qsp)
94	26-1680	0-14	sand (Qst)
		14-35	clay (Qpml)
		35-45 45-NR	boulders (Qr) sand and gravel (Qsp)
		45-NK NR-150	brownstone
			115, assumed depth to rock
0.5	26.2451		1.00
95	26-2451	0-9 9-27	sand (Qst) clay (Qpml)
		27-51	hardpan (Qr)
		51-69	silty water-bearing sand (Qsp)
		69-74	hardpan (Qb?)
		74-80	red shale
96	26-2482	0-2	fill
, 0	20 2702	2-16	clayey sand (Qst)
		16-33	clay (Qpml)
		33-62	hardpan (Qr)
		62-78	water-bearing sand (Qsp)
		78-85	shale
97	26-2486	0-17	sandy (Qst)

		17-31 31-52 52-58	clay (Qpml) hardpan (Qr) silty water-bearing sand (Qsp)
		58-84	shale
98	26-2448	0-4 4-34	sand (Qst) clay (Qpml)
		34-58	hardpan and stones (Qr)
		58-67 67-75	silty sand (Qsp) shale
99	26-2432	0-11 11-19	sandy (Qst)
		11-19	clay (Qpml) silty sand, some stones (Qpmf or Qr)
		54-67 67-81	hardpan (Qr) shale
100	26-2452	0-51	hardpan and large boulders (Qr)
		51-77	water-bearing silty sand (Qsp)
		77-135	red shale
101	26-4138	abbreviated	
		0-60 60-113	hardpan and boulders (Qr) very fine-to-coarse sand (Qsp)
		116-225	red sandstone
102	26-2288	0-21	sand (Qst)
		21-31	clay (Qpml)
		31-52 52-69	hardpan and very large boulders (Qr) water-bearing silty sand and gravel (Qsp)
		69-75	red rock
103	26-2286	0-2	fill
		2-16	black muck
		16-19 19-27	sand (Qst) clay (Qpml)
		27-43	hardpan and boulders (Qr)
		43-50 Cased to 50	water-bearing sand and gravel (Qsp)), yield 25 gpm
104	26-2260	0-8	black muck
		8-18	sand (Qst)
		18-31	clay (Qpml)
		31-69 69-141	hardpan and stones (Qr) red shale
105	26-4229	0-18	sand (Qst)
		18-54	gray clay (Qpml)
		54-78 78-200	hardpan and very bad boulders (Qr) red sandstone
106	26-1937	0-21	sand (Qst)
		21-33 33-61	clay (Qpml) water-bearing silty sand and gravel (Qpmf)
		61-140	red rock
107	26-2955	0-8	sandy (Qst)
		8-31 31-49	clay (Qpml) hardpan and stones (Qr)
		49-58	silty water-bearing sand (Qsp)
		58-80	red shale
108	26-4200	0-5	fill and meadow mat
		5-20 20-35	sand (Qst) boulders and clay (Qr)
		35-65	dirty sand (Qsp)
		65-80	red hardpan (Qb)
		80-124	red sandstone

109	26-2764	0-25 25-40 40-74 Cased to 7	sand (Qst) clay (Qpml) sand (Qpmf) '4, yield 15 gpm
110	26-2645	0-21 21-33 33-46 46-57 57-130	sandy (Qst) clay (Qpml) hardpan and stones (Qr) fine sand and gravel (Qsp) red shale
111	26-2930	0-15 15-60 60-90 90-140	sand (Qst) gray clay (Qpml) boulders and hardpan (Qr) red rock
112	26-4203	0-16 16-34 34-51 51-59 59-62 Cased to 6	sandy (Qst) clay (Qpml) hardpan and stones (Qr) silty heaving sand and gravel (Qsp) water-bearing sand and gravel (Qsp) i2, yield 18 gpm
113	26-4928	0-19 19-37 37-60 60-74 74-80	sandy (Qst) gray clay (Qpml) hardpan and stones (Qr) water-bearing silty sand with some stones and gravel (Qsp) water-bearing sand and gravel
114	26-4221	0-18 18-33 33-58 58-109 109-172	sandy (Qst) clay (Qpml) hardpan, stones, and boulders (Qr) silty sand and gravel (Qsp) red shale
115	26-4306	0-4 4-19 19-64 64-94 94-135	fill sandy (Qst) clay (Qpml) hardpan and stones (Qr) red shale
116	26-2600	0-40 40-90 90-135	hardpan (Qr) sand (Qsp) shale
117	26-2632	0-20 20-50 50-114 Cased to 1	sand (Qst) clay (Qpml) sand (Qpmf) 14, yield 8 gpm
118	26-2694	0-20 20-40 40-110 110-160	sand (Qst) clay (Qpml) sand (Qpmf) shale
119	26-2631	0-25 25-45 45-74 Cased to 7	sand (Qst) clay (Qpml) sand (Qpmf) 4, yield 15 gpm
120	26-2740	0-21 21-51 51-88 88-94 94-110	sandy (Qst) clay (Qpml) hardpan and stones (Qr) silty water-bearing sand and gravel (Qsp) red shale
121	26-2004	0-24 24-31 31-57 57-74	sand (Qst) clay (Qpml) hardpan (Qr) water-bearing silty sand (Qsp)

		74-76 Cased to	water-bearing sand and gravel (Qsp) 76, yield 12 gpm
122	26-2741	0-21 21-54 54-99 99-145	sandy (Qst) clay ((Qpml) hardpan and stones (Qr) red shale
123	26-2739	0-21	sandy (Qst)
		21-54	clay (Qpml)
		54-84 84-91	hardpan and stones (Qr) water-bearing silty sand and gravel (Qsp)
		91-98	red shale
124	26-2738	0-21	sandy (Qst)
		21-56 56-99	clay (Qpml) hardpan with some large stones (Qr)
		99-172	red and gray shale
125	26-1973	0-26	sand (Qst)
		26-34	clay (Qpml)
		34-46 46-92	hardpan (Qr) red rock
126	26-1971	0-21	sand (Qst)
		21-35	clay (Qpml)
		35-46	hardpan (Qr)
		46-115	red rock
127	26-2003	0-19	sand (Qst)
		19-34 34-58	clay (Qpml) hardpan (Qr)
		58-110	red shale
128	26-2047	0-19	sand (Qst)
		19-41	clay (Qpml)
		41-58 58-63	hardpan (Qr) red shale
129	26-2107	0-27	sand (Qst)
		27-43	clay (Qpml)
		43-51 51-61	hardpan (Qr) red rock
120	26.2048		
130	26-2048	0-13 13-39	sand (Qst) clay (Qpml)
		39-60	hardpan (Qr)
		60-65	shale
131	26-2109	0-27	sand (Qst)
		27-47 47-51	clay (Qpml) hardpan (Qr)
		51-61	red rock
132	26-2108	0-27	sand (Qst)
		27-46 46-53	clay (Qpml)
		53-62	hardpan (Qr) red rock
133	26-2146	0-17	sand (Qst)
		17-29	clay (Qpml)
		29-49 49-108	hardpan and large stones (Qr) red shale
134	26-2147	0-3	fill
- •		3-11	sand (Qst)
		11-18	clay (Qpml)
		18-37 37-100	hardpan (Qr) red shale

135	26-2495	0-4 4-17 17-36 36-51 51-98	fill sandy (Qst) clay (Qpml) hardpan (Qr) red shale
136	26-2348	0-16 16-27 27-45 45-126	sand (Qst) clay (Qpml) hardpan and stones (Qr) red shale
137	26-2153	0-3 3-16 16-29 29-41 41-145	fill sand (Qst) clay (Qpml) hardpan (Qr) red shale
138	26-2151	0-3 3-14 14-26 26-39 39-103	fill sand (Qst) clay (Qpml) hardpan (Qr) red shale
139	26-2150	0-4 4-18 18-29 29-39 39-124	fill sand (Qst) clay (Qpml) hardpan and large stones (Qr) red shale
140	26-2105	0-21 21-33 33-53 53-67	sand (Qst) clay (Qpml) hardpan (Qr) red shale
141	DOT 33	abbreviate 0-19 19-55 55-57	d medium-to-fine sand and silt (Qst) silt and clay (Qpml) compact sand and gravel (Qpmf or Qr)
142	26-4252	0-21 21-43 43-78 78-147	sandy (Qst) clay (Qpml) hardpan and stones (Qr) red shale
143	26-2561	0-2 2-16 16-89 89-96 Cased to 9	fill sandy (Qst) clay (Qpml) water-bearing sand and gravel (Qpmf) 25, yield 15 gpm
144	DOT 34	abbreviate 0-7 7-16 16-18 18-51 51-55	brown medium-to-fine sand, some fine gravel (Qst) gray sand and fine gravel (Qst) gray silt, some fine sand (Qst) gray clay, varved, silt seams (Qpml) fine sand and gravel (Qpmf)
145	26-2909	0-28 28-52 52-59 59-67 Cased to 6	sandy (Qst) clay (Qpml) hardpan with some large stones (Qr) water-bearing sand and gravel (Qpmf) (7, yield 12 gpm
146	26-4198	0-18 18-40 40-44 44-105 105-250	sand (Qst) gray clay (Qpml) sand and water (Qpmf) hardpan (Qr) red sandstone
147	26-4090	0-16	silty sand (Qst)

		16-48 48-56 56-66	clay (Qpml) hardpan and stones (Qr) water-bearing sand and gravel (Qsp)	
148	DOT 35	abbreviated 0-13 13-30 30-42	gray silty sand and sand (Qst) gray-brown varved clay (Qpml) gray to brown clayey sand and gravel (Qpmf)	
149	DOT 36	abbreviated 0-12 12-28 28-28.3	brown silty sand, some gravel (Qst) brown clay, sand layers, trap rock fragments below 25 (Crefusal (bedrock)	Qpml)
150	25-10453	0-15 15-35 35-55 55-100	sand (Qst) clay (Qpml) sand (Qpmf) shale	
151	26-2055	0-18 18-38 38-41 41-95	sand (Qst) clay (Qpml) hardpan (Qr) red shale	
152	26-4503	0-17 17-31 31-58 58-64 64-70	sandy (Qst) clay (Qpml) hardpan with some large boulders (Qr) water-bearing sand and gravel (Qsp) red shale	
153	25-10452	0-20 20-40 40-80 80-130	sand (Qst) clay (Qpml) sand (Qpmf) shale	
154	26-2144	0-19 19-33 33-59 59-186	sand (Qst) clay (Qpml) hardpan and stones (Qr) red and gray shale	
155	26-1917	0-18 18-27 27-46 46-69 69-90	sand (Qst) clay (Qpml) hardpan (Qr) boulders, gravel, silty sand (Qsp) red rock	
156	26-1918	0-19 19-29 29-67 67-127	sand (Qst) clay (Qpml) large stones and hardpan (Qr) red shale	
157	26-2394	0-2 2-19 19-32 32-44 44-117	fill sand (Qst) clay (Qpml) hardpan (Qr) red rock	
158	26-1961	0-23 23-32 32-43 43-136	sand (Qst) clay (Qpml) hardpan (Qr) red shale	
159	26-2347	0-4 4-19 19-31 31-46 46-117	fill sand (Qst) clay (Qpml) hardpan and stones (Qr) red shale	
160	26-4450	0-5 5-58	fill clay (Qpml)	

		58-230	red rock	
161	26-1477	0-34 34-123	sand and clay (Qst over Qpml) shale	
162	26-1478	0-36 36-125	sand and clay (Qst over Qpml) shale	
163	26-1498	0-23 23-125	sand and clay (Qst over Qpml) red rock	
164	26-1492	0-50 50-57 57-135	sand and clay (Qst over Qpml) boulders (Qr) shale	
165	26-1542	0-30 30-75 75-145	clay (Qpml) bad boulders at 30 and then hardpan (Qr) red rock	
166	DOT 37	abbreviated 0-9 9-24 24-28	gray, brown, red-brown fine-to-medium sand (Qst) gray clay (Qpml) gray-brown clay and large gravel, casing bent at 28 (Qr)	
167	26-1955	0-19 19-28 28-58 58-87 87-95	sand (Qst) clay (Qpml) hardpan (Qr) silty sand and gravel (Qsp) red rock	
168	26-4014	0-26 26-59 59-78 78-91 91-121	sandy (Qst) clay (Qpml) hardpan and stones (Qr) water-bearing silty sand and gravel (Qsp) red shale	
169	26-4697	0-101 At 101 Cased to 1	hardpan and boulders with lenses of sand and gravel (Qpmf and bedrock 01, yield 15 gpm	Qr)
170	26-4686	0-81 81-98 98-150	hardpan, some boulders, lenses of clay, sand and gravel (Qpmf ar water-bearing silty sand and gravel (Qsp) red shale	nd Qr)
171	26-3031	0-36 36-47 46-69 69-89 89-93 Cased to 9	hardpan and large boulders (Qpmf) clay (Qpml) hardpan and stones (Qr) silty sand and gravel (Qsp) water-bearing sand and gravel (Qsp) 3, yield 10 gpm	
172	26-4441	0-55 55-74 74-82 82-140	hardpan, stones, boulders (Qpmf over Qr) heaving silty sand and gravel (Qsp) hardpan (Qb?) red shale	
173	26-1433	0-85 85-175	sand and hardpan (Qst over Qpmf and Qr) red rock	
174	26-4482	0-36 36-103 Cased to 9	boulders (Qpmf and Qr) sand and gravel (Qsp) 3, yield 25 gpm	
175	26-4298	0-29 29-148	gray clay (Qal over Qpml) red shale	
176	25-4753	0-18 18-31 31-45 45-120	sandy (Qal) clay (Qpml) hardpan and stones (Qr) shale	

177	26-855	54		
178	26-971	51		
179	ACE GP-1	abbreviated 0-10 10-16 16-40 40-64 64-67	fill gray silt and fine sand (Qal) gray-brown to red-brown varved silty clay (Qpml) red-brown clayey sand, little gravel (Qr) red-brown sandstone	
180	ACE GP-2	abbreviated 0-13 13-40 40-77 77-80	gray-brown silty sand (Qal) gray silty clay (Qpml) brown, red-brown sand, little silt, with gravel and bou red-brown sandstone	tlders–glacial till (Qr)
181	26-4583	0-14 14-43 43-110	sandy (Qst) hardpan and stones (Qr) red shale	
182	26-1255	37		
183	26-13515	29		
184	26-4459	0-3 3-14 14-21 21-43 43-125	fill clay (Qpmf) sandy (Qpmf) hardpan with stones and boulders (Qr) red shale	
185	26-4365	0-58 58-122	hardpan, clay, stones, some boulders (Qpmf over Qr) red shale	
186	DOT 38	abbreviated	i brown clayey sand and gravel (Qpmf)	
187	26-1866	0-15 15-30 30-95	sand (Qst) clay (Qpml) shale	
188	26-4396	0-13 13-29 29-41 41-102	sandy (Qst) hardpan and boulders (Qr) red clay (Qsp) red shale	
189	26-2823	0-10 10-30 30-45 45-54	sand (Qst) clay (Qpml) hardpan (Qr) shale	
190	26-4818	0-47 47-54 54-90	hardpan with some large boulders (Qpmf over Qr) water-bearing silty sand and gravel (Qsp) red sandstone	
191	26-4296	0-14 14-27 27-49 49-105	sandy (Qst) clay (Qpml) hardpan and stones (Qr) red shale	
192	26-2509	0-10 10-40 40-59 59-90	sand (Qal) gray clay (Qpml) hardpan (Qr) red sandstone	
193	26-4451	0-62 62-64 64-200	sand (Qal over Qpml) hardpan (Qr) red rock	

194	26-4233	0-17 17-28 28-41 41-51 51-57	sandy (Qal) hardpan and stones (Qr) clay (Qsp) sand and gravel (Qsp) sandstone
195	26-4410	0-19 19-28 28-47 47-81	sandy (Qal) clay (Qpml) hardpan and boulders (Qr) red shale
196	DOT 39	abbreviated 0-10 10-20 20-22 22-25	brown fine gravel and sand (Qal) brown clay, trace gravel, trace sand (Qpml) boulder (Qr) trap rock
197	26-2976	0-18 18-54 54-70	dug well hardpan with large stones (Qr) red shale
198	26-5794	0-2 2-16 16-41 41-67 67-110	fill hardpan and lenses of clay (Qr) gray clay (Qsp) stones with some large boulders (Qsp or Qb) red shale
199	26-2198	0-5 5-18 18-45 45-72 72-200	fill sand (Qst) gray clay (Qpml) hardpan (Qr) red and gray sandstone
200	26-2921	60	
201	26-1705	0-54 54-128	clay and boulders (Qpml over Qr) red rock
202	26-2271	0-50 50-78 78-88	clay and sand over hardpan (Qst over Qpml over Qr) water and sand (Qsp) red hardpan (Qb)
203	26-2523	0-42 42-80 80-165	hardpan (Qr) sand (Qsp) shale
204	26-951	0-110 110-175	clay, sand, boulders, etc. (Qpmf over Qr) sandstone
205	26-3851	0-20 20-65 65-250	clay (Qpml) sand (Qpmf and Qr) trap rock
206	26-2758	0-50 50-80 80-90 90-163	hardpan and boulders (Qpmf and Qr) very fine sand (Qsp) red hardpan (Qb) red sandstone
207	26-2551	0-45 45-65 65-132	gray clay (Qpml) hardpan (Qr) red rock
208	26-2685	0-4 4-39 39-64 64-70 70-73 Screened to	sandy (Qst) clay (Qpml) hardpan (Qr) silty sand (Qsp) water-bearing sand and gravel (Qsp) 73, yield 30 gpm
209	26-338	0-28	gray clay (Qal over Qpml)

		28-50 50-52 52-85	gray clay, sand (Qpml) clay, gravel (Qr) trap	
210	26-4567	0-21 21-43 43-80	sandy, then clay (Qst over Qpml) hardpan and stones (Qr) trap rock	
211	26-4408	0-14 14-44 44-51 51-60	sandy (Qst) clay (Qpml) water-bearing silty sand and gravel (Qpmf) trap rock	
212	26-4299	0-42 42-65	sand (Qpmf) trap rock	
213	26-3007	0-6 6-14 14-43 43-49	sandy (Qpmf) clay (Qpml) hardpan and stones, water-bearing silty sand and gravel (Q trap rock	pmf, Qr)
214	26-2773	0-23 23-34 34-42 42-52	sand and gravel (Qpmf) hardpan and stones (Qpmf, Qr) water-bearing sand and gravel (Qpmf or Qsp) trap rock	
215	26-2244	0-58 58-113	sand over hardpan (Qst over Qr) trap rock	
216	26-540	0-15 15-30 30-50 50-69 69-155	sand (Qst) blue clay (Qpml) hardpan (Qr) fine sand (Qsp) trap rock	
217	26-1259	0-72 72-172	hardpan and boulders (Qr) trap rock	
218	26-3927	0-2 2-17 17-39 39-46 46-53 Cased to 5	fill sandy (Qst) clay (Qpml) hardpan and stones (Qr) water-bearing sand and gravel (Qsp) 63, yield 25 gpm	
219	26-2442	0-8 8-19 19-41 41-50 Cased to 5	sandy (Qst) clay (Qpml) hardpan (Qr) water-bearing sand and gravel (Qsp) 50, yield 20 gpm	
220	26-4123	0-25 25-60 60-76 76-110	silty clay (Qst over Qpml) sand (Qpmf) gray hardpan (Qry) trap rock	
221	26-36016	0-10 10-22 22-63 63-195	sand (Qst) clay (Qpml) till (Qry) rock	
222	25-9373	>53 Cased to 5	53, yield 30 gpm	
223	26-1763	0-40 40-67 67-150	sandy soil (Qpmf) hardpan (Qry) hard gray rock	
224	26-5445	abbreviate 0-13	d fill	

		13-30 30-35 35-45	sand and gravel (Qpmf) heavy gravel, stones, large boulders (Qry or Qpmf) weathered trap rock
225	26-1986	0-25 25-55 55-139	sand and gravel (Qpmf) brown hardpan (Qry) trap rock
226	26-1001	0-57 57-100	hardpan (Qpmf over Qry) hard gray rock
227	26-624	0-74 74-445 445-465 465-475 475-497 496-510	clay, dead sand, hardpan, a few boulders (Qpmf over Qry trap rock red rock trap rock slate trap rock
228	26-615	0-42 42-153	gravel and hardpan with boulders (Qpmf over Qry) hard gray rock
229	26-6183	abbreviate 0-29 29-32	d sand and gravel (Qpmf) trap rock
230	26-2228	0-9 9-21 21-28 28-34 34-85	sand (Qst) clay (Qpml) hardpan (Qry) water-bearing sand and gravel (Qsp) trap rock
231	26-3067	0-11 11-17 17-34 34-38 38-40	sandy (Qst) clay (Qpml) hardpan and stones (Qry) water-bearing silty sand and gravel (Qsp) trap rock
232	26-4115	0-11 11-38 38-43	sandy (Qst) hardpan and stones (Qry) trap rock
233	26-4426	0-16 16-31 31-44 44-65	sandy (Qst) clay (Qpml) hardpan and stones (Qry) trap rock
234	26-2454	0-3 4-18 18-46 46-53 Cased to 5	fill sand (Qst) clay (Qpml) water-bearing sand and gravel (Qpmf) 53, yield 20 gpm
235	26-2213	0-19 19-46 46-51 51-55 At 55 Cased to 5	sand (Qst) clay (Qpml) water-bearing silty sand (Qpmf) water-bearing sand and gravel (Qpmf) bedrock 55, yield 30 gpm
236	26-2223	0-6 6-15 15-38 38-45 At 45 Cased to 4	sand (Qst) clay (Qpml) hardpan and stones (Qry) water-bearing sand and gravel (Qsp) bedrock 15, yield 20 gpm
237	26-3976	0-17 17-38 38-47 47-53	sandy (Qst) clay (Qpml) hardpan and stones (Qry) water-bearing sand and gravel (Qsp)

		53-81	trap rock
238	26-2220	0-2 2-16 16-36 36-38 At 38 Cased to	fill clay (Qpml) hardpan and stones (Qry) water-bearing sand and gravel (Qsp) bedrock 38, yield 15 gpm
239	26-3582	0-14 14-42 42-50 50-55 55-68	sandy (Qst) clay (Qpml) hardpan and stones (Qry) water-bearing silty sand and gravel (Qsp) trap rock
240	26-2219	0-2 2-9 9-39 39-48	fill clay (Qpml) hardpan and large stones (Qry) trap rock
241	26-4308	0-14 14-32 32-46 46-121	sandy (Qst) clay (Qpml) hardpan, stones, boulders (Qry) trap rock
242	26-2822	0-10 10-30 30-51 51-98	sand (Qst) clay (Qpml) sand (Qpmf or Qry) trap rock
243	26-721	0-39 At 39 Cased to	dirt, hardpan, clay, sand (Qst over Qpml over Qry) blue stone 38, yield 6 gpm
244	26-4897	0-16 16-21 21-29 29-60	hardpan and stones (Qst over Qry) sand and gravel (Qsp) gray clay (Qsp) trap rock
245	26-2970	0-17 17-75	sand (Qst) trap rock
246	26-4906	0-26 26-135	hardpan, stones, and clay with small layers of sand (Qst over Qry) trap rock
247	26-4179	0-15 15-28 28-36	dug well hardpan and stones (Qry) trap rock
248	26-2941	0-2 2-14 14-23 23-42	fill black muck large stones, gravel, and sand (Qry) trap rock
249	26-4297	0-8 8-27 27-34 34-45	clayey sand (Qst) clay (Qpml) hardpan and stones (Qry) trap rock
250	26-4608	0-21 21-44 44-48	silty sand (Qst) hardpan and clay (Qry) trap rock
251	26-4167	0-34 34-53	hardpan, stones, and clay (Qst over Qry) trap rock
252	26-4927	0-2 2-29 29-42	fill hardpan and clay with small lenses of sand and gravel (Qst over Qry) trap rock

253	26-4633	0-12 12-19 19-31 31-41	hardpan (Qry) sandy (Qsp) clay (Qsp) trap rock	
254	26-1079	0-30 30-42 42-182	boulders (Qry) sand and silt (Qsp or weathered basalt) trap rock	
255	26-12005	0-50 50-475	overburden with layers of hardpan (Qry) trap rock	•
256	26-4385	30		
257	DOT 40	abbreviated 0-10 10-20 20-22 22-25	brown fine gravel and sand (Qst) brown clay, trace gravel and sand (Qpml) boulder (Qr) trap rock	•
258	ACE DC-122	abbreviated 0-4 4-12 12-23 23-57 57-273	sandy clay with gravel (Qal) sand and fine gravel (Qal) gray to brown silty clay to sandy clay (Qpml) till (Qr) red sandstone	•
259	26-4501	0-10 10-20 20-38 38-50 50-60 60-65 65-73 73-83 At 83	fine yellow sand (Qst) brown fine sand, some gray clay (Qst) gray clay (Qpml) reddish-brown hardpan, streak of gravel, some small c red sandy hardpan, some small cobbles (Qr) red hardpan with very fine sand (Qr) red hardpan, quite hard (Qr) sand and gravel, fine-to-coarse, some water (Qsp) gray shale	obbles (Qr)
260	ACE DC-121	abbreviated 0-15 15-32 32-71 71-273	silty sand, sand and gravel (Qst) gray-brown clay (Qpml) red-brown till (Qr) red sandstone and shale	
261	26-4634	0-75 75-90 90-101	clay (Qal over Qpml) sand (Qpmf) trap rock	-
262	DOT 23-77	abbreviated 0-13 13-17 17-21 21-35	fine-to-medium brown sand (Qst) brown clay (Qpml) medium gray sand, medium gravel (Qpmf) fine-to-medium gray sand and boulders (Qpmf)	-
263	26-31968	0-14 14-38 38-350	gray silty fine sand (Qst) gray very hard clay (Qpml or Qry) rock	
264	DOT 23-46	abbreviated 0-5 5-13 13-18 18-21 21-27 27-33 33-43	fill fine silty brown sand with pieces of rock (Qst) medium-to-coarse gravelly brown sand (Qst) gray and tan clay (Qpml) gray silt with pieces of rock (Qpml or Qry) white sandstone, traces of red clay (weathered basalt) trap rock	
265	DOT 23-85	abbreviated 0-5 5-8 8-21	brown fine-to-medium sand, some gravel (Qst) brown clayey fine sand (Qst) brown medium-to-coarse sand (Qst)	-

		21-30 30-40 40-43	gray-brown varved silt with some clay (Qpml) dark gray wet sandy clay (Qpml) reddish brown fine-to-medium clayey sand (Qpml)
266	DOT 23-33	abbreviated 0-14 14-20 20-34 34-45	medium-to-coarse gray sand (Qst) fine-to-medium slightly silty brown sand (Qst) gray clay (Qpml) soft red sandstone
267	DOT 23-78	abbreviated 0-6 6-13 13-27 27-32 32-42	topsoil, roots, fibrous organic fine gray sand (Qst) gray silty clay (Qpml) sandy gray clay with pieces of rock (Qry) gray trap rock boulders and clay (Qry)
268	26-49551	0-5 5-20 20-50 50-55 55-70	brown coarse-to-fine sand, little silt (Qst) gray sand, silt, and clay (Qst over Qpml) gray silt and clay (Qpml) brown silt (Qpml) brown coarse-to-fine sand and gravel, trace clay and boulders (Qry)
269	DOT 23-98	abbreviated 0-10 10-20 20-25 25-31 31-41 41-57	brown fine clayey sand (Qal) gray fine-to-coarse sand (Qst) gray fine silty sand, trace of clay (Qst) reddish-gray silty clay (Qpml) gray silty clay with pieces of rock (Qpml) reddish-gray silty clay with layers of gray fine sand and pieces of rock (Qpml)
270	26-27392	140	
271	DOT 23-61	abbreviated 0-4 4-8 8-21 21-26 26-53 53-60	fine-to-medium light brown sand (Qst) brown clay, some fine sand (Qst) fine-to-medium gray sand (Qst) gray-brown clay (Qpml) silty brown clay (Qpml) medium clayey brown sand (Qpml or Qpmf)
272	26-2826	0-15 15-58 Cased to 5	hardpan (Qst) sand (Qst over Qpmf) 8, yield 10 gpm
273	26-3029	57	
274	26-1995	0-19 19-27 27-51 51-56 Cased to 5	sand (Qal) clay (Qpml) hardpan (Qr) water-bearing sand and gravel (Qsp) 6, yield 30 gpm
275	26-4750	0-12 12-16 16-27 27-63	sandy (Qal) black humus (Qal) clay (Qpml) hardpan, large stones and gravel with lenses of water-bearing sand and gravel towards bottom (Qr over Qsp) red shale
276	26-3930	0-20 20-45 45-50 Cased to 5	sand (Qal) clay (Qpml) gravel (Qpmf) 0, yield 12 gpm
277	26-2636	0-15 15-26 26-67 67-72	sandy (Qal) clay (Qpml) hardpan and stones (Qr) water-bearing sand and gravel (Qsp)

		72-76	red shale	
278	26-4618	0-18 18-53 53-61 61-72	sandy (Qal) clay (Qpml) hardpan and stones (Qr) water-bearing sand and gravel (Qsp)	
			2, yield 8 gpm	
279	26-5025	0-40 40-105 105-320	sand, boulders (Qr) brown sand (Qsp) red shale	
280	26-5187	abbreviated 0-45 45-77	brown sand, clay, boulders (Qr) brown sand and gravel (Qsp)	
281	26-4281	0-50 50-68 68-98 98-423	hardpan and boulders (Qr) gravel (Qsp) hardpan and small boulders (Qb) gray and red shale	
282	23-5245	92 Screened 8	2-92 in gravel (Qsp), yield 21 gpm	
283	26-949	0-85 85-160	glacial till, hardpan over gravel atop rock (Qr over Qsp trap))
284	26-2074	0-70 70-83 83-100 100-306	hardpan and boulders (Qr) fine sand (Qsp) trap rock red shale	
285	26-31069	abbreviated	l fill	
		6-90 90-98 98-110	gray silty clay (Qpml) gray silt and fine sand, trace gravel (Qpml) red brown fine-to-medium sand, some gravel, trace silt	and clay (Qr)
286	26-25794	118		
287	26-26166	abbreviated 0-28 28-48 48-50 50-65	silt and fine sand (Qal over Qst) gray clay and silt (Qpml) gray silt, trace fine sand (Qpml) red-brown coarse gravel (Qr or Qpmf)	
288	ACE DC-102	abbreviated 0-3 3-12 12-52 52-87 At 87	clay with roots (Qal) sand (Qal over Qst) silty clay (Qpml) till (Qr) rock	
289	26-2361	0-49 49-148 148-264	sand, large stones with some boulders (Qry) hardpan (Qry) red and gray shale	
290	26-2306	0-151 151-251	hardpan and large stones (Qry) red and gray shale	
291	26-2140	0-130 130-260	hardpan and large stones (Qst over Qry) red rock	
292	26-2737	15		
293	26-2777	0-22 22-92 92-110 110-123 Cased to 1	sand (Qst) clay (Qpml) clay and hardpan (Qpml over Qry or Qpmf) packed gravel (Qpmf) 23, yield 10 gpm	

204	26.2002	-1-1i -4 - i	
294	26-3003	abbreviated 0-14	sand and gravel (Qst)
		14-94	slimy gray clay (Qpml)
		94-134	gray sand and gravel, heaves (Qpmf)
		134-171	gray clayey fine-to-medium sand and gravel, stones (Qry or Qpmf)
		At 171	brown shale
		Screened 1	00-120, yield 300 gpm
		well flows	to 4 feet above land surface at 5 gpm
295	26-308	184	
296	26-2089	0-35	hardpan (Qst over Qpml)
270	20 200)	35-93	clay (Qpml)
		93-96	coarse gravel (Qpmf)
		Cased to 9	6, yield 10 gpm
297	26-48762	0-20	sand (Qal)
		20-22	clay (Qal)
		22-30	sand and gravel (Qst)
		30-90	reddish clay (Qpml)
		90-355	sandstone
298	26-51104	0-27	sand (Qal)
		27-80	clay (Qpml)
		80-302	sandstone
299	26-48765	0-17	sand (Qal)
		17-70	clay (Qpml)
		70-86	gravel and sandstone
300	23-6146	117	
		Cased to 1	13, yield 8 gpm from sand and gravel
301	26-4734	0-23	sandy (Qal over Qst)
		23-64	clay (Qpml)
		64-71	hardpan and stones (Qr or Qpmf)
		71-76	water-bearing sand and gravel (Qpmf or Qsp)
			6, yield 30 gpm
302	26-2965	0-5	fill
		5-104	gray clay streaks of silt (Qpml)
		104-110	gravel (Qpmf)
		110-112	muddy sand (Qpmf)
		112-118 118-120	sand, gravel, boulders (Qpmf)
		120-130	clay, streaks of gravel (Qpmf)
			gray muddy sand (Qpmf) 07-127, yield 10 gpm, well flows to 2 inches above land surface
202	26 2011	0.25	and (Oat)
303	26-2911	0-25	sand (Qst)
		25-85 85-106	clay (Qpml) dirty sand (Qpmf or Qr)
		106-200	red and gray shale
304	26-2428	0-20	sand (Qal)
	20 2 120	20-100	clay (Qpml)
		100-111	sand (Qpmf)
		Cased to 1	11, yield 30 gpm, well flows to 2 feet above land surface at 2 gpm
305	26-2904	0-21	sandy (Qal)
		21-52	clay (Qpml)
		52-76	hard formation like trap rock (Qr?)
		76-89	sand and heavy gravel (Qsp)
		89-100	red shale
306	26-2832	0-35	clay (Qst over Qpml)
		35-45	boulders (Qr or Qpmf)
		45-84	sand, gravel (Qsp or Qpmf)
		Screened 6	9-84, yield 50 gpm, well flows to 1 foot above land surface at 5 gpm

307	26-20680	0-50 50-128	sand, clay (Qst over Qpml) red rock
308	26-2646	0-16 16-24 24-28 28-43 43-61 61-76 76-78 78-85	swamp muck (Qal) gray clay (Qpml) brown clay, some gravel (Qr) gray hardpan and big rocks (Qr) brown hardpan (Qr) red-brown hardpan (Qr) gray coarse sand (Qsp) red shale
309	23-6506	abbreviated 0-51 51-149	sand and gravel (Qst over Qpp) black, gray, brown rock, weathered to clay in places
310	23-6853	40	
311	23-6181	0-25 25-75 75-130	sand (Qst over Qpp) clay (Qpml) red shale
312	26-2462	0-21 21-91 91-104 104-273	sand (Qal) clay (Qpml) hardpan (Qry) gray and red shale
313	26-3002	0-15 15-55 55-152	boulders (Qry) sand (Qsp) shale
314	23-5115	75	
315	26-4487	48	
316	26-1512	0-25 25-35 35-150	clay and some boulders (Qn and Qry) red hardpan (Qr) red sandstone
317	23-1187	72	
318	26-1592	0-50 50-150	hardpan and boulders (Qn) red shale
319	26-2507	82	
320	26-2565	0-19 19-70 70-78 78-81	sand and gravel (Qst) gray clay (Qpml) sand, gravel, clay mixed (Qn) rock
321	26-4148	0-15 15-25 25-75 75-81 81-257	fill and top soil sand (Qst) sticky clay (Qpml) hardpan (Qry) red sandstone
322	26-2973	0-17 17-81 81-103 103-180	sand and gravel (Qal) clay (Qpml) hardpan (Qry) red shale
323	26-19184	abbreviated 0-23 23-35	brown sand, gravel, boulders, little to some silt, trace clay (Qn) rock
324	26-30328	0-43 43-150	sand, gravel, cobbles (Qn) red slate
325	23-8358	0-46	sand, clay, gravel overburden (Qpp over Qpml over Qpmf)

		46-75	red slate	
326	26-26447	32		
327	26-3048	0-76 76-84 Cased to 8	clay (Qpml) sand and gravel (Qpmf) 44, yield 40 gpm, well flows to 1 foot above land surface	at 11 gpm
328	26-26448	101		
329	26-698	0-12 12-140 At 140 well flows	fine sand (Qpp) gray clay (Qpml) gravel to 1 foot above land surface at 10 gpm	
330	26-898	0-10 10-25 25-90 90-114 at 114 Well flows	soft clay (Qpp) fine silty sand (Qpp) gray clay (Qpml) fine red sand coarse sand	
331	26-733	0-90 90-132	fine sand over blue clay (Qst over Qpml) red sandstone	
332	26-4465	0-21 21-126 126-160	sandy (Qst) clay (Qpml) red shale	
333	26-3990	0-10 10-70 70-90 90-122	sand (Qal) clay (Qpml) sand (Qpmf) shale	
334	26-2520	0-15 15-45 45-51 51-140	earth (Qst) clay (Qpml) hardpan (Qry) trap rock	
335	26-2869	0-15 15-55 55-143	sand (Qst) clay (Qpml) trap rock	
336	26-804	0-8 8-36 36-38 38-78	sand (Qal) clay (Qpml) sand (Qry or Qpmf) trap	
337	26-805	0-48 48-108	dirt, clay, sand (Qal over Qpml over Qpmf) trap rock	
338	26-2500	0-20 20-103 103-140	sand (Qal) soft gray clay (Qpml) trap rock	
339	26-10119	0-3 3-105 105-108 108-230	fill gray clay (Qal over Qpml) sand and gravel (Qpmf) trap rock	
340	26-4110	0-15 15-90 90-100 100-114 114-219	sandy soil (Qal) clay (Qpml) sand (Qpmf) silty hardpan (Qry) trap rock	
341	26-2936	0-20 20-83 83-96 96-268	sand (Qal) clay (Qpml) hardpan (Qry) trap rock	

342	26-1559	65	
343	26-3640	0-22 22-35 35-42	yellow hardpan (Qal) sand (Qst) clay (Qpml)
		42-130	trap rock
344	26-2205	0-48 48-114	silty sand then clay (Qal over Qpml) trap rock
345	26-1861	0-82 At 82 well flows	sandy clay then gray clay (Qal over Qpml) trap rock to 2 feet above land surface at 10 gpm
346	26-4810	0-17 17-79 79-86 86-91 Cased to 9	sandy (Qal) gray clay (Qpml) hardpan and stones (Qry or Qpmf) water-bearing sand and gravel (Qpmf) 1, yield 15 gpm
347	26-4754	0-16 16-88 88-100 Cased to 1	sandy (Qal) gray clay (Qpml) water-bearing sand and gravel (Qpmf) 00, yield 12 gpm
348	26-509	6	
349	22-27475	5	
350	26-29664	5	
351	26-29185	5	
352	22-4016	0-20 20-88 Cased to 8	hardpan and boulders (Qn) gravel (Qsp) 8, yield 4 gpm
353	22-27388	90	
354	22-24051	21	
355	22-21971	49	
356	23-4496	22	
357	22-7757	0-25 25-30 30-121	sand, gravel, boulders (Qmld) clay, fine sand, boulders (Qmld) granite
358	22-4921	25	
359	22-4494	9	
360	22-7913	abbreviated 0-76 76-125	sand, boulders, gravel, brown clay from 28-42 (Qbu1) granite
361	22-5812	0-103 103-116	boulder, gravel, sand, hardpan (Qbu1) sandstone (gneiss)
362	22-4523	37	
363	22-9805	3	
364	22-20152	0-18 18-248	overburden with boulders (Qbu2) granite
365	22-5350	0-80 80-113	boulders, sand, gravel, hardpan (Qbu1) granite

366	22-5621	0-61 61-78	hardpan, boulders, sand and gravel (Qbu1 over Qn) gray granite
367	22-27528	0-60 60-150	sand and gravel (Qn) granite
368	22-7028	0-65 65-93 93-145	sand, gravel, boulders (Qn) sandstone, soft, with mica (weathered gneiss) granite
369	22-8476	0-88 88-174	sand, gravel, boulders (Qn) granite
370	22-20122	7	
371	22-25699	0-30 30-400	sand and gravel (Qn) granite
372	22-26316	0-21 21-375	gravel, sand (Qbu1) granite
373	22-15302	0-5 5-40 40-55	overburden with boulders (Qbu1) sand, gravel, clay (Qbu1) granite
374	22-23346	15	
375	23-1481	7	
376	22-2956	0-23 23-142	earth and boulders (Qbu1) granite
377	22-20187	0-60 60-97 97-107 107-198	sand, boulders (Qbu1) boulders, gravel, etc. (Qbu1) boulder (Qbu1) granite
378	22-19972	0-20 20-30 30-50 50-60 60-66 66-145 145-200	overburden with boulders (Qbu1) fine sand (Qbu1) sand, gravel (Qbu1) clay, sand (Qbu1) rotten granite soft granite granite
379	22-20636	0-16 16-59 59-87 87-265	sand (Qbu1) all sand (Qbu1) fine brown sand (Qbu1) granite
380	22-24112	50	
381	22-27632	22	
382	22-20043	0-30 30-123	overburden with boulders (Qn) granite
383	22-21866	15	
384	22-24112	50	
385	22-14900	0-35 35-130	overburden-elay, gravel, boulders (Qn) granite
386	22-21937	27	
387	22-8206	0-84 84-88 88-120	sand, gravel, some clay (Qn) soft brown granite granite

388	22-17425	35	
389	22-14513	0-20 20-25 25-40 40-65 65-69 69-90 90-95	fine sand, clay, boulders (Qfy) sand and gravel (Qfy) very fine silt and sand (Qfy) coarse sand and gravel (Qfy) gravel, clay mix (Qfy) very fine water-bearing sand granite
390	22-3608	0-20 20-50 50-57 Screened 3	swamp dirt and fill sand and gravel (Qfy) fine sand 5-50, yield 435 gpm
391	22-6486	abbreviated 0-110 110-120 production	fine-to-coarse sand granite well (22-7045) at same location screened 48-90, yield 271 gpm
392	22-20875	3	
393	22-27148	23	
394	22-24701	17	
395	22-24699	17	
396	22-24700	0-18 18-575	sand gravel (Qfy) granite
397	22-23917	8	
398	22-14151	16	
399	22-26581	37	
400	25-29856	10	
401	25-11065	0-20 20-305	hardpan, boulders (Qn) granite
402	22-21774	0-12 12-175	sandy overburden (Qn) granite
403	22-27387	13	
404	22-14807	13	
405	23-3038	0-30 30-85 85-131	dirt and boulders (Qbu2) sand (Qbu2) granite
406	23-3119	0-20 20-80 80-163	dirt and boulders (Qbu2) sand (Qbu2) granite
407	233-3039	0-30 30-85 85-140	dirt and boulders (Qbu2) sand (Qbu2) granite
408	23-6787	0-20 20-67 67-74 74-300	sand (Qbu2) sand and gravel (Qbu2) rotten granite granite
409	23-2699	25	

410	23-2656	4		
411	23-2683	0-28 28-104	dirt, sand (Qbu2) granite	
412	23-6807	2		
413	23-2611	3		
414	23-1627	8		
415	23-5752	3		
416	23-6393	20		
417	23-2700	5		
418	23-2586	5		
419	23-3963	0-20 20-43 43-43.5 Screened 3	hardpan (Qpp, topset beds) sand (Qpp, foreset beds) granite 2-42, yield 60 gpm	
420	23-133	0-9 9-73 73-78 78-552	big gravel (Qpp, topset beds) fine yellow sand (Qpp, foreset beds) coarse gravel (Qpp, lacustrine-fan gravel) trap rock, blue rock	
421	23-5664	45		
422	23-2497	abbreviated 0-29 29-87 87-94 94-106 106-184	sand and gravel (Qal over Qst) fine gray sand and clay (Qpp over Qppl) silty gray clay (Qppl) fine gray sand and grit (Qpmf) conglomerate	
423	23-7059	abbreviated 0-25 25-104 104-109	sand, gravel, small cobbles (Qal over Qst) silt, sand, some clay (Qpp over Qppl) very dense wet gray coarse-to-fine sand and coarse-to-fi (Qpmf) gneiss	fine gravel, trace silt
424	23-3858	0-108 Screened 9	clay, sand, gravel (Qppl over Qpmf) 8-108, yield 204 gpm	
425	23-7055	0-116 116-347	sand and gravel red rock	
426	23-6958	0-176 176-605	sand and gravel overburden red slate	
427	23-6651	0-5 5-10 10-28 28-30 30-111 111-500	gravel (Qst) sand (Qst) gravel (Qpp) boulder (Qpp) gray sand and silt (Qppl) granite	
428	23-7338	0-30 30-103 103-120 Cased to 1	gravel and sand (Qst over Qpp) gray silt (Qppl) gravel and water (Qpmf) 20, yield 30 gpm	
429	23-7271	0-12 12-30 30-116	gravel (Qst) fine brown sand (Qpp) gray silt (Qppl)	

		116-127 silt and gravel (Qpmf) Cased to 127, yield 20 gpm
430	23-6228	0-20 brown sand and gravel (Qst) 20-85 gray silt (Qppl) 85-86 gravel and water (Qpmf) Cased to 86, yield 10 gpm
431	23-6534	0-17 sand and gravel with some large boulders (Qst) 17-49 very fine silty sand (Qpp or Qppl) 49-81 gray clay (Qppl) 81-109 heaving water-bearing silty sand with some gravel (Qpmf) 109-115 water-bearing sand and gravel Cased to 115, yield 15 gpm
432	23-6563	0-18 sand and gravel with some large boulders (Qst) 18-49 very fine silty sand (Qpp or Qppl) 49-82 gray clay (Qppl) 82-116 heaving water-bearing silty sand and gravel (Qpmf) 116-118 water-bearing sand and gravel (Qpmf) Cased to 118, yield 15 gpm
433	23-7641	0-121 sand and gravel Cased to 121, yield 20 gpm
434	23-6564	8
435	23-1520	0-124 sand, gravel (Qpp over Qpmf) 124-170 red rock
436	23-11599	0-176 sand (Qpp over Qpmf) 176-673 shale
437	23-6366	0-20 sand (Qal) 20-90 clay (Qppl) 90-111 sand (Qpmf) Cased to 111, yield 10 gpm
438	23-11257	abbreviated 0-160 sand and gravel, trace silt and clay (Qpg over Qpmf) 160-205 fine-to-medium sand (Qpmf)
439	23-12000	0-201 gray fine-to-coarse sand and gravel, little clay (Qpmf) 201-203 granite production well (23-12902) at same location screened 155-175, yield 700 gpm
440	23-7516	0-20 coarse sand (Qpmf) 20-40 coarse sand, some gravel (Qpmf) 40-48 coarse sand and large gravel (Qpmf) 48-55 fine gray sand (Qpmf) 55-57 rock
441	23-5405	abbreviated 0-113 sand and gravel (Qpmf) 113-169 clay and gravel (Qpmf) 169-216 sand and gravel (Qpmf) 216-226 clay and gravel (Qpmf) 226-236 gravel and boulders (Qn or Qpmf) 236-238 rock Screened 180-200, yield 409 gpm production well (23-5451) at same location screened 171-196, yield 704 gpm
442	23-6956	abbreviated 0-138 stones, sand, gravel, trace clay (Qpmf) 138-160 very fine sand and gray clay (Qpmf) 160-189 stones, boulders, gravel (Qpmf)
443	23-6955	abbreviated 0-82 sand, gravel, boulders (Qpmf) 82-101 clay (Qpmf)

		101-204 At 204	sand, gravel, boulders, a little clay (Qpmf) rock	
444	23-4924		sand, gravel, boulders (Qpmf) fine-to-coarse sand, a little gravel (Qpmf) 36-156, yield 352 gpm well (23-5033) at same location screened 120-150, yiel	ld 800 gpm
445	23-5819	0-73 73-83 Cased to 8	sand (Qpp over Qpmf) sand and gravel (Qpmf) 0, yield >20 gpm	
446	23-13108	0-87 87-502	sand, gravel (Qpmf) granite	
447	23-10981	0-100 100-500	sand, clay, gravel overburden (Qpmf) granite	
448	23-4041	0-65 65-400	sand and gravel (Qpmf) granite	
449	23-6518	0-22	hardpan with some large boulders and lenses of clay, g over Qn) granite	gravel, and sand (Qpmf
450	23-10603	abbreviated 0-30 30-90 90-147 147-154 154-400	-	
451	23-15156	0-205 205-550 550-1000	sand (Qpp over Qpmf) red shale granite	
452	23-3496	0-4 4-12 12-55 55-65 65-69 69-105 105-120 120-140 140-147 147-148	sand fill (Qal) gravel (Qal) very fine sand (Qml, deltaic bottomset beds) clay, some sand (Qppl) brown clay (Qppl) gray clay (Qppl) clay, fine (Qppl) brown, gray clay (Qppl) hardpan (Qry) gray shale	
453	23-5440	10		
454	23-1538	0-35 35-125	sand and gravel (Qrm1) red and gray shale	
455	23-9698	15		
456	23-5776	0-12 12-400	sand, gravel (Qrm1) sandstone and granite (conglomerate)	
457	23-2280	31		
458	23-5078	0-10 10-105	hardpan (Qry) red and gray shale	
459	23-8098	0-117 117-300	sand gray rock	
460	23-6944	100		
461	23-6946	>128 Cased to 1	18, yield 50 gpm from gravel (Qpmf)	

462	23-5454	0-10 black muddy sand (Qal) 10-40 fine sand and clay, some small gravel at 30 (Qal over Qpp)
		40-95 gray clay (Qpml)
		95-140 fine sand and gravel (Qpmf)
		140-153 sand and gravel (Qpmf) Screened 133-153, yield 855 gpm
463	23-5455	0-18 overburden (Qal) 18-34 sandy clay, full of pea gravel (Qpp)
		34-50 gray sandy clay (Qpml)
		50-80 gray sticky clay (Qpml)
		80-90 very soft mucky clay (Qpml) 90-140 sand and gravel (Qpmf)
		140-160 hard sticky clay (Qpml)
		160-170 fine silty sand (Qpmf)
		170-185 soft slimy clay (Qpml)
		185-190 sand (Qpmf) 190-210 water-bearing sand and gravel (Qpmf)
		210-221 very coarse gravel with more clay (Qpmf or Qry)
		Screened 196-215, yield 1000 gpm
464	23-6983	0-10 medium-to-coarse yellow sand (Qal)
		10-20 brown sand and gray clay (Qal over Qm1) 20-30 gray clay (Qpml)
		30-35 gravel, sand, gray clay (Qpml over Qpmf)
		35-50 medium-to-coarse gray gravel (Qpmf)
		50-54 gravel with pieces of red shale (Qpmf) 54-58 red shale
465	23-6984	0-5 brown sand (Qal)
		5-30 brown sand and gravel (Qal over Qrm1)
		30-45 fine sand and gray clay (Qml over Qpml)
		45-110 gray clay (Qpml) 110-129 gray sand and gravel (Qpmf)
		129-144 hard gray sand, boulders, and rock
		Cased to 144, yield 56 gpm
466	23-6997	0-72 sand and gravel (Qrm1)
		72-100 trap rock
467	23-11358	90
468	23-7549	0-10 clay (Qry)
		10-365 trap rock
469	23-3107	0-35 hardpan, boulders (Qn)
		35-55 clay (Qn or Qsp) 55-120 sand, boulders (Qn or Qsp)
		120-200 sandstone
470	23-5222	0-80 sand (Qal over Qpp)
		80-120 clay (Qpml)
		120-140 sand (Qpmf) Cased to 140, yield 30 gpm, well flows to 3 feet above land surface at 2 gpm
471	23-5626	0-23 sand and gravel (Qst over Qpp)
		23-159 clay (Qpml)
		159-191 silty sand and gravel (Qpmf) 191-272 clay (Qpml)
		272-280 water-bearing sand and gravel (Qpmf)
		Cased to 280, yield 20 gpm
472	23-1729	0-298 sand, quick sand, clay, finally gravel with water (Qpp over Qpml over Qpmf) Cased to 298, yield 100 gpm
473	23-6632	0-279 sand
.,,	25 0052	279-384 red rock and trap rock
474	23-844	0-50 sand and gravel (Qpp)

Cased to 50, yield 10 gpm

		Cased to 5	50, yield 10 gpm
475	ACE PW-2	0-4 4-12 12-34 34-74 74-130 130-132	dark brown sandy silt (Qal) brown, gray gravelly sand to sandy gravel (Qst) brown very fine silty sand (Qpp, deltaic bottomset beds) brown, gray silt, some clay, trace sand (Qpml) dark gray silty clay (Qpml) dark gray sand with some silt (Qpmf)
476	ACE PTI-1	0-10 10-15 15-23 23-44 44-82 82-89 At 89	fill medium-to-coarse sand and gravel (Qal) medium-to-coarse sand, some silt (Qpp) fine sand and silt, trace clay (Qpp, deltaic bottomset bed: gray clay (Qpml) red-brown till (Qr) rock
477	ACE DU-114A	0-11 11-18 18-48 48-49	fill sand and gravel (Qal) clay (Qpml) rock
478	ACE DC-114	0-16 16-21 21-46 46-51 At 51	fill silty sand Qal) gray clay (Qpml) coarse gray-black gravel and cobbles-till (Qry) rock
479	23-5858	0-18 18-43 43-53 53-65	yellow to brown sand (Qst) gray clay (Qpml) hard-packed sand (Qry) red shale
480	23-5052	0-30 30-133 133-348	clay and boulders (Qry) trap red rock
481	23-4988	15	
482	23-5187	14	
483	23-5186	10	
484	23-5204	20	
485	23-9158	0-10 10-30 30-198 198-206 206-275	sand, gravel (Qst) sand (Qst over Qpp) clay (Qpml) sand, gravel (Qpmf) red rock
486	23-4321	21	
487	23-4575	6	
488	23-4213	0-56 56-165	hardpan and sand overburden (Qry) red shale
489	23-4233	0-63 63-123	hardpan with boulders (Qry) red sandstone
490	23-115	0-64 64-150	hardpan (Qry) red shale
491	23-3152	4	
492	23-6867	0-48 48-190 190-260	clay, gravel, sand, etc. (Qry) red shale trap rock

493	23-633	0-30 30-47 47-135	boulders (Qry) gravel (Qry or Qsp) red rock
494	23-1094	26	
495	23-4244	15	
496	23-4327	23	
497	23-4217	30	
498	23-4243	27	
499	23-7197	0-20 20-498	clay and overburden (Qry) red and gray shale
500	23-4769	54	
501	23-4787	0-29 29-160	hardpan (Qry) red sandstone
502	23-5915	0-30 30-60 60-140 140-148 148-248	sand, gravel (Qst) sand (Qpp) clay (Qpml) fine sand, gravel, and clay (Qry) gray and red shale
503	23-6565	0-139 139-348	sand and clay shale
504	23-5029	0-18 18-54 54-88 88-237	sandy (Qst) clay (Qpml) silty sand and stones (Qpmf or Qry) shale and sandstone
505	22-6216	0-55 55-85 85-120	sand, clay (Qal over Qpml) hardpan, boulders (Qry) red rock
506	23-4939	0-10 10-25 25-100 100-115 115-153	sandy hardpan (af or Qst) sand and gravel (Qst) clay (Qpml) dirty sand and gravel (Qry or Qpmf) red and gray shale
507	23-3826	0-25 25-60 60-85	sand (Qal over Qst) clay (Qpml) rock
508	23-8151	0-87 87-175	gravel and clay (Qry) red rock
509	23-4304	0-40 40-154	sand and gravel (Qry) red shale
510	26-3358	0-30 30-197	red clay and boulders (Qry) red rock
511	23-4594	0-55 55-57 57-141	hardpan and boulders (Qry) sand (Qsp or weathered rock) shale
512	23-6859	30	
513	23-4045	0-30 30-107	hardpan (Qry) red shale
514	23-4134	7	

515	23-3247	7		
516	23-4357	0-12 12-230 230-240	rocky hardpan (Qry) red and gray shale trap rock	
517	23-4097	0-19 19-110	hardpan (Qry) red and gray shale	
518	23-4309	0-38 38-172	sand and clay (Qry) red rock	
519	23-41-41 obs. well 6	abbreviated 0-14 14-48 48-52	sand and gravel (Qn) large stones, boulders, medium-to-coarse sand (weathered shale	red conglomerate)
520	23-41-41 test well 7	abbreviated 0-14 14-48 48-52	sand and gravel (Qn) large stones, boulders, medium-to-coarse sand (weathered shale	red conglomerate)
521	23-41-41 obs. well 2	abbreviated 0-6 6-48 48-58	brown clay (Qn) sand, clayish (Qpml) gravel, stones, rocks (weathered conglomerate)	
522	23-41-41 obs. well 5	abbreviated 0-38 38-51	fine-to-medium sand (Qpmf) sand, stones, boulders, rock (weathered conglomerate)	
523	23-41-41 obs. well 4	abbreviated 0-22 22-26 26-30 30-38	sand and stones (Qpmf) clay and sand (Qpmf) stones and sand (Qpmf) clay, sand, gravel, stones (weathered conglomerate)	
524	23-41-41 obs. well 1	abbreviated 0-66 66-70 70-71	very fine sand, streaks of clay (Qpml) very hard dry sand (Qn) reddish shale	
525	23-1091	0-36 36-42 Cased to 4:	dead sand (Qpml) good sand and gravel (Qpmf) 2, yield 17.5 gpm	
526	23-7922	0-40 40-350	sand, gravel, loam, etc. (Qn over weathered conglomer granite (conglomerate)	ate)
527	23-6637	15		
528	23-4308	0-14 14-300	clay and sand (Qn) sandstone	
529	23-4303	0-9 9-245	sand, clay, gravel (Qn) red sandstone	
530	25-18221	0-3 3-36 36-130	boulders (Qn) hardpan, sand, gravel, clay (Qn) shale and sandstone	
531	23-6424	0-23 23-62 62-155	sandy (Qst) clay (Qpml) red shale and sandstone	
532	23-7723	0-8 8-17 17-86 86-200	black humus (Qal) water-bearing sand with some gravel (Qst) gray clay (Qpml) red shale and sandstone	

533	22-7691	30	
534	23-7250	0-5 5-11 11-24 24-150	gray clay with some black humus gray clay (Qpml) hardpan and stones with small layers of silty sand (Qn) conglomerate and shale
535	23-6415	0-4 4-23 23-86 86-92 92-155	humus and fill sandy (Qst) clay (Qpml) water-bearing sand (Qpmf or Qn) gray and red shale
536	23-5387	0-17 17-112 112-118 118-155	peat and sand (Qal) clay (Qpml) hardpan (Qn) red shale and sandstone
537	23-6547	0-3 3-17 17-98 98-104 104-250	black humus silty sand (Qst) gray clay (Qpml) water-bearing silty sand and gravel (Qpmf or Qn) red and gray shale and sandstone
538	22-4236	0-15 15-50 50-108 108-195	sand (Qst) gray clay (Qpml) dead sand (Qpml) red and gray rock
539	23-2569	0-30 30-72 72-90 90-150	sand (Qst) clay (Qpml) pink granite (conglomerate) red rock
540	23-148	12	
541	23-929	0-22 22-180	hardpan (Qn) gray and red shale
542	23-4538	0-125	clay, no water (Qpml)
543	23-6070	0-21 21-286 286-430	sandy (Qpp) clay and hardpan (Qpml over Qn) red and black shale
544	23-11803	0-220 220-700	sand, gravel, cobbles overburden red slate
545	23-7003	0-25 25-229 229-598	sand and silt (Qpp) gray silt (Qpml) gray and red shale
546	well LP02 of Hoffman and others (in review)	0-221 221-400	sand, clay, some stones (Qpp over Qpml) red shale
547	26-2295	0-10 10-90 90-245	sand (Qal) clay (Qpml) red and gray shale
548	22-9529	0-25 25-40 40-143 143-155 155-325	sand (Qpp) sand and clay (Qpp over Qpml) gray clay (Qpml) red gravel with clay (Qr) red and blue shale
549	26-2845	0-18 18-150 150-156	sand (Qst) clay (Qpml) hardpan 9Qry)

		156-439 439-468	gray and red shale trap rock
550	26-2564	0-90 90-105	sand and silt over gray clay (Qst over Qpml) red shale
551	26-1809	0-14 14-132 132-134 134-448 448-453	NR (Qpp) clay (Qpml) fine sand (Qry) trap rock red shale
552	26-2762	0-25 25-164 164-169 Cased to 1	sand (Qst over Qpp) clay (Qpml) sand and gravel (Qpmf) 169, yield 12 gpm
553	22-17205	9	
554	22-17896	0-14 14-273	hardpan and stones (Qn) granite
555	25-18707	2	
556	22-15901	24	
557	22-15731	0-22 22-150	hardpan, boulders, and gravel (Qn) granite
558	22-18043	0-12 12-200	hardpan and stones (Qn) granite
559	22-19158	0-29 29-160	hardpan, clay, some very large boulders with lenses of sand and gravel (Qn) limestone (gneiss)
560	25-13807	0-31 31-78	hardpan, boulders, clay (Qn) rock
561	25-15802	18	
562	22-21312	0-37 37-65	hardpan with some large boulders and small lenses of sand and gravel (Qn) conglomerated rock (gneiss)
563	22-13470	0-22 22-111	hardpan, clay, some large boulders (Qn) limestone (gneiss)
564	22-13968	0-16 16-103	hardpan, boulders and gravel (Qn) granite
565	22-19513	0-18 18-101	hardpan and stones (Qn) granite
566	25-44295	20	
567	22-17505	18	
568	25-7398	0-NR NR-115 Cased to 4	hardpan, boulders (Qn) soft granite 42, assumed depth to rock
569	22-7129	12	
570	25-12564	0-8 8-30 30-36 36-322	hardpan (Qpmf) dirty sand and gravel (Qpmf) hardpan (Qn) granite
571	25-12157	0-69 69-150	sand and gravel (Qpmd) conglomerate

572	25-11450	0-28 28-49 49-90	heavy gravel and sand (Qpmd topset beds) finer sand and gravel (Qpmd foreset beds) conglomerate
573	25-11955	0-85 Cased to 8	boulders and hardpan (Qpmd) 35, yield 10 gpm
574	25-10451	0-59 59-225	sand and gravel (Qpmd) granite
575	25-10885	0-NR NR-219 Cased to 1	sand (Qpmd) mountain rock (gneiss) 04, assumed depth to rock
576	25-9524	0-30 30-80 80-180	gravel, bank run (Qpmd topset beds) sand (Qpmd foreset beds) rotten granite
577	25-16555	0-22 22-85	hardpan and stones (Qn) limestone (gneiss?)
578	25-16306	0-20 20-95	hardpan and stones (Qn) limestone (gneiss?)
579	25-23066	0-64 64-270	sand and gravel with layers of fine sand (Qpmd) conglomerate
580	25-23065	0-58 58-330	sand and gravel with lenses of fine sand and some large boulders (Qpmd) conglomerate
581	22-21887	0-29 29-125	gravel and water (Qpmd) trap rock
582	23-14845	0-144 144-600	sand, clay, gravel (Qpmd) granite
583	23-14844	0-136 136-600	sand, clay, gravel (Qpmd) granite
584	23-6832	0-18 18-223	overburden with boulders and sand (Qn) granite
585	22-11279	0-136 136-167 167-200	sand and gravel (Qpmd) conglomerate granite
586	22-11889	0-151 151-300	sand and gravel (Qpmd) limestone
587	23-14817	0-108 108-500	sand, gravel, cobbles (Qpmd) granite
588	23-6677	0-105 Cased to 1	sand, gravel (Qpmd) 00, yield 15 gpm
589	22-17015	0-12 12-38 38-62 Cased to 5	overburden sand (Qpmd) gravel (Qpmd) 50, yield >10 gpm
590	23-8818	0-17 17-185	sand, gravel (Qpmd) red rock
591	25-22322	0-13 13-80 80-210 210-240	rotten conglomerate sandstone trap rock granite
592	23-8061	15	

593	22-1395	12		
594	22-20444	0-80	sand and gravel with layers of very fine sand and small lens (Qpmd)	es of gray clay
		80-99 99-102	water-bearing sand and gravel (Qpmf) conglomerate	
595	22-21998	0-71 71-180	fine sand with small lenses of coarse sand and gravel (Qpmd granite)
596	22-22990	0-64 64-68 68-160	fine sand with lense of coarse sand and gravel (Qpmd) hardpan and stones (Qpmf or Qn) granite	
597	22-20546	0-54 54-73 73-155	fine sand and gravel with some layers of coarse sand and graceonglomerate granite	avel (Qpmd)
598	22-19384	0-22 22-43 43-79 79-98 98-162	sand and gravel (Qpmd) coarse sand and gravel (Qpmd) fine sand (Qpmd, lower foreset beds) silty water-bearing sand and gravel (Qpmf) conglomerate	
599	22-18779	0-12 12-21 21-42 42-49 49-150	fine sand (Qpmd) large stones, gravel, and sand (Qpmd) sand with a little gravel (Qpmd foreset beds) water-bearing silty sand and gravel (Qpmf) conglomerate	
600	22-18999	0-41 41-150	fine sand with lenses of gravel (Qpmd) conglomerate	
601	22-24429	0-118 118-450	sand (Qpmd over Qpmf) trap rock	
602	22-17682	0-59 59-65 65-94 94-105 Cased to 1	very fine sand with few stones (Qpmf) gravel (Qpmf) silty sand and gravel (Qpmf) water-bearing sand and gravel (Qpmf) 05, yield 10 gpm	
603	22-17729	0-88 88-107 107-125	sand and gravel with lenses of fine sand (Qpmf) water-bearing silty sand (Qpmf) conglomerate	
604	25-16408	0-94 94-150	sand and gravel (Qpmf) conglomerate	
605	25-12015	0-51 51-110	sand and gravel (Qpmf) conglomerate	
606	25-18062	0-34 34-150	sand, gravel, large boulders (Qpmf) conglomerate	
607	22-14902	0-55 55-170	sand and gravel with lenses of clay (Qpmf) conglomerate	
608	22-16317	0-21 21-200	sand and gravel with lenses of hardpan (Qpmf) conglomerate	
609	22-11229	0-81 81-135	sand and gravel (Qpmf) conglomerate	
610	22-5302	0-29 29-56 56-108 108-115 Cased to 1	sand and gravel (Qpmf) clay (Qpmf) water-bearing silty heaving sand (Qpmf) sand and gravel (Qpmf) 15, yield 10 gpm	

611	22-11596	0-26 26-205	sand and gravel (Qpmf) conglomerate
612	25-11686	0-47 47-76 76-80 Cased to 8	fine sand and gravel (Qpmf) water-bearing silty sand (Qpmf) water-bearing sand and gravel (Qpmf) 30, yield 12 gpm
613	22-6912	0-17 17-21 21-162	sand and gravel becoming clayey (Qpmf) soft rock conglomerate
614	22-10939	0-61 61-72 72-105	sand and gravel (Qpmf) clay (Qpmf) conglomerate
615	22-7140	0-56 56-59 59-93	sand and gravel (Qpmf) clay (Qpmf) conglomerate
616	22-22528	0-21 21-26 26-65	hardpan, some large stones, lenses of sand and gravel (Qpmd over Qn hardpan and stones (Qn) conglomerate
617	22-2700	0-60 60-65 65-200	blue clay (Qpml) fine sand (Qpmf) pink granite (conglomerate)
618	22-6912	0-17 17-21 21-162	sand and gravel becoming clayey (Qpmf) soft rock conglomerate
619	22-6911	0-21 21-168	boulders, sand and gravel (Qpmf) conglomerate
620	22-7159	0-24 24-147	sand, gravel, some large boulders (Qpmf) conglomerate
621	22-7158	0-9 9-90	sand and gravel (Qpmf) conglomerate
622	25-11509	17	
623	25-11040	13	
624	22-121204	0-9 9-175	hardpan and stones (Qn) limestone (conglomerate)
625	22-6761	0-13 13-177	hardpan (Qn) pink granite (conglomerate)
626	22-13580	0-5 5-350	clay (Qn) shale
627	22-15348	0-12 12-350	hardpan and stones (Qn) conglomerate
628	22-14529	0-16 16-351	hardpan and clay (Qn) conglomerate
629	25-17325	0-5 5-300	clay (Qn) red shale
630	25-13511	0-68 68-109 109-133 133-140 Cased to 1	water-bearing heaving sand (Qpml) hardpan (Qpml?) silty sand (Qpmf) water-bearing sand and gravel 40, yield 20 gpm
631	25-15059	0-3	fill

		3-89 hardpan and clay (Qpml) 89-142 heaving silty sand (Qpml) 142-147 water-bearing sand (Qpmf) Cased to 147, yield 15 gpm
632	22-21605	abbreviated 0-208 water-bearing sand and gravel, a little clay from 76-98 (Qst over Qpmf) 208-210 conglomerate Screened 180-210, yield 300 gpm
633	22-22499	abbreviated 0-7 fill 7-9 humus 9-50 sand and small gravel (Qst) 50-78 fine sand (Qpml) 78-145 sandy clay, clayey fine sand, some gravel (Qpml over Qpmf) 145-200 sand and gravel (Qpmf) 200-208 sandy hardpan (Qn) 208-216 conglomerate Screened 175-200, yield 2000 gpm
634	22-21883	abbreviated 0-11 silty sand with some gravel (Qst) 11-29 fine sand (Qst) 29-51 silty fine sand (Qpml) 51-90 sand and gravel (Qpmf) 90-92 gray conglomerate (anomalous depth to rock, not contoured)
635	25-52907	abbreviated 0-21 brown silty clay (Qal over Qpml) 21-30 gray silty clay (Qpml) 30-35 silty fine gray sand (Qpml) 35-90 silty brown-gray clay (Qpml) 90-97 gray clay with sand streaks (Qpml) 97-118 clay and gravel (Qry) 118-130 gray rock
636	25-10660	0-100 clay (Qpml) 100-114 sand and gravel (Qpmf) Cased to 114, yield 50 gpm
637	22-13497	>242 Screened 209-242 in sand and gravel (Qpmf), yield 1200 gpm well flows to 1.5 feet above land surface
638	22-12140	abbreviated 0-26 clay and hardpan (Qst over Qpml) 26-50 very fine silty sand (Qpml) 50-100 fine sand (Qpml) 100-248 water-bearing sand and gravel (Qpmf) 248-252 conglomerate Screened 248-252 well flows to 13 inches above land surface at 5 gpm
639	22-13923	abbreviated 0-10 yellow sandy clay (Qst) 10-15 gray clay, some fine sand (Qpml) 15-35 fine sand, some gray clay (Qpml) 35-50 fine gray sand (Qpml) 50-100 fine silty sand (Qpml) 100-243 water-bearing sand and gravel (Qpmf) Screened 210-243, yield 771 gpm
640	25-18882	0-41 hardpan, gravel, and stones (Qpmf) 41-148 water-bearing silty sand with lenses of clay (Qpml and Qpmf) 148-170 conglomerate
641	25-52908	abbreviated 0-10 medium-to-coarse sand (Qst)

		10-30 30-55 55-75 75-100 100-115 115-125 125-160 160-164 Screened 1	silty fine sand (Qst) fine-to-medium sand (Qst) very fine sand (Qpml) silt with very fine sand (Qpml) silt and clay (Qpml) silt (Qpml) silt, fine sand, gravel (Qpmf) conglomerate 33-153, yield 300 gpm
642	22-45-499 well 4	abbreviated 0-31 31-139 139-185 185-195 195-200	brown sand and gravel (Qst) gray very fine silty sand with lenses of clay (Qpml) sticky gray clay (Qpml) gray clay with gravel (Qn) conglomerate
643	22-45-499 well 3	abbreviated 0-113 113-129 129-146 146-161 161-234 234-235	coarse brown silty sand (Qst over Qpml) clean fine sand (Qpml) very fine sand with lenses of clay (Qpml) gray clay (Qpml) water-bearing sand and gravel (Qpmf) trap rock
644	25-32755	abbreviate 0-15 15-25 25-33	d sandy silt (Qst) dark gray clay, silt, and fine sand (Qpml) gray clay with angular pebbles (Qpml)
645	25-15948	0-21 21-52 52-92 Cased to 9	sandy (Qst) clay (Qpml) water-bearing sand and gravel '2, yield 30 gpm
646	25-16372	0-30 30-54 54-85 85-92 Cased to 9	silty sand mixed with clay (Qst) water-bearing silty sand (Qpml and Qpmf) heaving sand (Qpmf) sand and gravel (Qpmf) (2, yield 35 gpm
647	25-17139	0-90 90-120 120-141 Screened 1	silty sand with lenses of clay (Qpmf and Qpml) water-bearing heaving silty sand (Qpmf) water-bearing heaving coarse sand with some gravel (Qpmf) 41-145, yield 60 gpm
648	25-21515	0-18 18-31 31-58 58-125	dug well sand (Qst) silty fine sand with lenses of gray clay (Qpml) trap rock
649	26-1912	0-50 50-144	dirt, sand, clay (Qst over Qpml) trap rock
650	25-31053	40	
651	25-17326	0-50 50-170	bank run, sand (Qpmd, Qpmf) trap rock
652	25-17327	0-25 25-52 52-150	dirt (Qal over Qpml) sand (Qpmf) trap rock
653	25-29984	0-78 78-178	silt, sand, clay and rocks red rock
654	25-20236	0-4 4-31 31-152	dark soil and clay (Qpml) sand and gravel with some small boulders (Qpmd) conglomerate

655	25-20287	0-25 25-152	sand and gravel (Qpmd) conglomerate
656	25-20288	0-19 19-151	sandy gravel (Qpmd) conglomerate
657	25-20364	0-21 21-152	sand and gravel (Qpmd) conglomerate
658	25-20366	0-7 7-152	sand and gravel (Qpmd) conglomerate
659	25-20365	0-14 14-152	sand and gravel (Qpmd) conglomerate
660	25-20368	0-5 5-152	sand and gravel (Qpmd) conglomerate
661	25-20367	0-4 4-127	sand and gravel (Qry) conglomerate
662	25-38875	4	
663	25-39769	3	
664	25-18041	4	
665	25-20655	0	
666	25-22844	0-8 8-77 77-172	hardpan and stones with small lenses of fine sand (Qpmf) conglomerate trap rock
667	25-20485	0-10 10-108 108-127	sand and gravel (Qpmf) conglomerate and sandstone trap rock
668	25-25401	0-8 8-100	sand and gravel with small lenses of clay (Qpmf) trap rock
669	25-16251	6	
670	25-17729	0-19 19-27 27-105	sand and gravel (Qst over Qpmf) conglomerate trap rock
671	25-20662	0-10 10-20 20-36 36-40 40-46 46-51 Cased to 5	hardpan, gravel, stones (Qst) silty fine sand (Qpml) silty coarse sand (Qpmf) water-bearing silty sand and gravel (Qpmf) water-bearing coarse sand (Qpmf) water-bearing sand and gravel (Qpmf) vater-bearing sand and gravel (Qpmf) (1, yield 20 gpm
672	25-47402	0-85 85-95	gray clay (Qst over Qpml) granite (conglomerate)
673	25-42652	abbreviated 0-9 9-39	d silt and fine sand (Qal) silt, fine sandy silt, varved (Qpml)
674	25-23222	0-23 23-54 54-70 Cased to 7	hardpan with clay and small lenses of sand (Qst) very fine silty sand (Qpml) water-bearing sand and gravel (Qpmf) (0, yield 12 gpm
675	25-12532	0-15 15-25 25-92	dirt (Qpmf) clay (Qpmf) sand (Qpmf)

Cased to 92, yield	20	gpm
--------------------	----	-----

		Cused to	72, yiola 20 gpiii
676	25-17159	0-68 68-77	silty sand streaked with coarse sand (Qpml) water-bearing heaving sand (Qpmf)
		77-120	trap rock
677	25-17140	0-63 63-75 75-91	fine silty sand (Qpml) heaving sand with some gravel(Qpmf) water-bearing sand and gravel (Qpmf)
			91, yield 20 gpm
678	25-19714	0-18	hardpan, sand, gravel (Qpmf)
		18-37 37-51 Cased to :	clay (Qpml) water-bearing sand and gravel (Qpmf) 51, yield 15 gpm
679	25-22768	0-18	dark brown hardpan and clay (Qpml)
		18-44 44-64	brownish-gray very fine silty sand with small lenses of clay (Qpml) light brown coarse water-bearing silty sand with some gravel (Qpmf)
		64-70 Cased to	water-bearing sand and gravel (Qpmf) 70, yield 18 gpm
680	25-20212	0-18	sandy (Qpmf)
		18-52	silty fine sand with lenses of clay (Qpml)
		52-85 Cased to	water-bearing sand and gravel (Qpmf) 85, yield 15 gpm
681	25-34688	0-55 55-205	fine sand and water (Qpml) trap rock
682	25-20896	0-31	coarse sand and gravel (Qpmf)
		31-47	very fine sand (Qpml)
		47-71 71-80	coarse silty sand and gravel (Qpmf) water-bearing sand and gravel (Qpmf)
			80, yield 15 gpm
683	25-21674	0-27 27-48	sand and gravel (Qpmf)
		48-62	silty fine sand with layers of clay (Qpml) water-bearing silty sand and gravel (Qpmf)
		62-65 65-72	hardpan and stones (Qpmf) water-bearing sand and gravel (Qpmf)
684	25-40320	29	
685	25-18880	0-29	sand and gravel (Qpmf)
		29-34	clay (Qpml)
		34-47	hardpan and stones (Qpmf)
		47-55 Cased to	water-bearing sand and gravel (Qpmf) 55, yield 15 gpm
686	25-38423	0-30 30-350	sand, gravel, cobbles (Qpmf over Qry) granite (basalt)
687	25-38360	0-34 34-195	sand, clay, gravel (Qpml over Qry) slate
688	25-38424	0-29 29-200	sand, clay, gravel, cobbles (Qpml over Qpmf) granite (basalt)
689	25-16993	0-19 19-24	sand and gravel (Qpmf) clay (Qpml)
		24-55 55-109	water-bearing sand (Qpmf) trap rock
690	25-16994	0-21	sandy (Qpml)
		21-26	clay (Qpml)
		26-57 57-107	water-bearing silty sand (Qpmf) trap rock
691	25-16321	0-18	sand and gravel (Qpmf)
			-

		18-59 silty sand (Qpml) 59-63 water-bearing sand and gravel (Qpmf) 63-75 trap rock
692	25-21473	0-12 hardpan with small lenses of sand and gravel (Qal) 12-55 gray clay with small layers of silty sand (Qpml) 55-175 trap rock
693	25-18091	0-46 fine sand with lenses of clay (Qpml) 46-150 trap rock
694	25-14542	0-125 sand and gravel (Qpmd) 125-274 pink granite (conglomerate)
695	25-49189	115
696	25-13962	0-8 hardpan (Qry) 8-191 pink granite (conglomerate)
697	25-25845	9
698	25-7000	0
699	25-30103	abbreviated 0-35 brown-gray sand, stones, gravel, trace clay (Qry)
700	25-37982	abbreviated 0-27 brown fine sand and fine-to-medium gravel (Qpmf) 27-40 basalt
701	25-17372	0-86 sand, gravel, large stones with small lenses of clay (Qpmf) 86-91 water-bearing sand and gravel Cased to 91, yield 10 gpm
702	25-22669	0-58 brown sand, gravel, trace to some silt (Qpmf) 58-60 refusal
703	25-22670	0-8 fill 8-17 brown medium-to-fine sand (Qpmf) 17-28 brown silty fine sand (Qpmf) 28-64 brown silt, sand, gravel (Qpmf) 64-102 gravel, sand, silt, some cobbles and boulders-till (Qpmf, Qry)
704	25-22616	abbreviated 0-60 brown sand and gravel (Qpmf) 60-62 brown large stones with very little sand (Qry) 62-63 gray trap rock
705	25-22674	0-44 brown fine sand with layers of silt (Qpmf) 44-49 brown medium-to-fine sand and gravel, trace cobbles, trace silt (Qpmf) 49-69 brown medium-to-fine sand, trace silt (Qpmf) 69-75 rock?
706	25-22667	brown medium sand, trace gravel, trace silt (Qpmf) 47-54 brown medium-to-coarse sand and gravel 54-60 brown silt with fine sand layers (Qpmf) 60-95 brown medium-to-fine sand, some gravel, some silt, trace cobbles (Qpmf)
707	25-22672	0-58 brown fine-to-medium sand with layers of gravel, some layers of silt (Qpmf) 58-112 brown fine-to-medium sand and gravel with some cobbles and some silt (Qpmf) 112-115 rock?
708	25-6609	0-60 real fine sand (Qpmf) 60-80 coarse gravel and sand (Qpmf) Cased to 80, yield 10 gpm
709	25-16532	0-62 sand and gravel, water-bearing below 47 (Qpmf) Cased to 62, yield 30 gpm

710	25-7727	0-30 30-50 50-92 Cased to 9	sand (Qpmf) clay (Qpml) sand (Qpmf) 2, yield 15 gpm	
711	25-8207	0-73 Cased to 7	fine sand, coarse sand (Qst over Qpmf) 3, yield 6 gpm	
712	25-22845	0-8 8-17 17-52 52-72	brown sand and gravel with some large stones (Qst) water-bearing brown silty sand with some gravel (Qst very fine water-bearing gray brown silty sand with sm (Qpml) water-bearing brown sand and gravel (Qpmf)	
		72-73	conglomerate	
713	25-18147	0-38 38-81 Cased to 8	clay (Qpml) sand and gravel (Qpmf) 1, yield 15 gpm	
714	25-30227	0-45 45-51 51-148	silt, gray clay, sand, water (Qstl over Qpml) gray clay and gravel (Qry) gray trap rock	
715	25-21033	0-38 38-44 44-140	coarse sand and gravel, small lenses of clay (Qpmf) fine silty sand and gravel (Qpmf) conglomerate	
716	25-22468	0-71 71-160	sand and gravel with layers of very fine sand and clay conglomerate	(Qpmf)
717	25-23288	0-13 13-32 32-38 38-41 41-110	sand and gravel with small layers of clay (Qpmf) clean sand and gravel (Qpmf) fine sand (Qpmf) hardpan and stones (Qpmf) conglomerate	
718	25-21031	0-24 24-45	very fine silty sand with lenses of gray clay (Qstl over trap rock	· Qpml)
719	25-15904	4		
720	25-15909	2		
721	25-7327	5		
722	25-7468	3		
723	25-10309	2		
724	25-40810	15		
725	25-18552	4		
726	25-23173	3		
727	25-38568	10		
728	25-20235	3		
729	22-10009	3		
730	25-11146	0-75 Cased to 7	hardpan, clay, gravel (Qstl over Qpml over Qpmf) 5, yield 50 gpm	
731	25-10668	0-6 6-54 54-87 87-205	gravel (Qstl) clay (Qpml) hardpan with some large boulders (Qpmf or Qry) red shale and conglomerate	
732	25-15430	0-8	sandy (Qstu)	

		8-61 61-121	clay (Qpml) trap rock
733	25-16549	0-15 15-52 52-150	sand (Qstu) clay (Qpml) trap rock
734	25-16649	0-10 10-40 40-48 48-125	sand (Qstu) clay (Qpml) sand (Qpmf or Qry) trap rock
735	25-21677	0-13 13-21 21-44 44-54 54-61 61-70 70-81 81-200	sand and gravel with large boulders (Qstl) hardpan with layers of clay (Qpml) gray clay (Qpml) hardpan and stones (Qpmf or Qry) water-bearing sand and gravel with some large boulders (Qpmf or Qry) silty water-bearing fine sand with some stones (Qpmf or Qry) hardpan and stones (Qpmf or Qry) red and gray shale
736	25-10190	0-65 Cased to 0	clay, hardpan, and gravel(Qpml over Qpmf or Qry) 65, yield 50 gpm
737	25-15803	4	
738	25-33293	20	
739	25-6958	4	
740	25-31362	6	
741	25-12810	0-18 18-59 59-62 62-108	sand and gravel (Qstu) clay (Qpml) hardpan (Qry) trap rock
742	25-9909	0-70 Cased to	clay, hardpan, boulders (Qpml over Qpmf or Qry) 70, yield 10 gpm
743	25-8205	0-40 40-85 85-130	clay (Qpml) sand (Qpml or Qpmf) shale
744	25-7881	0-82 82-140	clay and sand (Qstu over Qpml) shale
745	25-43884	0-5 5-9 9-15 15-20	yellow-brown sand (Qstu) yellow-brown medium sand to coarse sand, some small gravel (Qstu) gray clay, some silt (Qpml) gray silty clay with medium sand (Qpml)
746	25-8086	0-20 20-80 80-133	sand (Qstu) clay (Qpml) shale
747	25-28735	0-5 5-8 8-13 13-29 29-35 35-39 39-64 64-65 At 65	coarse brown sand, graded (Qst) fine and medium gray sand (Qst) brown stiff sandy clay (Qpml) gray stiff sandy clay (Qpml) gray soft sandy clay (Qpml) fine gray silty sand (Qpml) silty soft clay (Qpml) till (Qr) refusal
748	ACE B4	0-5 5-10 10-32	sand (Qal) silty sand (Qr) silt (Qr)

	ACE B9	0-5 5-10 10-14 14-32	silty sand (Qal) sand (Qal) silty sand (Qal) silt (Qpml)
750	25-9230	0-10 10-38 38-65 65-78 78-325	stony fill coarse gravel and sand (Qal) red clay (Qpml over Qr) stony red hardpan (Qr) red shale
751	25-11258	0-NR NR-150 Cased to 7	clay (Qpml) red shale 5, assumed depth to rock
752	25-9913	0-NR NR-85 Cased to 4	sand, clay (Qst over Qpml) shale 2, assumed depth to rock
753	25-17624	0-16 16-38 38-44 44-110	sandy (Qpmf) clay (Qpml) hardpan and stones (Qry) trap rock
754	25-20539	0-41 41-89 89-99 99-202	sand and gravel (Qpmf) gray clay (Qpml) hardpan and stones (Qry) trap rock
755	25-19300	20	
756	25-12450	4	
757	22-20560	5	
758	25-12493	0-10 10-12 12-50	sand (Qry) clay (Qry) trap rock
759	25-20110	0-4 4-152	clay and hardpan (Qry) trap rock
760	26-1472	1	
761	26-16312	3	
762	25-28068	0-32 32-302	sand, gravel (Qry) granite (basalt)
763	26-4428	10	
764	26-1697	0-8 8-96	sand (Qpp) trap rock
765	25-19178	9	
766	26-3982	6	
767	25-9054	25	
768	25-13618	2	
769	25-39070	14	
770	26-793	0	
771	25-1038	48	
772	25-522	3	

773	25-20234	0-4 4-10 10-127	sandy clay loam (Qry) silty red sand (Qry) trap rock
774	25-3237	1	
775	25-15658	5	
776	25-2583	8	
777	25-43319	5	
778	25-30764	10	
779	25-15902	0-15 15-180	clay (Qry) trap rock
780	25-3165A	0-18 18-93	clay (Qry) trap rock
781	25-10139	4	
782	25-20577	5	
783	25-16158	3	
784	25-20112	0-5 5-122 122-253	clay and hardpan (Qry) trap rock red shale and sandstone
785	25-38246	15	
786	25-22334	4	
787	26-4247	0-18	dug well
		18-31 31-42 42-45 45-48	clay (Qry) hardpan (Qry) water-bearing silty sand and gravel (Qry or Qsp) sandstone
788	26-4893	0-31 31-85	hardpan, clay, small layers of sand and stones (Qry) red and gray shale and sandstone
789	26-4324	0-12 12-18 18-96 96-142	clay (Qpml) sand (Qpml) hardpan and stones (Qry) red shale and sandstone
790	26-4302	2	
791	26-365	6	
792	25-12217	3	
793	25-24177	5	
794	25-24211	2	
795	25-24176	4	
796	25-20296	0-8 8-84 84-240	hardpan and stones (Qry) trap rock red and gray shale and sandstone
797	25-24499	0-3 3-69 69-261	hardpan (Qry) trap rock red and gray shale and sandstone

798	25-23174	2	
799	25-17652	0-8 8-140	hardpan and stones (Qry) red and gray shale and sandstone
800	25-20263	0-4 4-125 125-302	dead sand and clay (Qry) trap rock red shale and sandstone
801	25-18959	0	
802	25-17788	3	
803	25-20488	0-8 8-130	hardpan and stones (Qr) red sandstone
804	25-16007	0-16 16-166	hardpan and stones (Qr) red and gray shale and sandstone
805	25-17714	2	
806	25-20492	0-8 8-211	hardpan, large stones, and small lenses of gravel (Qry) red and gray shale
807	25-15729	0-11 11-166	hardpan, stones, and some boulders (Qry) red and gray shale
808	25-18224	0-3 3-180	hardpan (Qry) red and gray shale
809	25-14300	7	
810	25-17932	5	
811	25-20262	2.5	
812	25-15761	0-8 8-290	clay (Qry) red shale
813	25-10055	8	
814	25-13356	0-13 13-305	hardpan, stones, boulders (Qry) red and gray shale
815	25-20591	2.5	
816	25-17558	3	
817	25-12688	2	
818	25-9879	0-9 9-122	hardpan (Qr) red and gray shale
819	25-19901	0-6 6-166	hardpan and stones (Qr) red and gray shale
820	25-17702	0-8 8-240	hardpan and stones (Qr) red and gray shale
821	25-10510	9	
822	25-10669	11	
823	25-10509	8	
824	25-10671	10	
825	25-10958	11	
826	25-11386	7	

827	25-10670	10	
828	25-10024	9	
829	25-10255	11	
830	25-10075	12	
831	25-10206	7	
832	25-11387	11	
833	25-10253	9	
834	25-10618	7	
835	25-9921	5	
836	25-9922	4	
837	25-10619	7	
838	25-20399	0-11 11-160	hardpan with some large stones (Qr) red and gray shale
839	25-23864	0-9 9-160	hardpan with small lenses of sand and gravel (Qr) shale and sandstone
840	25-13016	0-17 17-100	hardpan, clay and boulders (Qr) red shale
841	22-25260	8	
842	25-19439	0-4 4-18 18-100	fill hardpan and clay (Qr) red and gray shale
843	25-21619	0-7 7-145	hardpan with some large stones (Qry) shale and sandstone
844	25-11768	0-21 21-55	clay and hardpan (Qry) red shale
845	25-19850	0-30 30-75	hardpan, boulders, and lenses of sand and gravel (Qry) red and gray shale
846	25-21726	0-41	hardpan and stones with small lenses of sand and gravel and some large boulders (Qr)
		41-80	red and gray shale
847	25-11180	0-48 48-59 59-93	clay (Qpml or Qr) hardpan and stones (Qr) red shale
848	25-13529	0-54 54-69 69-73 Cased to 7	hardpan and stones (Qry) water-bearing silty sand and gravel (Qsp) water-bearing sand and gravel (Qsp) 73, yield 25 gpm
849	25-12807	0-16 16-58	hardpan, clay, and some large stones (Qry) gray and red shale
850	26-7681	0-38 38-53 53-58 58-130	hardpan, lenses of sand and gravel with some very large stones (Qry) water-bearing very silty sand and gravel (Qsp) hardpan and stones (Qb?) red and gray shale
851	25-25548	0-34	hardpan with some very large stones and small lenses of sand and gravel (Qry)

		34-47 47-51 51-67 67-73 73-125	water-bearing silty sand and gravel (Qsp) clay (Qsp) heaving water-bearing sand and gravel (Qsp) hardpan and stones (Qb?) black and red shale
852	25-15440	0-33 33-59 59-96 96-105	hardpan, stones, and some large boulders (Qry) clay (Qsp) silty water-bearing sand and gravel (Qsp) sandstone
853	26-11061	0-8 8-248	sandy hardpan (Qry) trap rock
854	25-24406	0-7 7-13 13-100	sand and gravel (Qpmf) conglomerate trap rock
855	ACE FL-11	0-2 2-16 16-22	fill silty sand (Qst) clay (Qpml)
856	26-2693	0-20 20-40 40-71 Cased to 7	sand (Qst) clay (Qpml) sand (Qpmf) (1, yield 15 gpm
857	26-29699	41	
858	26-1474	0-70 70-94 At 94 Screened 6	clay and stones (Qst over Qr) gray sand and gravel (Qsp) red shale 7-92, yield 360 gpm
859	26-1461	0-40 40-45 45-70 70-84 84-91 Screened 7	clay and boulders (Qr) coarse gravel (Qsp) sandy clay with little gravel (Qsp) coarse gravel and sand (Qsp) red shale 10-84, yield 50 gpm
860	26-1496	0-30 30-82 At 82 Screened 5	clay and stones (Qpmf over Qr) sand and coarse gravel (Qsp) red shale 8-78, yield 554 gpm
861	N23-41-585	0-7 7-24 24-55	silty fine sand (Qst) silty sand and gravel (Qst) silt and clay (Qpml)
862	N23-41-528	0-160 160-350	clay (Qpml) gray and red shale
863	26-3627	0-8 8-19 19-50 50-60 60-77 77-143	sand (Qst) clay (Qpml) sand and gravel (Qr) hardpan (Qr) fine sand (Qsp) black and red shale
864	26-5392	0-7 7-29 29-38 38-48	brown sand (Qst) gray clay (Qpml) hardpan and stone with some boulders (Qry) trap rock
865	26-2876	0-15 15-50 50-107 Cased to 1	sand (Qst) clay (Qpml) sand (Qpmf) 07, yield 10 gpm

866 26-4243 0-21 sandy (Qst)
21-89 clay (Qpml)
89-106 water-bearing sand and gravel (Qpmf)
Cased to 106, yield 15 gpm

¹Identifiers of the form 26-xxxx, 25-xxxx, 22-xxxx, and 23-xxxx are well permit numbers issued by the N. J. Department of Environmental Protection, Bureau of Water Allocation. Identifiers of the form xx-xx-xxx are N. J. Atlas Sheet grid coordinates of well records in the Bureau of Water Allocation files that do not have permit numbers. Identifiers of the form Nxx-xx-xxx are N. J. Atlas Sheet grid coordinates of entries in the N. J. Geological Survey permanent note collection. Identifiers preceded by "ACE" are U. S. Army Corps of Engineers borings on file at the N. J. Geological Survey. Identifiers preceded by "DOT" are N. J. Department of Transportation borings on file at the N. J. Geological Survey.

²A number without a log is the depth, in feet below land surface, to bedrock reported for wells where the surficial material is either not identified or identified only as "overburden" or other non-informative terminology. For wells and borings with logs of the surficial materials of sufficient detail, the depth (in feet below land surface) and driller's or logger's description is provided. Inferred map units and comments by author are in parentheses. Some inferred map units may not exactly match the map and sections due to scaling and lack of detail in drillers' descriptions. All descriptions are reproduced as they appear in the original source, except for minor format, punctuation, and spelling changes. Logs identified as "abbreviated" have been condensed for brevity. Many bedrock descriptions have been condensed; these are not identified as abbreviated. The notation "NR" indicates "not reported". For wells completed in surficial materials, the screened interval (in feet below land surface), or depth below land surface (in feet) to which the well is cased, and yield (in gallons per minute, gpm) are reported beneath the log. Map units are inferred from the known extent of materials at the surface and from known depositional settings, in addition to the drillers' descriptions.

Table 2.--Composition of pebbles in surficial deposits

Site	Unit	Number	Percentages of pebbles					
		ofpebbles	gneiss ¹	gray mudstone ²	red sandstone, mudstone, conglomerate ³	purple quartzite ⁴	basalt⁵	chert ⁶
1	Qbr	151	66	22		12		
2	Qbu2	82	57	40		3		
3	Qbu1	100	89	3		8		
4	Qbu2	114	63	33		4		
5	Qbu2	146	69	27		4		
6	Qbu1	118	27	70		3		
7	Qfy	82	85	9		6		
8	Qn	155	55	37		8		
9	Qpmd	134	75	20		5		
10	Qpmf	159	63	32		5		
11	Qpmf	115	65	31		4		
12	Qpmf	146	68	29		3		
13	Qpmd	164	61	30		9		
14	Qpmf	148	68	27		5		
15	Qpp	129	68	27		5		
16	Qpp	133	67	29		4		
17	Qm1	98	61	34		5		
18	Qry	118	36	34	5	6	19	
19	Qm1	107	63	34		3		
20	Qst	91	66	31		3		
21	Qst	121	62	35		3		
22	Qry	81	56	17		2	24	1
23	Qn	132	76	12		2	10	1
24	Qry	169	59	19		1	20	1
25	Qst	120	64	25	4	3	4	
26	Qpmd	107	56	41		3		
27	Qpmf	166	54	43		3		
28	Qpmf	150	33	53	14			
29	Qpmd	161	27	24	49			
30	Qpmd	133	30	18	52			

31	Qpmf	157	34	18	48			
32	Qpmf	106	27	39	30	4		
33	Qpmf	48	27	23	40	10		
34	Qpmf	147	34	21	44	1		
35	Qn	144	59	31	6		4	
36	Qstu	110	50	35	6	9		
37	Qbu3	128	78	14		8		
38	Qpmf	136	22	21	57			
39	Qpmf	153	65	31		4		

¹Proterozoic gneiss from the Highlands.

²Paleozoic sedimentary rocks from the Wallkill Valley and Green Pond mountain belt.

³Sedimentary rocks from the Newark Basin.

⁴Quartzite-conglomerate from the Green Pond and Skunnemunk formations in the Green Pond mountain belt.

⁵Basalt from the Watchung and Hook Mountain basalt flows of the Newark Basin.

⁶Chert from Paleozoic carbonate rocks in the Wallkill Valley.