Prepared in cooperation with the
U.S. GEOLOGICAL SURVEY
NATIONAL COOPERATIVE GEOLOGIC MAPPING PROGRAM

INTRODUCTION

The Cedarville quadrangle is situated in southwestern New Jersey, within New Jersey's Outer Coastal Plain physiographic province. It encompasses parts of Fairfield, Lawrence, and Downe townships in Cumberland County. Elevations in the quadrangle vary from sea level to approximately 100 feet above sea level, with the lowest points found in the southwestern corner along the Delaware Bay and the highest elevations located in the northeastern corner along Ramah Road.

The geological units exposed in the map area consist of surficial units that are underlain by older, unconsolidated bedrock units. Unconsolidated bedrock units include marginal marine to marine sediments of the Cohansey Formation, which represent a period of high sea level in the Early to Middle Miocene. After the deposition of the Cohansey Formation, a drop in sea level exposed the region to fluvial erosion from a major drainage system, leading to the deposition of fluvial sediments of the Bridgeton Formation during the Late Miocene. Further drop in sea level caused this large river system to down cut and shift to the west. Throughout the Pliocene, Pleistocene, and Holocene, the map area experienced incision and deposition from new local drainage systems and at least three minor sea-level rises, leading to the formation of various surficial units, including fluvial, freshwater wetland, salt-marsh, estuarine, and marine sediments.

Sediment lithologies for these units are described in the *Description of Map Units*. Lithologies and extent of the surficial units and the sand facies of the Cohansey Formation are based on previously collected and new field data, well records, Digital Elevation Model (DEM) data generated using a UTM coordinate system based on the NAD83 datum, with elevations referenced to NAVD88 and a spatial resolution of 10 feet (State of New Jersey, 2021b), and infrared and natural color orthoimagery (State of New Jersey, 2019, 2021a). Lithologies for the units that occur only in the subsurface (i.e., the Shark River (Tsr) and the Kirkwood (Tkw) formations and the clay-sand facies of the Cohansey Formation (Tchc)) are based on well records, adjacent geologic maps (Stanford, 2011, 2019), geophysical logs, and a corehole study conducted in Millville, NJ (Sugarman et al., 2005) which is located approximately three miles northeast from the northeastern corner of the Cedarville quadrangle.

Cross sections A-A' and B-B' show the lateral extent and thickness of surficial and unconsolidated bedrock units to elevations of as much as 600 feet (183 m) below sea level. These cross sections were constructed using geophysical logs (gamma and single-point resistance) and driller's logs on file at the New Jersey Geological and Water Survey (NJGWS) and were correlated to the stratigraphic corehole located in Millville, NJ as mentioned above.

Table 1 (in the pamphlet) details the geologic formations encountered by wells on file at the New Jersey Department of Environmental Protection (NJDEP), one oil and natural gas exploration well from the 1916, and one vibracore collected during a previous study (O'Neal and McGeary, 2002), as shown on the map. Geologic interpretations for the wells and vibracore are derived from lithologic descriptions and, when available, geophysical logs. Wells and vibracores within this list are drilled to depths ranging from 16 to 570 feet (5 to 174 m). Most of these wells are completed in the Cohansey Formation (Kirkwood-Cohansey aquifer system); however, along the shoreline in the small beach communities of Money Island, Gandy's Beach (Cove Road), and Dyer Creek Road, wells are more commonly finished in the Shark River Formation (Piney Point aquifer).

SURFICIAL DEPOSITS

During the Late Miocene (11.6 Ma to 5.3 Ma; Ma = million years before present), a large river system formed a broad plain of braided rivers and streams across southern New Jersey, including the quadrangle area (Salisbury and Knapp, 1917; Owens and Minard, 1979; Newell et al., 1995). The fluvial sediments deposited by this large river system are referred to as the Bridgeton Formation (Tb). Remnants of this formation still exist today on uplands in the northeastern corner of the map area at elevations of approximately 50 feet and higher. The Bridgeton Formation does not contain datable materials; however, its stratigraphic position between the Middle Miocene or younger Cohansey Formation and the Pliocene-aged Pensauken Formation, which is a fluvial deposit that is inset into the Bridgeton Formation to the west, indicates a Late Miocene age (Stanford, 2019). By the Early Pliocene (5.3 Ma to 3.6 Ma), lowering of sea level caused the Bridgeton River system to down cut and shift to the west of the quadrangle to what is now the lower Delaware Valley (Stanford, 2019).

During the Pleistocene, the mapped area experienced at least three times when sea level was higher than at present, each marked by three distinct transgressive sequences referred to as the Cape May Formation, unit 1 (Qcm1), Cape May Formation, unit 2 (Qcm2), and Cape May Formation, unit 3 (Qcm3) (Newell et al., 1995).

The earliest of these highstands is marked by the Cape May Formation, unit 1 (Qcm1) which consists of estuarine sand and gravel. In the map area, it is found at elevations up to 60 feet (18 m) above present-day sea level. It is preserved at the surface of the map area as terraces and benches that define a wave-cut marine platform that extends approximately 5 to 30 feet (1.5 to 9 m) higher than the next, younger sea level highstand identified in the map area (unit 2 of the Cape May Formation). Amino acid racemization (AAR) ratios measured from shells collected on the Cape May Peninsula and in sand pit excavations near the Maurice River indicate an age between 450 ka and 200 ka (ka = thousand years before present) (Lacovara, 1997; O'Neal et al., 2000; Sugarman et al., 2007), corresponding to Marine Isotope Stages (MIS) 7, 9, or 11. The sea level recorded during MIS 11 in the Bahamas and Bermuda (Olson and Hearty, 2009) is similar to that recorded by the Cape May Formation, unit 1 in New Jersey, suggesting a comparable age for this unit.

Inset into Cape May Formation, unit 1 deposits are the unit 2 deposits of the Cape May Formation, which consist of sandy tidal-flat and shoreline sediments (Qcm2) and bay muds (Qcm2f). In the map area, the Cape May Formation, unit 2 deposits are found at elevations up to 40 feet (12 m) above present-day sea level. They are preserved at the surface of the map area on a wave-cut marine platform that terminates bayward at a well-pronounced scarp termed the "Cedarville scarp" by Newell et al. (1995). This platform extends approximately 5 to 20 feet (1.5 to 6 m) higher than the next, youngest sea-level highstand identified in the map area (unit 3 of the Cape May Formation) and parallels the present-day shoreline. AAR ratios measured on shells from the Cape May Peninsula indicate a Late Pleistocene age (Sangamonian interglacial stage, MIS 5) for unit 2 of the Cape May Formation (Lacovara, 1997).

Well records and geophysical logs from areas around Newport Neck, Jones Island, and Fairfield show especially thick (up to 50 feet or 15 m) bay mud deposits (Qcm2f) (see cross sections A-A' and B-B' and table 1). These findings align with previous studies (O'Neal and McGeary, 2002; Newell et al., 1995) that have identified a deep paleochannel within the map area using well, vibracore, hand-auger, and/or ground penetrating radar (GPR) data. This paleochannel extends from the northwestern corner of the quadrangle to the south before feeding into a deeper, main channel that extends from the upper reaches of the Delaware Bay southeast across the Cape May Peninsula. Figure 1 illustrates the location of this channel within the map area, along with other MIS 6 channels and Quaternary deposits that have been mapped in prior studies.

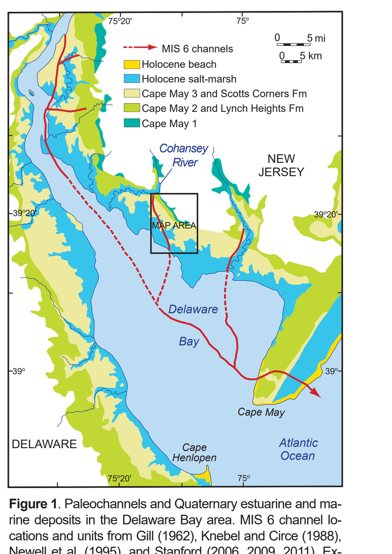

Figure 1. Paleochannels and Quaternary estuarine and marine deposits in the Delaware Bay area. MIS 6 channel locations and units from Gill (1962), Knebel and Circe (1988), Newell et al. (1995), and Stanford (2006, 2009, 2011). Extents of the deposits in Delaware are from Ramsey (2005, 2007, 2010). Channel is dashed outside area of seismic coverage. Figure slightly modified from Stanford et al. (2016).

O'Neal and McGeary (2002) and Newell et al. (1995) propose that this paleochannel represents an earlier course of the Cohansey River, situated just north of the mapped area as shown in figure 1. Deposition of unit 2 sediments of the Cape May Formation likely diverted the Cohansey River westward, altering its original north-south flow (O'Neal and McGeary, 2002). Well records (shown in table 1) indicate that the deepest incision was to an elevation of approximately 85 feet (26 m) below sea level. Newell et al. (1995) mapped the maximum depth of incision in the map area as ranging from 50 to 100 feet (15 to 30 m). South of the map area in the Delaware Bay, Knebel and Circe (1988) mapped the maximum depth of incision to be at least 100 feet (15 m) below sea level. Situated between units 1 and 2 of the Cape May Formation deposits, this erosional surface likely formed during low sea levels between the deposition of the two units.

In this map area and the adjacent Bridgeton quadrangle (Stanford, 2019) to the north, fluvial sediments in the form of an upper stream terrace (Qtu) occur upstream from the limit of deposition of the Cape May Formation, unit 1 (fig. 2) and unit 2. During the Middle to Late Pleistocene, the formation of permafrost may have impeded the infiltration of water into the soil (French et al., 2007) causing an increase in runoff and slope erosion that resulted in an influx of sediment in the valleys of the map area. Evidence of slope erosion in this quadrangle and the Bridgeton quadrangle are shallow, inactive paleogullies (fig. 2) that extend into the upland areas bordering upper stream terrace and Cape May Formation, unit 1 and unit 2 deposits. In places, upper terrace deposits are inset into and overlie the Cape May Formation, unit 1 and unit 2 deposits, indicating that deposition of the upper terrace deposits continued as lea level lowered after the deposition of the Cape May Formation, unit 2 sediments.

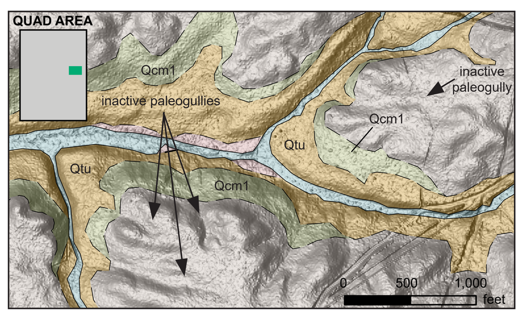

Figure 2. Hillshade imagery showing shallow, inactive paleogullies. Location shown in inset and on figure 3a with green box. Imagery was generated from DEM data (State of New Jersey, 2021b) with a spatial resolution of 10 feet using a multidirectional hillshade analysis with a Z factor of 10 to highlight topographic features.

Estuarine sediments of the Cape May Formation, unit 3 (Qcm3 and Qcm3f) overlay Cape May Formation, unit 2 and older upper terrace deposits. These sediments consist of estuarine and fluvial, quartz sand, silty sands, gravels, and silty clays and are found at elevations up to 25 feet (7.5 m) above present-day sea level. The inland limit of the Cape May Formation, unit 3 is especially visible on hillshade imagery (fig. 3) as a well-pronounced scarp termed the "Cedarville scarp" by Newell et al. (1995). Optically stimulated luminescence dates obtained from east of the Cohansey River, and radiocarbon dates obtained from organic matter in the Canton quadrangle (NJ-DE) are consistent with a MIS 5 or Late Pleistocene age (O'Neal and Dunn, 2003; Stanford, 2011).

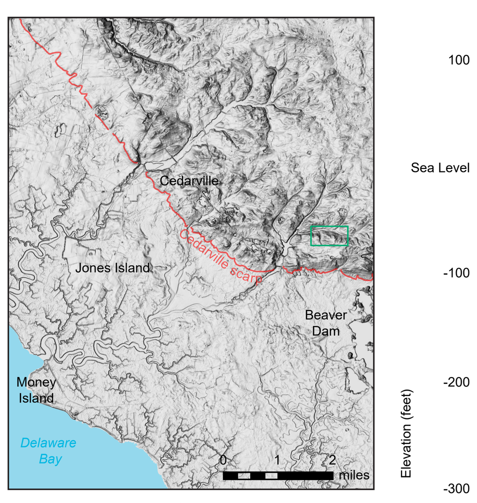

Figure 3. Hillshade imagery of the map area showing inland limit of the Cape May Formation, unit 3 (Qcm3) or the Cedarville scarp (shown with orange line). Green box shows location of figure 3b. Imagery was generated from DEM data (State of New Jersey, 2021b) with a spatial resolution of 10 feet using a multidirectional hillshade analysis with a Z factor of 15 to highlight topographic features.

Around 70 ka, the Wisconsinan glacial stage began, causing global sea levels to fall. Sediments of the Cape May Formation and older were incised and eroded. The formation of permafrost may have again led to increased slope erosion, forming lower terrace deposits (Qtl) in previously incised valleys. These deposits consist of fluvial sediments and are typically found inset into upper terrace deposits. Around the beginning of the Holocene (11 ka) or earlier the climate began to warm, permafrost melted, sediment influx slowed, and the lower terraces were incised to form the present-day floodplains (Qals). The melting of permafrost may have also created shallow topographic basins (shown in fig. 4 and as blue diagonal ruling pattern on the map). These basins are circular or elliptical, shallow depressions and are scattered across the map area but occur mostly in Cape May, unit 2 and unit 3 deposits. They range from 50 feet (15 m) to 0.2 miles (0.3 km) in size and are typically less than 5 feet (1.5 m) deep.

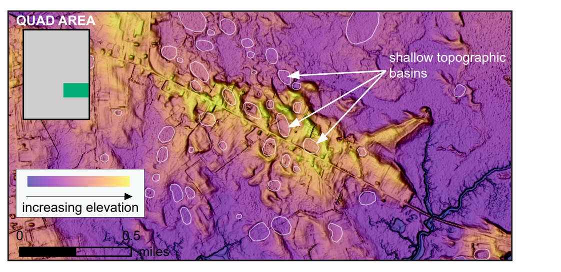

Figure 4. Hillshade imagery showing shallow topographc basins (outlined in white). Imagery was generated from DEM data (State of New Jersey, 2021b) with a spatial resolution of 10 feet using a multidirectional hillshade analysis with a Z factor of 15 to highlight topographic features. Inset shows figure location in map area.

Sea-level rise during the Holocene (about 11 ka to present) has caused a landward advancement of modern-day estuarine and salt-marsh deposits (unit Qm) and beach deposits (unit Qbs) along the Delaware Bay. Most of this deposition occurred between 10 ka and 4 ka (Fletcher et al., 1990). However, in more recent years, sea-level rise has accelerated. Shorelines traced from orthoimagery (State of New Jersey, 2007, 2019) and topographic map sheet 95 (N.J. Geological Survey, c. 1880, scale 1:21,120) from the years 1870-1887, 1930, and 2007 (shown as solid yellow, blue, and pink lines on the map) suggest up to 0.2 miles (0.3 km) of shoreline retreat since the 1880s in the Nantuxent Point and Newport Neck areas.

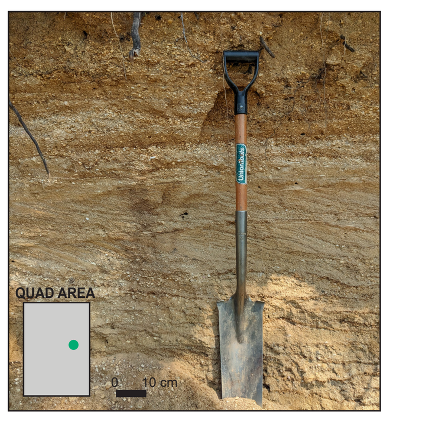

Figure 5. Pale-brown and light- to dark-yellowish-brown, gravelly, fine- to medium-grained, quartz sand with thin-bedded (3 cm to 1 ft), planar, cross-bedding of the Cape May Formation, unit 1 (Qcm1). Inset shows figure location in map area. Photograph by A.R. Carone.

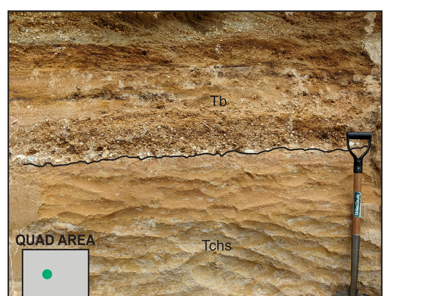

Figure 6. Reddish-yellow, gravelly, slightly clayey, fine- to very coarse-grained, quartz sand with ironstone concentrations and thin-bedded (3 cm to 1 ft), planar, cross-bedding (Tb) underlain by brownish-yellow, medium- to coarse-grained, quartz sand with some very thin, light-gray, clay lenses (Tchs). Inset shows figure location in map area. Photograph by A.R. Carone.

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DESCRIPTION OF MAP UNITS

Color designations are based on Munsell Color Company (1975).

Holocene and Pleistocene Deposits

ARTIFICIAL FILL – Gravel, sand, silt, and clay; gray, brown, and yellow. Organic material, construction debris, and trash in places. Sand is fine- to coarse-grained. Up to 45 feet (14 m) thick. Typically occurs beneath roadways, in earthen dams and dikes, around stormwater management infrastructure, and as infill in mined areas.

Qm — SALT-MARSH AND ESTUARINE DEPOSITS – Peat, clay, silt, and fine- to medium-grained, quartz sand; very dark-gray, dark-gray, dark-grayish-brown, and brown. Contains white, gray, and pink granules and pebbles (2 mm to 1.5 cm) in places and abundant organic matter and shells. Up to 30 feet (9 m) thick (estimated). Vegetated with marsh grass. Deposited in tidal wetlands, salt marshes, tidal flats, and tidal channels during the Holocene sea-level rise during the past 10,000 years.

Qals — ALLUVIUM AND FRESHWATER WETLAND DEPOSITS – Silty, clayey, gravelly, fine- to very coarse-grained, sub- to well-rounded, quartz sand; gray, grayish-brown, dark-brown, and black; peat in places. Gravel is white, yellow, reddish-yellow, pink, and gray, well-rounded to subangular granules and pebbles (4 mm to 6 cm) comprised of quartz and some quartzite. Up to 5 feet (1.5 m) thick but typically less. Deposited in modern-day fluvial channels, floodplains, and freshwater wetlands.

Qbs — BEACH SAND – Fine- to medium-grained quartz sand; white, pale-brown, yellowish-brown. Contains minor amounts of shell fragments and white, gray, and pink, well-rounded, quartz pebbles (2 mm to 1.5 cm). Up to 8 feet (2.5 m) thick. Forms in areas that border the Delaware Bay and overlies salt-marsh and estuarine deposits.

Qtl — LOWER TERRACE DEPOSITS – Silty, fine- to coarse-grained, quartz sand, minor gravel and clay; light- to dark-gray, brown, dark-brown, very pale-brown, and yellowish-brown. Gravel is white, yellow, and gray, sub- to well-rounded, quartz and some quartzite granules and pebbles (2 mm to 6 cm). Up to 5 feet (1.5 m) thick. Forms terraces and pediments with top surfaces that are within 5 feet (1.5 m) above the modern-day floodplain.

Qtu — UPPER TERRACE DEPOSITS – Silty, gravelly, medium- to coarse-grained quartz sand, minor clay; gray, grayish-brown, pale-brown, brown, yellowish-brown, and light-olive-brown. Gravel is white, yellow, gray, and, in places, pink, sub- to well-rounded, quartz and some quartzite granules and pebbles (2 mm to 6 cm). Minor amounts of fine- and very coarse-grained, quartz sand, and chert. Up to 15 feet (4.5 m) thick. Forms terraces and pediments with top surfaces that are 5 to 30 feet (1.5 to 9 m) above the modern-day floodplain, and valley bottom fills in small tributary valleys on upland areas.

CAPE MAY FORMATION – Fine- to medium-grained quartz sand, silty sand, and silty clays; minor gravel. Consists primarily of estuarine deposits of Pleistocene age that mark previous sea levels higher than present-day sea level. The Cape May Formation is divided into three units that are distinguished from each other by surface elevation and age (Newell et al., 1995):

Qcm3, Qcm3f — Cape May Formation, unit 3 – Fine- to medium-grained, quartz sand, silty sand, and silty clay, minor gravel; yellowish-brown, brown, pale-brown, light-olive-brown, and gray. Gravel is typically white, grey, and, in places, yellow, pink, and reddish-yellow, quartz and quartzite pebbles and granules (2 mm to 1.5 cm). Minor amounts of coarse sand grains and mica in places. Well records show thin beds (up to 30 feet or 9 m) of silty clay or clay (Qcm3f) in places. Total thickness, including the finer-grained sediments, is up to 40 feet (12 m). Forms a terrace with a maximum surface elevation of up to 25 feet (7.5 m) in the map area.

Qcm2, Qcm2f — Cape May Formation, unit 2 – Fine- to medium-grained, quartz sand and clay; yellowish-brown, brown, and light-olive-brown. Minor amounts of silt, coarse-grained sand, and gravel in places. Gravel is typically white, gray, yellow, and, in places, pink and reddish-yellow, quartz, quartzite, and white and gray chert pebbles and granules (2 mm to 1.5 cm). Chert granules and pebbles typically range in size from 2 to 8 mm. Forms a terrace with a maximum surface elevation of up to 40 feet (12 m) in the map area. In the subsurface, some well records indicate thick (up to 80 feet or 24 m), dark-colored layers of clay, silt, and silty sands, in places, containing organic matter. These fine-grained sediments (Qcm2f) occur in the subsurface only. These sediments are thickest in areas of Newport Neck, Jones Island, and Fairfield and may overlie a thin fluvial sand and gravel in the lowest part of the paleovalley. Total thickness, including the finer-grained sediments, is up to 100 feet (30.5 m).

Qcm1 — Cape May Formation, unit 1 – Gravelly, fine- to medium-grained, quartz sand (fig. 5); pale-yellow, light- to dark-yellowish brown, and pale-brown. Gravel is typically white, gray, yellow, and, in places, pink and reddish-yellow, pebbles and granules (2 mm to 1 cm) comprised of quartz, quartzite, and white and gray chert. Minor amounts of coarse sand and silt in places. Beds are 3 centimeters to 1 foot thick and are planar-horizontal to cross-bedded (fig. 5). Up to 20 feet (6 m) thick. Forms a terrace with a maximum surface elevation of up to 60 feet (18 m) in the map area.

Miocene Deposits

Tb — BRIDGETON FORMATION – Clayey, gravelly sand (fig. 6) and gravelly, sandy clay, slightly silty; strong-brown, reddish-brown, reddish-yellow, yellow-brown, brown, olive-brown. Sand is medium- to coarse-grained with minor amounts of fine- and very coarse-grained sand and consists of sub- to well-rounded quartz and chert. Typically unstratified or poorly stratified but can include medium- to thickly-bedded (3 cm to 3 feet) with planar-horizontal bedding and cross-bedding in places (fig. 6). Gravel is white, yellow, reddish-yellow, and pink, well-rounded to subangular, thinly-bedded (3 cm to 1 ft) quartz and quartzite and gray and white, subrounded to subangular chert; gravel size ranges from granules to pebbles (2 mm to 6 cm) with minor amounts of cobbles (6.5 to 16 cm). Iron-cemented masses present in places. Up to 35 feet (10.5 m) thick but typically ranges from 10 to 20 feet (3 to 6 m). Deposits cap uplands above approximately 50 feet in elevation in the northeastern part of the quadrangle.

COHANSEY FORMATION – Quartz sand with interbedded clay and sand. As much as 120 feet (36.5 m) thick in the map area. Strontium isotope ratios from shells in the underlying Kirkwood Formation (Sugarman et al., 1993) suggest a Middle Miocene or younger age. Unconformably overlies the Kirkwood Formation. The Cohansey Formation is divided into two units that are distinguished from each other by lithology:

Tchs — Sand Facies – Fine- to medium-grained, some medium- to coarse-grained, quartz sand with trace amounts of light-gray clay (fig. 6); very pale-brown, brownish-yellow, yellow, reddish-yellow, and white. Minor amounts of silt and opaque white and gray, sub- to well-rounded, quartz granules and pebbles typically ranging in size from 2 to 4 mm but can have a maximum clast size of 1.5 cm in places. Represented by large blocks of low readings in gamma-ray logs. Up to 90 feet (27 m) thick according to well records but typically between 5 and 45 feet (1.5 and 14 m).

Tchc — Clay-Sand Facies – Clay with interbedded very fine- to fine-grained sand, minor silt; white, yellow, brown, gray, and black. Clay beds contain lignitic organic matter in places. Represented by a thin, sharp spike in gamma-ray logs. Up to 30 feet (9 m) thick according to well records but is typically 5 to 15 feet (1.5 to 4.5 m) and may extend laterally up to a mile within the subsurface of the map area. Occurs in the subsurface only.

Tkw — KIRKWOOD FORMATION – Very fine- to medium-grained, some coarse- to very coarse-grained, well-rounded, slightly micaceous, silty, quartz sand interbedded with clay; light- and dark-gray, bluish-gray, grayish-brown, brown, and black (Sugarman et al., 2005). Heavily bioturbated; contains lignite and shells (Sugarman et al., 2005). Ranges from 255 to 310 feet (78 to 94.5 m) thick in the subsurface of the map area. Correlation between Well 11 and the Millville corehole (Sugarman et al., 2005) suggests that this formation includes the Brigantine, Shiloh, and Wildwood Members. Early to Middle Miocene in age based on strontium stable-isotope ratios (Sugarman et al., 1993, 2005; Stanford, 2011). Unconformably overlies the Shark River Formation. Occurs in the subsurface only.

Eocene Deopsits

Tsr — SHARK RIVER FORMATION – Medium- to coarse-grained, shelly, glauconitic, quartz sand interbedded with sandy clay underlain by glauconitic, slightly shelly, silt and clay; grayish-green, green, and brown (Sugarman et al., 2005). Glauconite content typically ranges between 10 and 20% but is as much as 50% in the upper part of the formation and locally as much as 40% in the lower part of the formation (Sugarman et al., 2005). The contact between the Kirkwood and Shark River formations is generally easily identifiable with gamma-ray response and well records showing a lithologic change from very fine-grained sediments (typically clays) of the Kirkwood Formation to coarser-grained sediments (typically fine- to medium-grained sand) of the underlying Shark River Formation. This upper sand, also known as the Piney Point aquifer (Rooney, 1971; Sugarman and Monteverde, 2008), ranges in thickness from 65 feet to 85 feet (20 to 26 m). Total formation thickness is up to 210 feet (64 m). Middle to late Eocene in age based on nannofossils (Browning et al., 2011) and planktonic foraminifers (Sugarman et al., 2005). Occurs in the subsurface only.

EXPLANATION OF MAP SYMBOLS

Contact - Solid where well-defined on hillshade imagery generated from DEM data (State of New Jersey, 2021b) and orthoimagery (State of New Jersey, 2019, 2021a); dashed where approximately located; dotted where concealed; dotted and queried where unit was removed by excavation.

Tch / Tkw — Concealed bedrock contact - Contact of the Cohansey (Tch) and Kirkwood (Tkw) formations beneath surficial deposits. Approximately located.

3Qtu/5Tb — Material observed in exposure, excavation, or penetrated in five-foot hand-auger hole - Annotation present where more than one unit was observed. Upper unit is indicated before the slash; lower unit is indicated after the slash. Number indicates depth (in feet) to which the unit is observed.

9Qcm1 — Material formerly observed in outcrop or excavation - Numbers indicate depth (in feet) to which material was observed. Where more than one unit was observed, upper unit is indicated before the slash; lower unit is indicated after the slash. A missing number indicates that a depth was not reported in the field note. Field notes on file at the NJGWS.

4, 228 — Well or test boring (top) or vibracore (bottom) - Identifier is the site I.D. number shown in table 1 (in pamphlet). List of formations penetrated provided in table 1. Locations accurate to within 500 feet.

fig. 5 — Photograph location - Identifier refers to figure number.

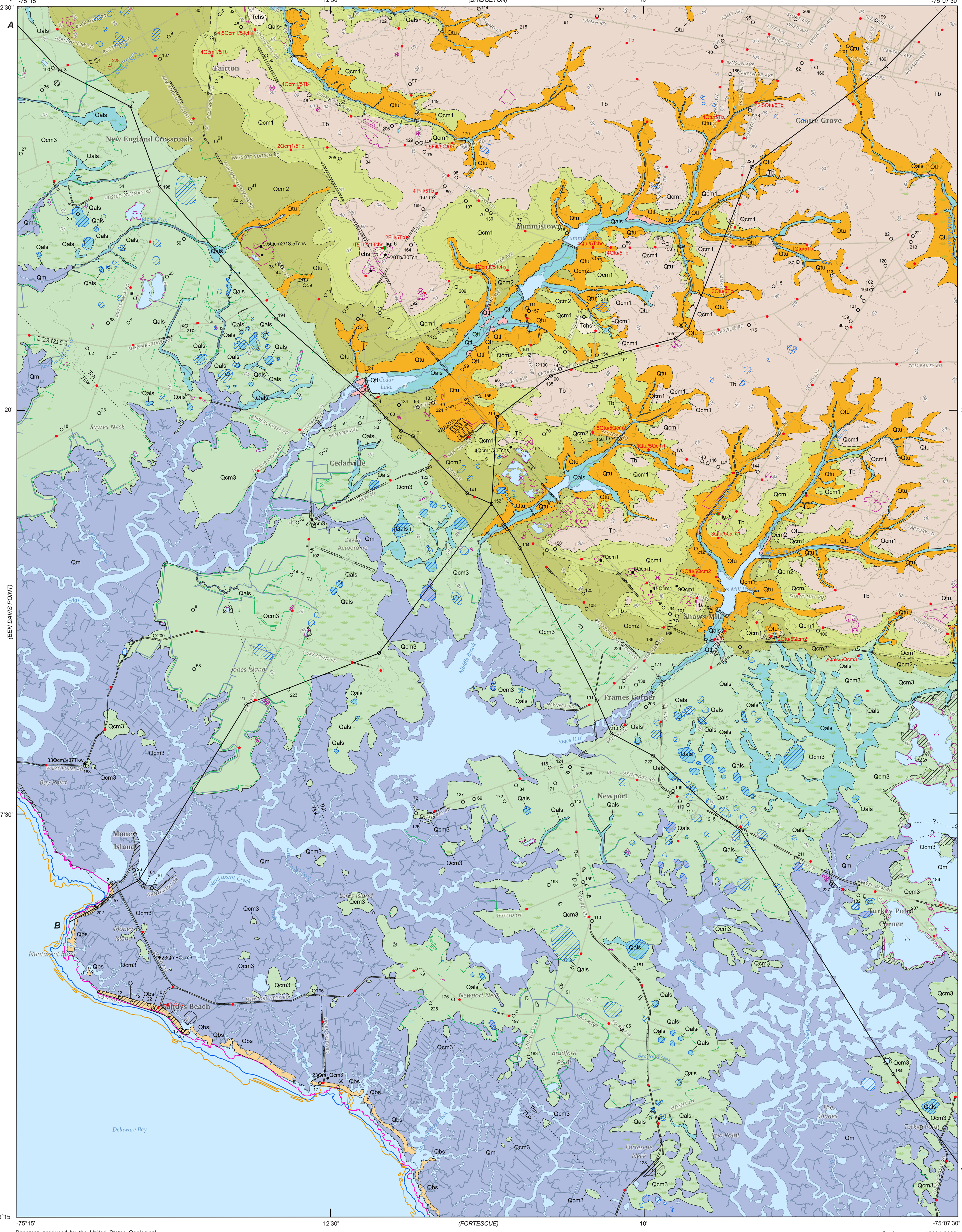
Shallow topographic basin - Circular or elliptical, shallow depressions visible on hillshade imagery generated from DEM data (State of New Jersey, 2021b) and orthoimagery (State of New Jersey, 2019, 2021a).

Excavation perimeter - Line encloses area of excavation based on hillshade imagery generated from DEM data (State of New Jersey, 2021b). Top symbol indicates sand or gravel pits active in 2020. Bottom symbol indicates sand or gravel pits inactive in 2020. Areas without symbols are large road cuts, drainage ditches, excavations from ground leveling, stormwater management basins, and artificial ponds. Topography within these areas may differ from topography shown on basemap.

Dike and ditch-spoil banks - Visible on hillshade imagery generated from DEM data (State of New Jersey, 2021b) and in orthoimagery (State of New Jersey, 2019, 2021a).

Shorelines during the years of 1870-1887 (yellow), 1930 (blue), and 2007 (pink) - Shorelines during the years of 1930 (State of New Jersey, 2007) and 2007 (State of New Jersey, 2019) are based on orthoimagery while the shoreline during the years of 1870 to 1887 is based on topographic map sheet 95 (N.J. Geological Survey, c. 1880, scale 1:21,120). Historical topographic manuscript maps on file at the NJGWS and obtainable through the NJGWS website.

Geophysical well log (on cross sections) - Gamma-ray log in black (radiation intensity increases to the right); single-point resistance log shown in red (resistance increases to the right). Approximate location and depth of well shown with vertical black line.



Basemap produced by the United States Geological Survey, 2023. North American datum of 1983 (NAD83). World Geodetic System of 1984 (WGS84). Projection and 1,000-meter grid: Universal Transverse Mercator, Zone 18S.

Imagery..........NAIP, July 2017-November 2017
Roads..........U.S. Census Bureau, 2016
Names..........GNIS, 1979-2023
Hydrography...National Hydrography Dataset, 2001-2022
Contours..........National Elevation Dataset, 2021
Wetlands..........FWS National Wetlands Inventory 2007

MAGNETIC NORTH DECLINATION AT CENTER OF QUAD, 2025

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

LOCATION IN NEW JERSEY

Geology mapped 2021-2023.
Cartography by Alexandra R. Carone. External reviews provided by Kelvin W. Ramsey of the Delaware Geological Survey and Kathleen Farrell of the North Carolina Geological Survey.

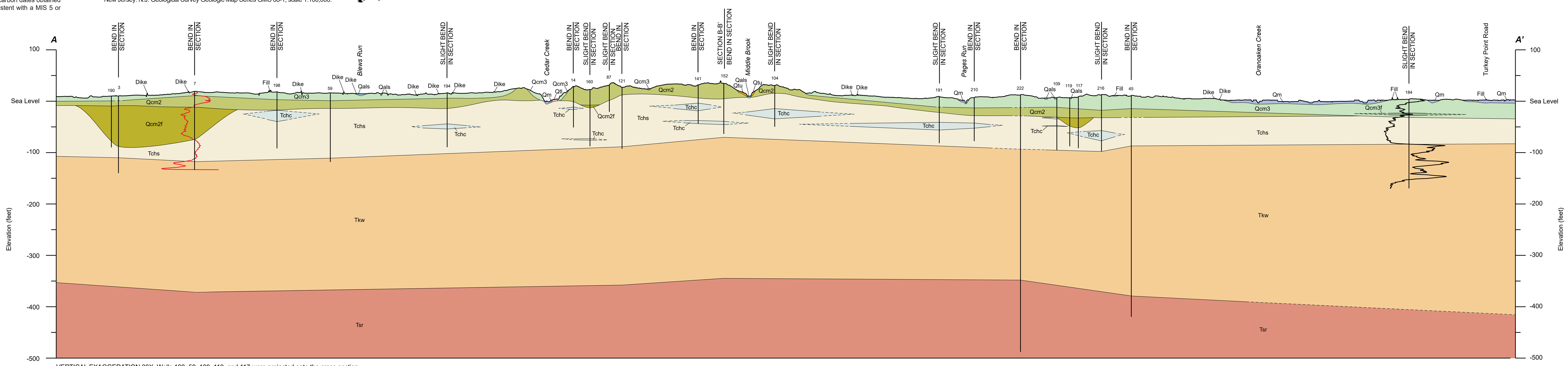
Research supported by the U.S. Geological Survey, National Cooperative Geologic Mapping Program, under U.S.G.S. award number G21AC10769. The views and conclusions contained in this document are those of the author and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Government.

GEOLOGIC MAP OF THE CEDARVILLE QUADRANGLE CUMBERLAND COUNTY, NEW JERSEY

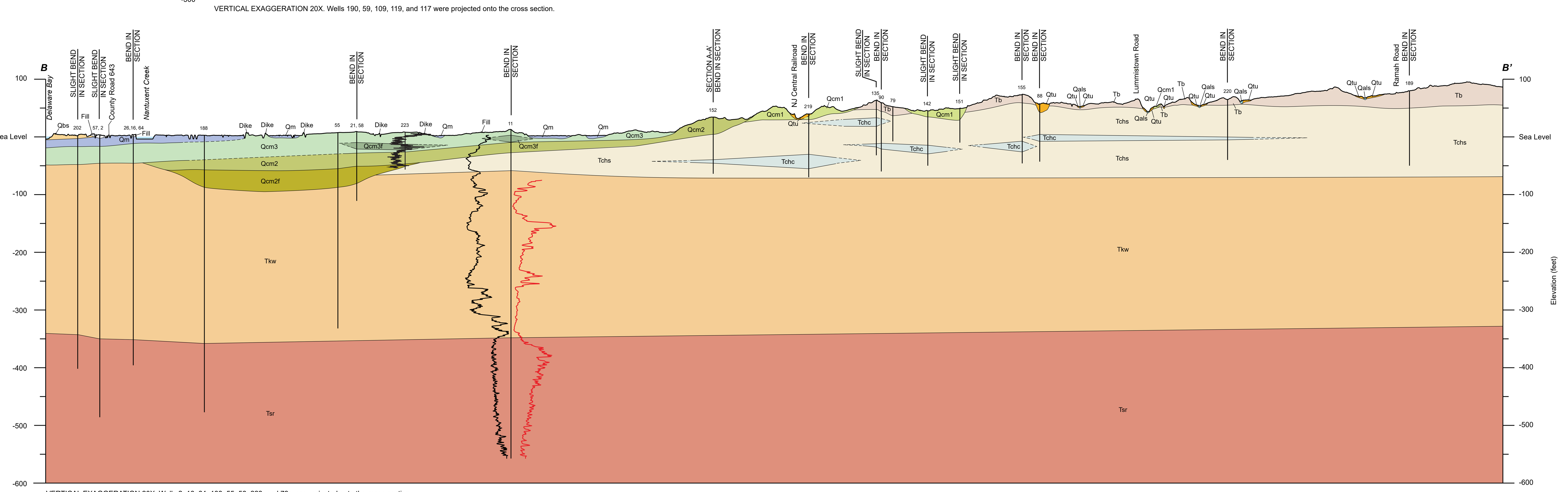
By

Alexandra R. Carone

2025

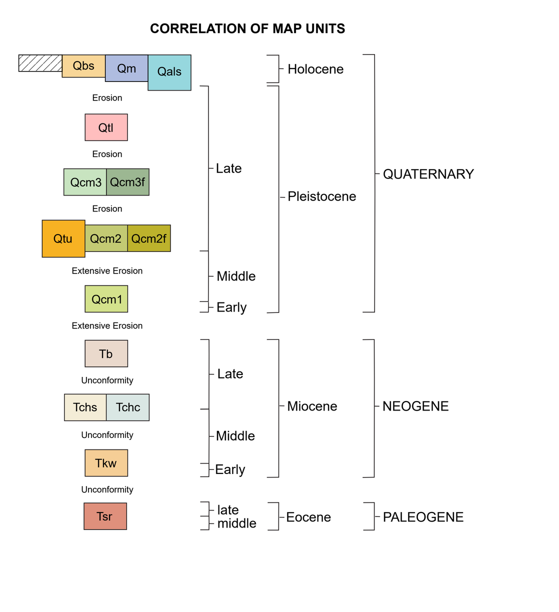


VERTICAL EXAGGERATION 20X. Wells 190, 59, 109, 119, and 117 were projected onto the cross section.



VERTICAL EXAGGERATION 20X. Wells 2, 16, 64, 188, 55, 58, 223, and 79 were projected onto the cross section.

CORRELATION OF MAP UNITS



Geologic Map of the Cedarville Quadrangle
Cumberland County, New Jersey

New Jersey Geological and Water Survey
Geologic Map Series GMS 25-2
2025

Pamphlet containing table 1 to accompany map.

Table 1. Selected well, vibracore, and permanent note records. Wells are **bolded** if depicted on cross section(s). Footnotes at end of table (p. 8).

Site I.D.	Cross Section(s)	Well/Vibracore Number or Name[1]	Log Type[2]	Site Elev. (feet)	Interpreted Stratigraphy[3]
1	-	25-26458	Lithologic	40	0-20Qcm1, 20-40Tchs, 40-60Tchc, 60-70Tch, 70-85Tchs
2	**B-B’**	**34-00002**	**Lithologic**	**4**	**0-20Fill+Qm, 20-50Qcm3, 50-354Tkw, 354-362Tsr**
3	**A-A’**	**34-00019**	**Lithologic**	**10**	**0-18Qcm3+Qcm2, 18-97Qcm2f, 97-105Tch, 105-120Tchs, 120-150Tkw**
4	-	34-00084	Lithologic	13	0-8Qcm3, 8-49Qcm3+Qcm2+Qcm2f
5	-	34-00086	Lithologic	37	0-12Qcm2, 12-20Qcm2f, 20-45Qcm1?+Tch, 45-50Tchs, 50-55Tchc, 55-80Tchs
6	-	34-00386	Lithologic	44	0-9Qcm1, 9-50Tchs, 50-51Tchc, 51-62Tchs
7	**A-A’**	**34-00436**	**Geophysical (E) & Lithologic**	**19**	**0-7Qcm3, 7-31Qcm2, 31-93Qcm2f, 93-137Tchs, 137-153Tkw**
8	-	34-00460	Lithologic	28	0-58Qcm3+Qcm2, 58-74Qcm2f+Tkw?
9	-	34-00594	Lithologic	7	0-7Qcm2, 7-31Qcm1+Tb, 31-63Tch, 63-151Tchs, 151-155Tkw
10	-	34-00801	Geophysical (G) & Lithologic	13	0-15Fill+Qbs+Qm, 15-40Qcm3, 40-360Qcm3?+Tkw, 360-376Tsr
11	**B-B’**	**34-00852**	**Geophysical (G+E) & Lithologic**	**5**	**0-10Qcm3, 10-21Qcm2f, 21-39Qcm2, 40-70Tchs, 70-360Tkw, 360-570Tsr**
12	-	34-01190	Lithologic	6	0-6Fill+Qbs, 6-11Qm, 11-21Qcm3, 21-40Qcm3f, 40-50Qcm3, 50-361Tkw, 361-415Tsr
13	-	34-01193	Lithologic	29	0-2Fill, 2-4Qbs, 4-20Qm, 20-40Qcm3f, 40-53Qcm3, 53-355Tkw, 355-405Tsr
14	**A-A’**	**34-01276**	**Lithologic**	**5**	**0-30Qcm2, 30-40Tchs, 40-45Tchc, 45-80Tchs**
15	-	34-01727	Lithologic	6	0-4Fill+Qbs, 4-15Qm, 15-60Qcm3+Qcm2?, 60-350Tkw, 350-400Tsr
16	**B-B’**	**34-01739**	**Lithologic**	**4**	**0-3Fill, 3-18Qm, 18-55Qcm3, 55-360Tkw, 360-400Tsr**
17	-	34-01814	Lithologic	4	0-20Qbs+Qm+Qcm3, 20-110Qcm3+Qcm2?+Qcm2f?+Tkw, 110-480Tkw+Tsr
18	-	34-01835	Lithologic	31	0-10Qcm3, 10-40Qcm3+Qcm2, 40-143Qcm2f+Tkw
19	-	34-01872	Lithologic	33	0-15Qcm2, 15-30Qcm1?+Tch, 30-52Tchs, 52-58Tch
20	-	34-01978	Lithologic	9	0-22Qcm2, 22-42Qcm2f?+Tchc?

Site I.D.	Cross Section(s)	Well/Vibracore Number or Name[1]	Log Type[2]	Site Elev. (feet)	Interpreted Stratigraphy[3]
21	**B-B'**	**34-02006**	**Lithologic**	**4**	**0-15Qcm3, 15-30Qcm3f, 30-70Qcm3+Qcm2+Qcm2f**
22	-	34-02028	Lithologic	8	0-3Fill, 3-12Qbs+Qm, 12-40Qcm3f, 40-100Qcm3?+Tkw, 100-400Tkw, 400-425Tsr
23	-	34-02132	Lithologic	15	0-15Qcm3, 15-65Qcm3+Qcm2, 65-160Qcm2f+Tkw
24	-	34-02331	Lithologic	8	0-15Qtu+Qcm3, 15-30Qcm2, 30-40Tch, 40-53Tchs
25	-	34-02404	Lithologic	4	0-35Qals+Qcm3+Qcm2, 35-45Qcm2f
26	**B-B'**	**34-02498**	**Lithologic**	**13**	**0-3Fill, 3-15Qm, 15-75Qcm3+Tkw, 75-360Tkw, 360-400Tsr**
27	-	34-02541	Lithologic	43	0-45Qcm3+Qcm2, 45-90Qcm2f, 90-150Tch+Tkw, 150-160Tkw
28	-	34-02637	Lithologic	41	0-15Qcm1, 15-60Tchs, 60-85Tch, 85-100Tchs, 100-105Tch
29	-	34-02701	Lithologic	29	0-15Qcm1, 15-35Tchs, 35-45Tchc, 45-60Tchs, 60-70Tch, 70-80Tchs
30	-	34-02713	Lithologic	33	0-15Qcm2, 15-20Qcm1?+Tchc, 20-50Tchs, 50-65Tchc, 65-75Tchs
31	-	34-02721	Lithologic	47	0-15Qcm2, 15-30Qcm1?+Tchs, 30-40Tch, 40-67Tchs
32	-	34-02757	Lithologic	19	0-15Qcm1, 15-35Tchc, 35-50Tch, 50-85Tchs, 85-100Tchc, 100-110Tch, 110-130Tchs, 130-140Tkw
33	-	34-02890	Lithologic	58	0-15Qcm3, 15-35Qcm2+Qcm2f?, 35-52Tchs, 52-57Tchc
34	-	34-03000	Lithologic	5	0-20Tb, 20-40Tchc, 40-102Tchs
35	-	34-03006	Lithologic	8	0-100Fill+Qbs+Qm+Qcm3+Qcm2?+Qcm2f?+Tkw, 100-360Tkw, 360-390Tkw+Tsr, 390-430Tsr
36	-	34-03019	Lithologic	6	0-7Qcm3, 7-20Qcm2, 20-29Qcm2+Qcm2f?, 29-45Tchs
37	-	34-03024	Lithologic	33	0-15Qcm3, 15-36Qcm2
38	-	34-03087	Lithologic	33	0-15Qcm2, 15-40Qcm1?+Tch, 40-55Tchc, 55-80Tchs, 80-85Tchc
39	-	34-03090	Lithologic	29	0-15Qcm2, 15-35Qcm1?+Tchs, 35-55Tchc, 55-70Tchs
40	-	34-03142	Lithologic	38	0-10Qtu, 10-20Qcm2+Tchs, 20-35Tch, 35-55Tchs
41	-	34-03184	Lithologic	11	0-15Qcm2, 15-30Qcm1?+Tch, 30-87Tchs
42	-	34-03185	Lithologic	33	0-15Qcm3, 15-30Qcm2, 30-41Tchs
43	-	34-03206	Lithologic	33	0-19Qcm2, 19-33Qcm1?+Tchs, 33-76Tch, 76-92Tchs
44	-	34-03342	Lithologic	11	0-15Qcm2, 15-30Qcm1?+Tchs, 30-40Tchc, 40-55Tchs, 55-70Tch, 70-82Tchs
45	**A-A'**	**34-03425**	**Lithologic**	**52**	**0-25Qcm3, 25-96Qcm2+Tch, 96-390Tkw, 390-430Tsr**
46	-	34-03441	Lithologic	12	0-40Tb+Tchs, 40-90Tch
47	-	34-03482	Lithologic	47	0-18Qcm3, 18-30Qcm2f, 30-50Qcm2, 50-80Qcm2f
48	-	34-03577	Lithologic	4	0-15Qcm1, 15-30Tch, 30-60Tchs, 60-75Tchc, 75-92Tchs
49	-	34-03598	Lithologic	41	0-30Qcm3+Qcm2, 30-82Tchs, 82-90Tch
50	-	34-03677	Lithologic	38	0-7Qcm1, 7-20Tchs, 20-39Tch, 39-66Tchs, 66-68Tchc, 68-75Tch, 75-102Tchc, 102-120Tchs
51	-	34-03679	Lithologic	5	0-15Qcm1, 15-25Tchs, 25-40Tch, 40-50Tchc, 50-90Tchs, 90-100Tchc, 100-117Tchs
52	-	34-03701	Lithologic	57	0-30Qcm3+Qcm2, 30-40Tch, 40-50Tchs, 50-60Tch, 60-70Tchs
53	-	34-03721	Lithologic	4	0-3Fill, 3-30Qcm1+Tchs, 30-45Tchs

Site I.D.	Cross Section(s)	Well/Vibracore Number or Name[1]	Log Type[2]	Site Elev. (feet)	Interpreted Stratigraphy[3]
54	-	34-03819	Lithologic	6	0-30Qcm3+Qcm2, 30-52Qcm2f, 52-75Tch, 75-128Tchs
55	**B-B’**	**34-03875**	**Lithologic**	**32**	**0-58Qcm3+Qcm2, 58-95Qcm2f+Tkw?, 95-340Tkw**
56	-	34-05056	Lithologic	5	0-30Qcm3+Qcm2, 30-45Tchs, 45-75Tch, 75-82Tchs, 82-90Tch
57	**B-B’**	**34-05644**	**Lithologic**	**5**	**0-6Fill, 6-22Qm, 22-47Qcm3, 47-350Tkw, 350-490Tsr**
58	**B-B’**	**34-05718**	**Lithologic**	**5**	**0-37Qcm3, 37-60Qcm2, 60-90Qcm2f, 90-120Tkw**
59	**A-A’**	**34-05820**	**Lithologic**	**44**	**0-15Qcm3, 15-30Qcm2, 30-67Tchs, 67-97Tch, 97-112Tchs, 112-127Tch, 127-135Tkw**
60	-	34-07237	Lithologic	11	0-8Qbs, 8-15Qm, 15-35Qcm3, 35-85Qcm3f+Qcm2f?+Tkw?, 85-38Tkw, 380-460Tsr
61	-	34-07396	Lithologic	4	0-15Qcm2, 15-30Qcm1?+Tch, 30-45Tchs, 45-105Tch, 105-120Tchs
62	-	34-07439	Lithologic	42	0-47Qcm3+Qcm2, 47-55Qcm2f, 55-75Tchs
63	-	34-07580	Lithologic	49	0-4Fill, 4-15Qbs+Qm, 15-20Qcm3, 20-82Qcm3+Qcm2f?+Tkw, 82-360Tkw, 360-435Tsr
64	**B-B’**	**34-07587**	**Lithologic**	**61**	**0-6Fill, 6-13Qm, 13-50Qcm3, 50-355Tkw, 355-390Tsr**
65	-	34-07697	Lithologic	49	0-16Qcm3, 16-18Qcm3f, 18-40Qcm2, 40-46Qcm2f, 46-70Tchs
66	-	34-08157	Lithologic	41	0-18Qcm3, 18-20Qcm3f, 20-38Qcm2, 38-57Qcm2f, 57-67Tchs
67	-	34-08253	Lithologic	8	0-2Fill, 2-5Qbs, 5-21Qm, 21-85Qcm3+Qcm2?+Tkw?, 85-372Tkw, 372-405Tsr
68	-	34-08301	Lithologic	4	0-10Qcm3, 10-16Qcm3f, 16-40Qcm2, 40-58Qcmf2, 58-68Tchs
69	-	35-01423	Lithologic	53	0-19Qcm3, 19-23Qcm3f, 23-33Qcm2, 33-112Tchs, 112-217Tkw
70	-	35-03032	Lithologic	71	0-15Qcm1, 15-65Tch, 65-88Tchs
71	-	35-03048	Lithologic	78	0-30Qcm3+Qcm2
72	-	35-03190	Lithologic	67	0-35Qcm3+Qcm2, 35-65Qcm2f?+Tchc?, 65-110Tch+Tkw?
73	-	35-03391	Lithologic	8	0-15Qtu+Tchs, 15-30Tch, 30-45Tchc, 45-62Tchs
74	-	35-03509	Lithologic	6	0-12Qcm1, 12-30Tchs, 30-60Tch, 60-75Tchs
75	-	35-03749	Lithologic	42	0-25Tb, 25-30Tchc, 30-55Tchs, 55-65Tch, 65-80Tchs, 80-85Tchc
76	-	35-03882	Lithologic	75	0-10Qcm1,10-40Tchs, 40-50Tchc, 50-72Tchs
77	-	35-03952	Lithologic	32	0-20Qcm1, 20-40Tch, 40-45Tchs, 45-80Tch, 80-105Tchc, 105-120Tchs
78	-	35-03953	Lithologic	57	0-45Qcm3+Qcm2+Tchs, 45-60Tchc, 60-75Tchs, 75-110Tch+Tkw?
79	**B-B’**	**35-04075**	**Lithologic**	**63**	**0-15Tb, 15-30Tchs, 30-50Tch, 50-58Tchs, 58-60Tch**
80	-	35-04094	Lithologic	59	0-15Tb, 15-60Tchs, 60-70Tchc
81	-	35-04258	Lithologic	8	0-15Tb, 15-30Tchc, 30-88Tchs, 88-95Tch
82	-	35-04315	Lithologic	65	0-10Tb, 10-20Tchs, 20-45Tchc, 45-50Tchs, 50-100Tch, 100-105Tchc, 105-115Tchs
83	-	35-04325	Lithologic	35	0-20Qcm3, 20-35Qcm2f, 35-45Tchs, 45-75Tchc, 75-85Tchs, 85-95Tchc, 95-110Tchs
84	-	35-04326	Lithologic	47	0-12Qcm3, 12-30Qcm3f, 30-35Qcm2, 65Qcm2?+Tchc?, 65-110Tch+Tkw?
85	-	35-04336	Lithologic	54	0-15Qcm1, 15-35Tchs, 35-60Tchc, 60-75Tchs
86	-	35-04421	Lithologic	54	0-78Tb+Tchs, 78-130Tch, 130-150Tchs
87	**A-A’**	**35-04552**	**Lithologic**	**66**	**0-30Qcm2, 30-52Tchs**

Site I.D.	Cross Section(s)	Well/Vibracore Number or Name[1]	Log Type[2]	Site Elev. (feet)	Interpreted Stratigraphy[3]
88	**B-B'**	**35-04810**	**Lithologic**	**61**	**0-15Qtu, 15-53Tchs, 53-65Tchc, 65-100Tchs**
89	-	35-04816	Lithologic	24	0-33Tb+Tchs, 33-50Tchs, 50-70Tch, 70-85Tchs
90	**B-B'**	**35-04819**	**Lithologic**	**62**	**0-15Tb, 15-35Tch, 35-55Tchs, 55-70Tch, 70-80Tchc, 80-120Tchs**
91	-	35-04929	Lithologic	37	0-35Qcm3+Qcm2?, 35-65Qcm2f?+Tchc?, 65-85Tch, 85-105Tchs
92	-	35-05040	Lithologic	69	0-80Tb+Tchs
93	-	35-05058	Lithologic	70	0-30Qcm2, 30-75Tchs, 75-90Tchc, 90-100Tchs
94	-	35-05062	Lithologic	30	0-17Qcm1, 17-32Tchs
95	-	35-05064	Lithologic	8	0-17Qcm1, 17-28Tch, 28-30Tchs
96	-	35-05106	Lithologic	47	0-15Tb, 15-40Tch, 40-70Tchs
97	-	35-05127	Lithologic	49	0-15Tb, 15-45Tchs, 45-50Tchc, 50-70Tchs
98	-	35-05249	Lithologic	21	0-15Tb, 15-45Tchs, 45-60Tchc, 60-83Tchs, 83-90Tch
99	-	35-05280	Lithologic	12	0-15Qtu+Qcm2?, 15-25Tchs, 25-35Tch, 35-60Tchs, 60-70Tch, 70-85Tchc
100	-	35-05355	Lithologic	8	0-15Tb, 15-25Tchs, 25-50Tch, 50-84Tchs
101	-	35-05408	Lithologic	32	0-15Qcm1, 15-30Tchs, 30-40Tch, 40-52Tchs, 52-75Tchc, 75-80Tch
102	-	35-05431	Lithologic	11	0-18Tb, 18-55Tchs, 55-65Tch, 65-77Tchs
103	-	35-05432	Lithologic	69	0-12Tb, 12-53Tchs, 53-63Tch, 63-75Tchs
104	**A-A'**	**35-05438**	**Lithologic**	**71**	**0-15Qcm2, 15-45Tchs, 45-65Tchc, 65-80Tchs**
105	-	35-05444	Lithologic	79	0-25Qcm3, 25-30Qcm3f, 30-60Tchs
106	-	35-05546	Lithologic	12	0-15Qcm1, 15-40Tchs, 40-65Tch, 65-75Tchs
107	-	35-05647	Lithologic	12	0-15Qcm1+Tb, 15-50Tchs, 50-55Tchc, 55-79Tchs
108	-	35-05728	Lithologic	72	0-20Qcm2, 20-32Tch, 32-47Tchs, 47-55Tch, 55-68Tchs, 68-72Tch
109	**A-A'**	**35-05734**	**Lithologic**	**13**	**0-18Qcm3, 18-38Qcm2, 38-42Tchc, 42-54Tchs, 54-56Tchc, 56-67Tchs, 67-83Tch, 83-95Tchs, 95-102Tch**
110	-	35-05757	Lithologic	63	0-40Qcm3+Qcm2+Tchs, 40-60Tchc, 60-80Tch, 80-110Tch+Tkw
111	-	35-05768	Lithologic	27	0-7Qtu, 7-82Qcm2?+Tchs, 82-120Tch
112	-	35-05782	Lithologic	49	0-34Qcm3+Qcm2, 34-46Tchs
113	-	35-06163	Lithologic	14	0-15Tb, 15-45Tchc, 45-60Tch, 60-70Tchs
114	-	35-06210	Lithologic	9	0-15Tb, 15-75Tchs, 75-80Tchc, 80-100Tchs
115	-	35-06221	Lithologic	25	0-12Tb, 12-18Tchc, 18-35Tchs, 35-45Tchc, 45-67Tchs, 67-75Tch
116	-	35-06222	Lithologic	4	0-30Qcm2+Qcm3, 30-60Qcm2f?+Tchc?, 60-75Tchs, 75-90Tch, 90-109Tchs
117	**A-A'**	**35-06223**	**Lithologic**	**4**	**0-23Qcm3, 23-40Qcm2, 40-60Qcm2f, 60-75Tch, 75-100Tchs**
118	-	35-06532	Lithologic	5	0-10Tb, 10-30Tchs, 30-40Tchc, 40-50Tchs, 50-90Tch, 90-100Tchc, 100-115Tchs
119	**A-A'**	**35-06846**	**Lithologic**	**65**	**0-15Qcm3, 15-39Qcm2, 39-55Qcm2f, 55-70Tch, 70-95Tchs**
120	-	35-06975	Lithologic	50	0-10Tb, 10-20Tchc, 20-35Tchs, 35-100Tch, 100-115Tchs
121	**A-A'**	**35-07041**	**Lithologic**	**75**	**0-15Qcm2, 15-50Tchs, 50-95Tch, 95-115Tchs, 115-120Tkw**
122	-	35-07053	Lithologic	78	0-15Qcm1+Tb, 15-25Tchc, 25-62Tchs

Site I.D.	Cross Section(s)	Well/Vibracore Number or Name[1]	Log Type[2]	Site Elev. (feet)	Interpreted Stratigraphy[3]
123	-	35-07088	Lithologic	24	0-10Qcm3, 10-25Qcm2f, 25-60Tchs
124	-	35-07108	Lithologic	33	0-20Qcm3, 20-55Qcm2+Tch, 55-60Tchs, 60-95Tch, 95-100Tchc, 100-110Tchs
125	-	35-07310	Lithologic	64	0-15Qcm2, 15-30Tchs, 30-45Tch, 45-65Tchs
126	-	35-07311	Lithologic	25	0-30Qcm3+Qcm2, 30-45Qcm2f?+Tchc?, 45-84Tchs
127	-	35-07312	Lithologic	70	0-30Qcm3+Qcm2, 30-55Qcm2f?+Tchc?, 55-73Tchs
128	-	35-07575	Lithologic	12	0-10Qm+Qcm3, 10-20Qcm3f, 20-90Qcm3?+Tch, 90-302Tkw
129	-	35-07623	Lithologic	76	0-10Tb, 10-43Tchs, 43-67Tch, 67-96Tchs
130	-	35-07683	Lithologic	101	0-10Qcm1, 10-15Tchs, 15-20Tchc, 20-50Tchs
131	-	35-07816	Lithologic	31	0-9Tb, 9-23Tchs, 23-54Tch, 54-82Tchs, 82-90Tch
132	-	35-08012	Lithologic	45	0-14Tb, 14-35Tchs, 35-63Tch, 63-90Tchs, 90-95Tch
133	-	35-08042	Lithologic	8	0-15Qtu+Qcm2, 15-35Tchs, 35-40Tchc, 40-60Tchs
134	-	35-08047	Lithologic	58	0-29Qcm2, 29-70Tchs
135	**B-B’**	**35-08257**	**Lithologic**	**62**	**0-15Tb, 15-30Tch, 30-45Tchc, 45-60Tchs, 60-75Tch, 75-80Tchc, 80-95Tchs**
136	-	35-08281	Lithologic	71	0-25Qcm2, 25-35Tchs, 35-75Tch, 75-85Tchs, 85-90Tchc, 90-100Tchs
137	-	35-08332	Lithologic	60	0-15Tb, 15-30Tchc, 30-45Tchs, 45-55Tch, 55-67Tchs, 67-75Tch
138	-	35-08387	Lithologic	71	0-37Qcm3+Qcm2, 37-67Tchs, 67-75Tch, 75-120Tchs, 120-125Tkw
139	-	35-08411	Lithologic	50	0-10Tb, 10-28Tchs, 28-50Tch, 50-70Tchs
140	-	35-08796	Lithologic	38	0-15Tb, 15-30Tch, 30-50Tchs, 50-65Tch, 65-87Tchs
141	**A-A’**	**35-08898**	**Lithologic**	**50**	**0-25Qcm2, 25-35Tchs, 35-50Tchc, 50-69Tchs, 69-75Tchc**
142	**B-B’**	**35-08921**	**Lithologic**	**35**	**0-10Qcm1, 10-25Tchs, 25-40Tch, 40-60Tchs, 60-75Tchc, 75-95Tchs**
143	-	35-08971	Lithologic	61	0-25Qcm3, 25-110Qcm2f+Tch+Tkw
144	-	35-09236	Lithologic	46	0-32Tb+Tchs, 32-35Tchc, 35-57Tch, 57-68Tchs
145	-	35-09308	Lithologic	74	0-22Tb+Tchs, 22-26Tchc, 26-65Tch, 65-80Tchs
146	-	35-09401	Lithologic	41	0-18Tb, 18-22Tchc, 22-58Tch, 58-70Tchs
147	-	35-09402	Lithologic	33	0-18Tb, 18-22Tchc, 22-45Tchs, 45-56Tch, 56-70Tchs
148	-	35-09406	Lithologic	44	0-18Tb, 18-23Tchc, 23-55Tch, 55-70Tchs
149	-	35-09661	Lithologic	9	0-40Qtu+Tch, 40-50Tchc, 50-60Tchs
150	-	35-09727	Lithologic	22	0-11Qcm2+Qcm2f, 11-48Tchs, 48-60Tch, 60-77Tchs
151	**B-B’**	**35-09782**	**Lithologic**	**54**	**0-20Qcm1, 20-30Tchs, 30-40Tch, 40-50Tchs, 50-60Tch**
152	**A-A’ & B-B’**	**35-09811**	**Lithologic**	**94**	**0-30Qcm2, 30-65Tch, 65-74Tchs, 74-80Tchc, 80-98Tchs**
153	-	35-10068	Lithologic	61	0-2Fill, 2-8Tb, 8-20Tchs, 20-38Tch, 38-43Tchs, 43-52Tchc, 52-75Tch, 75-90Tchs
154	-	35-10146	Lithologic	62	0-30Qtu+Qcm1+Tchs, 30-45Tch, 45-65Tchs, 65-75Tchc, 75-90Tchs
155	**B-B’**	**35-10182**	**Lithologic**	**35**	**0-15Tb, 15-35Tchs, 35-50Tch, 50-80Tchs, 80-100Tchc, 100-120Tchs**
156	-	35-10343	Lithologic	87	0-8Qcm1, 8-17Tchs, 17-30Tchc, 30-52Tchs, 52-68Tch, 68-90Tchs
157	-	35-10393	Lithologic	65	0-15Qtu+Qcm2?, 15-30Tchs, 30-45Tchc, 45-60Tchs, 60-70Tch, 70-86Tchs
158	-	35-10503	Lithologic	11	0-10Qcm1, 10-25Tch, 25-50Tchc, 50-75Tch, 75-80Tchc, 80-100Tchs

Site I.D.	Cross Section(s)	Well/Vibracore Number or Name[1]	Log Type[2]	Site Elev. (feet)	Interpreted Stratigraphy[3]
159	-	35-10592	Lithologic	60	0-10Qcm3, 10-15Qcm3f, 15-72Qcm2+Tch, 72-88Tchs, 88-95Tch
160	**A-A'**	**35-10653**	**Lithologic**	**56**	**0-30Qcm2, 30-35Qcm2f, 35-40Tchs, 40-80Tch, 80-95Tchs, 95-98Tchc, 98-110Tchs**
161	-	35-10689	Lithologic	15	0-9Qcm1, 9-27Tchs, 27-43Tchc, 43-56Tch, 56-75Tchs
162	-	35-10725	Lithologic	8	0-15Tb, 15-50Tchs, 50-60Tchc, 60-75Tchs, 75-85Tch, 85-96Tchs
163	-	35-10768	Lithologic	39	0-18Tb+Tchs, 18-26Tchc, 26-50Tchs, 50-65Tchc, 65-92Tchs
164	-	35-10866	Lithologic	101	0-18Tb, 18-22Tchc, 22-60Tchs, 60-72Tchc, 72-96Tchs
165	-	35-10901	Lithologic	68	0-10Qcm2, 10-30Qcm2f, 30-35Tchs, 35-90Tch, 90-110Tchs
166	-	35-10919	Lithologic	4	0-10Tb, 10-25Tchs, 25-40Tch, 40-80Tchs, 80-90Tch, 90-109Tchs
167	-	35-11051	Lithologic	49	0-10Tb, 10-25Tchc, 25-40Tch, 40-70Tchc, 70-75Tchs, 75-85Tchc, 85-100Tchs
168	-	35-11143	Lithologic	70	0-30Qcm3+Qcm2, 30-45Qcm2f?+Tchc?, 45-60Tchs, 60-75Tchc, 75-100Tchs
169	-	35-11234	Lithologic	53	0-18Tb, 18-20Tchc, 20-80Tchs
170	-	35-11248	Lithologic	27	0-52Qtu+Tb+Tchs, 52-55Tchc, 55-70Tchs
171	-	35-11416	Lithologic	5	0-40Qcm3+Qcm2, 40-55Tch, 55-60Tchc, 60-83Tchs
172	-	35-11501	Lithologic	5	0-10Qcm3, 10-25Qcm3f, 25-40Qcm2, 40-70Qcm2f?+Tchc?, 70-75Tchs, 75-85Tchc, 85-100Tchs
173	-	35-11523	Lithologic	4	0-30Qcm2+Qcm1, 30-35Tchc, 35-55Tch, 55-98Tchs
174	-	35-11579	Lithologic	79	0-22Tb, 22-35Tchs, 35-42Tch, 42-80Tchs
175	-	35-11623	Lithologic	8	0-25Tb, 25-40Tchs, 40-60Tch, 60-72Tchc, 72-90Tchs
176	-	35-12013	Lithologic	31	0-45Qcm3+Qcm2?, 45-75Qcm2f?+Tchc?, 75-120Tchs?+Tkw
177	-	35-25049	Lithologic	5	0-15Qcm1, 15-35Tch, 35-65Tchc, 65-85Tch, 85-110Tchs
178	-	35-25885	Lithologic	80	0-18Tb, 18-39Tchs, 39-41Tchc, 41-80Tchs
179	-	35-26318	Lithologic	9	0-15Qals+Qtu, 15-30Tchs, 30-45Tchc, 45-75Tchs, 75-120Tch, 120-135Tchs
180	-	35-26413	Lithologic	8	0-21Qcm2, 21-53Qcm2f+Tchc, 53-82Tchs, 82-91Tchc, 91-110Tchs
181	-	35-26620	Lithologic	6	0-23Qcm3, 23-45Qcm3f?+Qcm2f?, 45-51Tch, 51-70Tchs
182	-	35-26854	Lithologic	16	0-45Qcm3+Qcm2, 45-130Tch+Tkw
183	-	35-4053	Geophysical (G+E) & Lithologic	93	0-25Qcm3, 27-32Qcm3f, 32-45Qcm3+Qcm2?, 45-65Qcm2f?+Tchc?, 65-100Tch, 100-355Tkw, 355-515Tsr
184	**A-A'**	**55-00086**	**Geophysical (G) & Lithologic**	**4**	**0-26Qcm3, 26-32Qcm3f, 32-35Qcm3, 35-87Tchs, 87-174Tkw**
185	-	E201002272	Lithologic	6	0-30Tb+Tch, 30-45Tchc, 45-60Tch, 60-75Tchc, 75-90Tch, 90-120Tchs
186	-	E201004646	Lithologic	18	0-40Qcm3+Qcm2, 40-120Tch+Tkw
187	-	E201008366	Lithologic	84	0-45Qcm2+Qcm1, 45-80Tb?+Tch, 80-100Tchs
188	**B-B'**	**E201008779**	**Lithologic**	**5**	**0-60Qm+Qcm3+Qcm2, 60-90Qcm2f, 90-360Tkw, 360-480Tsr**
189	**B-B'**	**E201012580**	**Lithologic**	**75**	**0-30Tb, 30-75Tchs, 75-105Tch, 105-130Tchs**
190	**A-A'**	**E201100795**	**Lithologic**	**3**	**0-9Qcm3, 9-19Qcm2, 19-88Qcm2f, 88-100Tchs**
191	**A-A'**	**E201103275**	**Lithologic**	**12**	**0-30Qcm3+Qcm2, 30-50Tch, 50-65Tchc, 65-90Tchs**

Site I.D.	Cross Section(s)	Well/Vibracore Number or Name[1]	Log Type[2]	Site Elev. (feet)	Interpreted Stratigraphy[3]
192	-	E201104030	Lithologic	24	0-30Qcm3+Qcm2, 30-55Tchs, 55-75Tchc, 75-85Tch, 85-110Tchs
193	-	E201105619	Lithologic	50	0-40Qcm3+Qcm2, 40-55Qcm2f?+Tchc?, 55-90Tchs
194	**A-A’**	**E201110206**	**Lithologic**	**68**	**0-10Qcm3, 10-30Qcm2, 30-60Tch, 60-70Tchc, 70-105Tchs**
195	-	E201111402	Lithologic	6	0-60Tb+Tchs, 60-90Tchc, 90-120Tchs
196	-	E201115065	Lithologic	86	0-30Qcm3, 30-50Qcm3+Qcm2, 50-75Qcm2f, 75-90Qcm2, 90-375Tkw, 375-410Tsr
197	-	E201116466	Lithologic	45	0-11Qcm3, 11-88Qcm3+Qcm2?+Tch?, 88-107Tch
198	**A-A’**	**E201116704**	**Lithologic**	**7**	**0-15Qcm3, 15-35Qcm2, 35-58Tchc, 58-95Tch, 95-110Tchs**
199	-	E201120564	Lithologic	8	0-25Tb, 25-35Tchc, 35-50Tchs, 50-70Tchc, 70-115Tchs
200	-	E201201271	Lithologic	31	0-40Qcm3, 40-90Qcm2+Qcm2f+Tkw?, 90-370Tkw, 370-470Tsr
201	-	E201213604	Lithologic	62	0-30Qtu+Tb, 30-105Tchs
202	**B-B’**	**E201217465**	**Lithologic**	**47**	**0-5Qbs, 5-19Qm, 19-50Qcm3, 50-343Tkw, 343-404Tsr**
203	-	E201307853	Lithologic	76	0-28Qcm3+Qcm2, 28-52Tchs, 52-54Tchc, 54-70Tch, 70-82Tchs, 82-86Tchc, 86-97Tchs
204	-	E201309493	Lithologic	13	0-35Qtu+Qcm2, 35-65Qcm2f?+Tchc, 65-80Tch, 80-105Tchs
205	-	E201313528	Lithologic	12	0-20Qcm1, 20-40Tchs, 40-60Tchc, 60-110Tchs
206	-	E201313841	Lithologic	40	0-35Tb, 35-65Tchs, 65-75Tchc, 75-95Tchs
207	-	E201503474	Lithologic	40	0-40Qcm3+Qcm2f?, 40-55Tchs, 55-90Tch, 90-135Tkw
208	-	E201700436	Lithologic	65	0-10Tb, 10-25Tchs, 25-35Tchs, 35-70Tch, 70-110Tchs
209	-	E201706246	Lithologic	66	0-7Qcm1, 7-15Tb, 15-20Tchc, 20-82Tchs
210	**A-A’**	**E201711194**	**Lithologic**	**12**	**0-20Qcm3, 20-35Qcm2, 35-50Tchs, 50-60Tchc, 60-85Tchs**
211	-	E201803777	Lithologic	6	0-40Qcm3, 40-60Tchs, 60-80Tch, 80-120Tkw
212	-	E201804895	Lithologic	18	0-9Qtu, 9-44Tchs, 44-76Tchc, 76-112Tchs, 112-250Tkw
213	-	E201808888	Lithologic	2	0-20Tb, 20-60Tchs, 60-80Tchc, 80-100Tchs
214	-	E201812841	Lithologic	10	0-14Qcm1, 14-21Tchc, 21-36Tchs, 36-42Tchc, 42-50Tchs, 50-61Tchc, 61-85Tchs
215	-	E201813016	Lithologic	8	0-20Tb, 20-40Tchs, 40-60Tchc, 60-110Tchs
216	**A-A’**	**E201900611**	**Lithologic**	**3**	**0-30Qcm3, 30-45Qcm2, 45-70Tchs, 70-90Tchc, 90-110Tchs**
217	-	E201901505	Lithologic	11	0-20Qcm3, 20-40Qcm2, 40-60Qcm2f, 60-90Tchs
218	-	E201911043	Lithologic	7	0-35Qcm1+Tchs, 35-50Tchc, 50-100Tchs
219	**B-B’**	**E202000300**	**Lithologic**	**11**	**0-10Qtu+Qcm1, 10-50Tch, 50-70Tchs, 70-95Tchc, 95-110Tchs**
220	**B-B’**	**E202009524**	**Lithologic**	**15**	**0-10Tb, 10-44Tchs, 44-65Tch, 65-70Tchc, 70-105Tchs**
221	-	E202103461	Lithologic	14	0-70Tb+Tchs, 70-80Tchc, 80-105Tchs, 105-107Tchc, 107-125Tchs
222	**A-A’**	**E202106268**	**Lithologic**	**15**	**0-360Qcm3+Qcm2+Tch+Tkw, 360-500Tsr**
223	**B-B’**	**E202213094**	**Geophysical (G) & Lithologic**	**13**	**0-20Qcm3, 20-30Qcm3f, 30-35Qcm3, 35-55Qcm2, 55-59Qcm2f, 59-64Tch**
224	-	La-11	Lithologic	14	0-10Qtu+Qcm2, 10-60Tchs, 60-68Tch
225	-	P200804012	Lithologic	7	0-20Qcm3+Qcm2?, 20-40Qcm2f?+Tchc?, 60-75Tchs
226	-	P200905428	Lithologic	5	0-20Qcm3+Qcm2, 20-50Tch, 50-90Tchs

Site I.D.	Cross Section(s)	Well/Vibracore Number or Name[1]	Log Type[2]	Site Elev. (feet)	Interpreted Stratigraphy[3]
227	-	*35-21-564 (East Coast Oil Exploration Well)	Lithologic	22	0-370Qm+Qcm3+Qcm2+Tch+Tkw
228	-	CVV2 (O'Neal and McGeary, 2002)	Lithologic	22	0-9Qcm2, 9-16Qcm2f

[1] Well numbers in the form of 2x-xxxxx, 3x-xxxxx, 5x-xxxxx, Exxxxxxxxx, and Pxxxxxxxxx are permit numbers assigned by the N.J. Department of Environmental Protection (NJDEP) that can be searched at https://njems.nj.gov/DataMiner/Search/SearchByCategory. One vibracore (CVV2), sourced from O'Neal and McGeary (2002), is included in the table. This vibracore is in the northwestern corner of the map area. Lithologies for well 224 (La-11) and well 7 (34-00436) were sourced from Rooney (1971). A permanent note file number is listed for well 227 rather than the permit number. Permanent notes on file at the New Jersey Geological and Water Survey (NJGWS). Well and vibracore locations are shown on the map to an accuracy of within 500 feet. Wells are bolded where depicted on cross sections.

[2] A "G" indicates that a gamma-ray log is on file at the NJGWS; an "E" indicates that an electric log (single-point resistance and/or spontaneous potential) is on file at the NJGWS.

[3] A "+" sign between units indicates that such units could not be differentiated in the lithologic and/or geophysical log; a "?" following a unit indicates that there is uncertainty that the unit is present. Lithologic descriptions for the Cohansey Formation can sometimes group sands and clays together rather than identify each separately. If sand facies and clay-sand facies cannot be distinguished in the lithologic description, "Tch" is indicated. Unit abbreviations are explained in the *Description of Map Units*. Units are interpreted from drillers', geologists', or engineers' lithologic descriptions in well records filed with the NJDEP, geophysical logs on file at the NJGWS, or in vibracore logs reported in previous studies (O'Neal and McGeary, 2002). Interpretation of sediments described in the logs may not match the map and sections due to variability in drillers' descriptions and lag times involved in the drilling process.