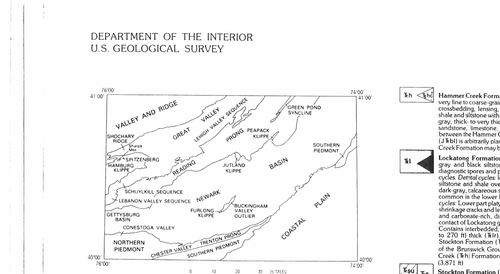

STRUCTURAL AND PHYSIOGRAPHIC REGIONS OF NEWARK 1° x 2° QUADRANGLE

COASTAL PLAIN

The Coastal Plain is a gently seaward-sloping surface on poorly consolidated sediments of Tertiary and Cretaceous age. These rocks form a southeastward thickening, gently tilted prism of strata which exceeds 7,000 m (22,966 ft) in thickness along the coast, and thins to a feather edge along the Fall Line, where they unconformably overlap the Southern Piedmont and Newark Basin. Whereas the oldest Cretaceous clastic sediments are nonmarine, the overlying deposits are mostly marine and shallow marine.

- **Tch** **Cohansey Sand (Pliocene (?) and Miocene)**—Well-sorted, crossbedded, medium-grained, partly arkosic quartz sand; some interbedded carbonaceous, kaolinitic, and dark silty clay; crossbedded gravel in channels with pebbles of quartzite, vein quartz, and other metamorphic rock fragments which are less than 5 cm (2 in) in diameter. As much as 46 m (150 ft) thick, thinning toward the Fall Line
- **Tkw** **Kirkwood Formation (Miocene)**—Interbedded, fine-grained quartz sand, micaceous sand, locally clayey or silty, with local thick beds of clayey silt and fine pebble gravel. Lower contact unconformable. 30–70 m (100–230 ft) thick
- **Tmq** **Manasquan Formation (Eocene)**—Thick-bedded to massive, silty and clayey glauconitic and quartzose sand; interbedded clay and clayey silt. Apatite pellets and bone fragments locally abundant. 15–61 m (50–199 ft) thick
- **Tvt** **Vincentown Formation (Paleocene)**—Partly clayey, glauconitic quartz sand. 15–30 m (50–100 ft) thick
- **Tht** **Hornerstown Sand (Paleocene)**—Massive, poorly sorted, fine- to medium-grained, locally very silty and clayey glauconite and quartz sand with some phosphate pellets and bone fragments. Lower contact unconformable. 0–20 ft thick
- **Krb** **Red Bank Sand (Upper Cretaceous)**—Very thick bedded, medium- to coarse-grained, fairly indurated, micaceous, arkosic, feldspar-and-quartz-rich micaceous sandy silt. As much as 37 m (120 ft) thick
- **Krss** **Navesink Formation (Upper Cretaceous)**—Dark-gray, thick-bedded, clayey and silty, glauconite sand, with organic matter, pyrite, and local thick shell beds. As much as 14 m (45 ft) thick
- **Kml** **Mount Laurel Sand (Upper Cretaceous)**—Medium-grained, poorly to moderately sorted, kaolinitic quartz sand. Abundant bioturbation; filled with glauconite sand and fine-pebble gravel; thick, micaceous and carbonaceous silt and clay alternating with medium-bedded, light-colored, micaceous, glauconitic quartz sand with discontinuous layers of clay, siderite concretions. As much as 15 m (50 ft) thick
- **Kw** **Wenonah Formation (Upper Cretaceous)**—Generally dark, thick-bedded, fine- to medium-grained, poorly to moderately sorted, carbonaceous, pyritic, very silty and clayey, quartose glauconite sand. 0–15 m (0–50 ft) thick
- **Kms** **Marshalltown Formation (Upper Cretaceous)**—Dark, fine-grained, massive, fossiliferous, very silty and clayey, glauconitic quartz sand with common shell beds; siderite, pyrite, and carbonaceous matter. 5–6 m (15–20 ft) thick
- **Kgt** **Englishtown Formation (Upper Cretaceous)**—Light-colored, well-sorted, fine- to medium-grained, crossbedded, glauconitic, feldspathic, and micaceous quartz sand, and interbedded clayey silt and sandy silt; contains siderite concretions. 6–46 m (20–150 ft) thick
- **Kwb** **Woodbury Clay (Upper Cretaceous)**—Dark-gray, massive to crudely laminated, carbonaceous, pyritic, partly glauconitic, micaceous, very clayey (dominantly illite) silt. As much as 30 m (100 ft) thick
- **Kmr** **Merchantville Formation (Upper Cretaceous)**—Dark, clayey, micaceous, quartzose, carbonaceous silt with interbedded gray micaceous sand; pyrite and siderite concretions; thick bedded glauconite and quartz sand. 6–30 m (20–100 ft) thick
- **Kmg** **Magothy Formation (Upper Cretaceous)**—Dark, micaceous, pyritic, kaolinitic, clayey silt and light-colored quartz sand with large lignitized logs. Lower contact is unconformable. Beds as much as 30 m (100 ft) thick occur in subsurface beneath Staten Island and in Brooklyn, N.Y. 0–61 m (0–200 ft) thick
- **Kr** **Raritan Formation (Upper Cretaceous)**—Massive, crossbedded quartz sand, thick-bedded clayey silt; laminated clay and silt; and minor gravel. Black in (1200 ft) thick
- **Kp** **Potomac Formation (Lower Cretaceous)**—Moderately well sorted, medium- to coarse-grained quartz sand, gravelly sand with quartz and quartzite pebbles as much as 1.3 cm (½ in) in diameter; thick beds of clay, commonly kaolinitic and silty, locally lignitic. 76–268 m (250–880 ft) thick. Lower contact unconformable
- **TK** **All Coastal Plain sediments (Tertiary and Cretaceous)**—Shown in cross section only. Includes units Tch through Kp

NEWARK AND GETTYSBURG BASINS

The Newark basin, an element of the Schuylkill River, the Gettysburg basin, form a rolling lowland underlain by a thick succession of sedimentary rocks of Triassic and Jurassic age (Lehigh and Lee Thrasher, 1971). Diabase dikes, sills, and stocks cut and thermally metamorphose older rocks in the basin. The rocks generally dip gently to moderately to the north toward a broad, fault-bounded axis that extends from near Princeton, N.J., to near Lebanon, Pa. Numerous high angles to the axis and many normal faults have been mapped. The rocks have a northward thickening wedge with a composite thickness that may exceed 10,000 m (33,000 ft); however, not all of the units are preserved in one area. Sedimentary rocks make up most of the rocks of the basin, but do not appear to affect the order-of-magnitude thickness of the basin. The basin may have formed as a pull-apart structure with adjacent basins, such as those in Connecticut, that are the sites of deposits for local horts and grabens within the basin, possible sequential development of different parts of the basin, the compositional regime that produced the rocks of the basin, and local and basin-wide stratigraphy of the folds within the basin from structures outside the basin. Some of the gently dipping lotric normal faults. Lithostratigraphic units are grouped into informal members and informal lower, middle, and upper members of the Lockatong and Passaic Formations (Kümmel, 1931). Lithostratigraphic units are grouped into informal members and informal lower, middle, and upper members of the Lockatong and Passaic Formations (Kümmel, 1931).

- **Jd** **Diabase (Lower Jurassic)**—Dikes, sills, and sill-like intrusives. Dark-gray to black, fine- to coarse-grained (except very fine grained near chilled borders), diabase composed largely of calcic plagioclase and augite. Some of the dikes are several miles long and as much as 0.8 km (0.5 mi) wide, some may have been intended along faults. Generally deeply weathered. Larger bodies, as much as 520 m (1,700 ft) thick, interpreted as sills or discordant sheets with oval or ringlike outcrop pattern. Shale and siltstone surrounding these bodies have been thermally metamorphosed to a purplish-red, light-gray, and dark-gray, hornfelsic, and fine-grained hornfels with quartz, plagioclase, sericite, biotite, cordierite, epidote, chlorite, magnetite, hornblende, pyroxene, tourmaline, nepheline, cancrinite, and sodalite in a zone average about 610 m (2,000 ft) wide. The width of this zone depends on the thickness of the intrusive, its topographic expression, and its inclination

NEWARK SUPERGROUP

- **Jc** **Conglomerate (Lower Jurassic)**—Generally poorly exposed conglomerate and conglomeratic sandstone with a clast of quartz, sandstone, conglomerate, granite, metamorphic rocks, limestone, and diabase. Clasts may be more than 15 cm (6 in) in diameter. Overlies Brunswick formation, Hook Mountain Basalt, and Towaco Formation. Thickness not known
- **JTr** **Boonton Formation of the Brunswick Group (Lower Jurassic)**—Lower (?) and (?) brown, and black, blocky, partly dolomitic siltstone; locally contains hopper (salt crystal) casts pseudomorphic after gypsum, glauconite, and halite. Overlies the upper, red-bed and thick-bedded siltstone and sandstone and thin beds of gray-green siltstone. Bed of microlaminated, gray, calcareous shale with fossil fish near the top, 1 m (3.3 ft) thick with thin, gray and brown pebble-conglomerate beds as much as 0.5 m (1.6 ft) thick. Reptile and arthropod fossils also occur in the lower part of the section. Fossil fish bone fragments of red-, gray-, and brown-matrix conglomerate and breccia. More than 500 m (1,640 ft) thick
- **Jh** **Hook Mountain Basalt of the Brunswick Group (Lower Jurassic)**—Two holotetic basalt flows composed mainly of spherulitic to finely crystalline plagioclase and augite. In places, the flows contain vesicles near the top. As much as 110 m (361 ft) thick
- **Jt** **Towaco Formation of the Brunswick Group (Lower Jurassic)**—Red, gray, and black, fine- to coarse-grained sandstone, siltstone, and conglomerate in fining-upward cycles. Medial black and gray, microlaminated, calcareous siltstone containing diagenetic pellets, fish, and dinosaurs. Cycles average about 35 m (115 ft) in thickness with maximum thickness of about 340 m (1,115 ft)
- **Jp** **Preakness Basalt of the Brunswick Group (Lower Jurassic)**—At least three holotetic basalt flows, with some pillows and hyaloclastic breccia resembling an. Columnar with characteristic, pale, prismatic joint pattern. Locally, thin red siltstone (Jps) separates the flows. Thickness of flows 30 m (100 ft) thick
- **Jf, JTRf** **Feltville Formation of the Brunswick Group in New Jersey and upper part of the Brunswick Group in Pennsylvania (Lower Jurassic)**—Gray, black, and brown, partly crossbedded, fine- to coarse-grained feldspathic sandstone, gray and black siltstone, in fining-upward cycles; and a laterally continuous, gray, laminated limestone. Lower bed contains a unit of black to white laminated limestone, calcarenite, graded siltstone, and crossbedded siltstone and sandstone about 1–10 m (3–39 ft) thick. Fossiliferous, with reptiles, arthropods, abundant fish, and diagnostic spores and pollen. About 170–600 m (558–1,969 ft) thick. Only lower 215 m (705 ft) preserved near Reading, Penn.
- **Jb** **Orange Mountain Basalt of the Brunswick Group in New Jersey and Jacksonwald Basalt of the Brunswick Group in Pennsylvania (Lower Jurassic)**—The Orange Mountain Basalt comprises at least two holotetic, pillowed pahoehoe, and columnar basalt flows, with thin interbedded volcaniclastic rocks that are about 1.4 m (3.13 ft) thick, in the First Watchung Mountain of New Jersey. The Jacksonwald Basalt (Wherry, 1910, also called the Jacksonwald Basalt Member of the Brunswick Formation by MacLachlan, 1983), 74 km (5 ft-mi) east of Reading, Penn., and other flow 8 km (5 mi) south of Flemington, N.J., may be the same extrusive unit. Probably between 100 and 200 m (328 and 656 ft) thick
- **JTRp, JTRbf, JTRbp, JTRbs** **Passaic Formation of Olsen (1980a) of the Brunswick Group in New Jersey and lower part of the Brunswick Group in Pennsylvania (Lower Jurassic and Upper Triassic)**—Predominantly grayish-red to reddish-brown, evenly to irregularly bedded, thin- to thick-bedded shale, siltstone, very fine to coarse-grained sandstone, and pebble conglomerate. Generally becomes coarser in the northeastern half of the basin in New Jersey. Mudcracks, ripple marks, crossbeds, and burrows are common. Contains dental cycles of medium- to dark-gray and olive- to greenish-gray, thin-bedded and evenly bedded shale and siltstone (JTRp, JTRbp), similar to the rocks in the underlying Lockatong Formation (Kk). Many cycles are known near New Brunswick and northeast of Lambertville, N.J. but are not shown on the map (Olsen, unpub data, 1983). Greenish and brownish, fine- to coarse-grained, arkosic sandstone grades in places to quartzite fanglomerate (JTRqt), and contains some interbedded red beds and impure limestone or calcareous shale. Locally contains dinosaur footprints. Individual cycles as much as 76 m (250 ft) thick; some cycles are too thin to show on this map. Lower contact with the Stockton Formation (JTRs) is conformable and gradational. JTRbf, JTRbs, and JTRp are mapped where thickness of red beds is dominant over thickness of gray and black beds. Intertongues laterally with the Lockatong (Kk) and Hammer Creek (Khc) Formations. Where contact grades laterally into the Lockatong, lower contact is either conformable and gradational to older rocks of the Newark Supergroup, or is unconformable on basement rocks. Contains reptiles, arthropods, pelecypods, plant impressions, spores and pollen. The Jurassic-Triassic boundary lies within the uppermost 100 m (328 ft). The maximum thickness may exceed 6,000 m (19,685 ft) in the western part of the basin and is about 2,670 m (8,760 ft) in the northeastern part
- **Kk** **Lockatong Formation (Upper Triassic)**—Predominantly laminated to thick-bedded, gray and brown, fine-grained, dolomitic, calcareous, and carbonaceous shale, including plants, reptiles, fish, and diagnostic spores and pollen. Unit composed of alternating dental and chemical lacustrine cycles. Dental cycles lower part of cycle are thin-bedded, medium dark-gray to black, calcareous, argillaceous siltstone and shale overlain by platy to massive, disrupted (mudcracked and burrowed), dark-gray, calcareous siltstone and fine-pebble dolomite, and fine-grained sandstone; more common in the lower Lockatong. Averages about 5.2 m (17.1 ft) in thickness. Chemical cycles Lower part, thin, medium dark-gray to black, massive siltstone and shale, locally with silt-laminated, fine-grained, crossbedded, and burrowed sandstone, overlain by massive, gray-red, arkosic, micaceous, crossbedded, fine- to medium-grained sandstone. Upper part, 1–10 m (3–33 ft) thick in the west, consists of massive, fine-grained, light- to medium-gray to black siltstone. Contains interbedded, reddish-brown, sandy siltstone in units from about 3 to 82 m (10 to 270 ft) thick. Represents the deepest lacustrine facies and, geographically, the center of the Stockton Formation (Ks) as well as up into the Passaic Formation (JTRp) and lower part of the Brunswick (Jc) and Towaco (Jt) Formations. Contains Hammer Creek (Khc) and Stockton (Ks) Formations. Thickness not known
- **Ts** **Stockton Formation (Upper Triassic)**—Light- to medium-gray and light yellowish-gray to pale red-brown, fine- to coarse-grained, arkosic, locally pebbly sandstone; arkosic conglomerate with pebbles of quartz, quartzite, feldspar, shale, limestone, and chert; lesser amounts of shale and siltstone. Beds 5 m (3 ft) long, generally thick to moderately thick, brown, and light- to medium-gray siltstone and shale, bioturbated by roots and burrows, and graybeds of fine- to medium-grained sandstone. Contains thin, discontinuous, medium-gray, arkosic sandstone, generally fining upward with abrupt lateral lithic changes. These rocks contain channels, ripple marks, mudcracks, crossbeds, pinch and swell structures, and minor burrows. Pumpkin siltstone near the middle and top. Well-bedded, gray and gray-green, fossiliferous siltstone, locally known as the Stockton. Locally contains a fine-grained, limestone breccia filling solution cavities in Ordovician Cambrian limestones. Local lamination of the siltstone is caused by algae. Contains a thin, discontinuous, black, carbonaceous shale and coal. Lower contact is with the Lockatong and, where the Lockatong is absent, with the Passaic Formation. Contains Stockton (Ks) and Hammer Creek (Khc) Formations. Thickness of the Stockton (Ks) and Hammer Creek (Khc) Formations west of the Schuylkill River. Maximum thickness about 1,180 m (3,870 ft)
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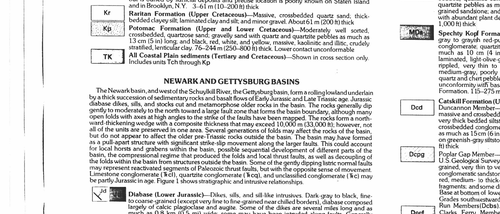
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