FSAR: Section 2.5

Figure 2.5-215— {Map Legend for Surficial Geology of the Monmouth Junction Quadrangle, Somerset, Middlesex, and Mercer Counties, New Jersey, Open-File Map OFM 47, Department of Environmental Protection, New Jersey Geological Survey}

SURFICIAL GEOLOGY OF THE MONMOUTH JUNCTION QUADRANGLE, SOMERSET, MIDDLESEX, AND MERCER COUNTIES, NEW JERSEY

> by Scott D. Stanford 2002

MAP UNITS

- Age of unit indicated in parentheses. For units spanning more than one period, principal age is listed first. Order of map units in list does not necessarily indicate chronologic sequence.
- ARTIFICIAL FILL-Sand, sill, clay, gravel: brown, gray, yellowish brown; may include angular fragments of shale, sandstone, and diabase bedrock. May also include demoillion debris (concrete, brick, saphall, glass) and frash. As much as 30 feet thick. Many samil areas of fill in urban areas are not shown.
- Qal
 ALLUVIUM (Holocene and late Pleistocene)—Sand, silt, clay, peat; yellowish brown, reddish brown, treddish brown, treddish brown, treddish brown, dark brown, gray; and pebble-to-cobble gravel. Abundant organic matters: Sand is chiefly quartz and shale fragments, with some glauconite and micz. Gravel is quartz, shale fragments, and quartzite with minor diabase and ironstone. As much as 20 feet thick. Deposited in floodplains, channels, and groundwater seepage areas.
- Qs SWAMP AND MARSH DEPOSITS (Holocene and late Pleistocene)—Peat and organic slit, sand, and clay dark brown to black. As much as 10 feet thick.
- Qcal COLLUVIUM AND ALLUVIUM (Holocene and late Pleistocene)—Interbedded alluvium and colluvium in headwater valleys. As much as 15 feet thick.
- ALLUVIAL FAN DEPOSITS (Holocene and late Pleistocene)—Sand, slit; brownish yellow, reddish brown, brown; and peoble gravel. Minor amounts of organic matter. As much as 15 feet thick. Forms small fans at mouths of steep streams.
- Qc EOLIAN DEPOSITS (late Pleistocene and Holocene)—Fine-to-medium sand, very pale brown to reddish yellow. Sand is chiefly quartz and shale fragments with minor mica in places. As much as 15 feet thick Forms sand sheets.
- CII LOWER TERRACE DEPOSITS (late Pleistocene)—Sand and minor silt; reddish brown, yellowish brown, reddish yellow; and pebble gravel. Sand is chleffy quartz and red and gray shale fragments with some glauconite and mica. Gravel is quartz, quartzite, gray and red shale and siltstone, with minor diabase, gneiss, and chert. As much as 30 feet thick. Forms stream terraces with surfaces 5 to 20 feet above the modern floodplain.
- LOWER COLLUVIUM (late Pleistocene)–Sand, slit, minor clay; yellow, yellowish brown, reddish yellow, light gray; some quartz and ironstone pebbles. As much as 15 feet thick, generally less than 10 feet thick. Deposited by downshope movement of Cretaceous s and and clay.
- SHALE COLLUVIUM (late Pleistocene)—Sandy, clayey silt; reddish brown; many angular chips and fragments of shale. As much as 10 feet thick. Deposited by downslope movement of weathered shale Forms aprons on grade with lower terraces.
- Ocd DIABASE COLLUVIUM (middle and late Pleistocene)—Sandy, clayes slit to sandy, slity clay; reddish yellow, brown, gray; some to many angular to subrounded pebbles, cobbles, and small boulders of diabase and gray homfels, and a few rounded pebbles and cobbles of quartz and quartzie. As much as 25 feet thick. Deposited by downslope movement of weathered diabase, hormfels, and Beacon Hill lag.
- Tp PENSAUKEN FORMATION (Pliocene)—Sand, minor silt and clay; yellow to reddish yellow; pebble gravel and minor cobble gravel, particularly at the base of the deposit. Sand is chiefly guartz with some weathered feldspara and minor glauconite and mike. Gravel is chiefly guartz and quartitie with some chert and ironstone, and minor sandstone, mudstone, gnelss, and diabase. Gnelss, diabase, and some sandstone and mudstone, clasis are deeply weathered. Locally iron-cemented. As much as 145 fest links. In erosional remains of a dissected river plan.
- Qwcp WEATHERED COASTAL PLAIN FORMATIONS-Exposed sand and clay of Coastal Plain bedrock formations. May be overlain by thin, patchy alluvium and colluvium. Quartz, chert, and ironstone pebbles left from erosion of surficial deposits may be present on the surface and in the upper several feet of the formation.
- Cons WEATHERED SHALE–Slifty clay to sandy sill; reddish brown, pale red, reddish yellow, gray; some to many angular chips and fragments of shale and a few quartz, chert, and fronstone pebbles left from erosion of surficial deposits. As much as 10 feet linkic, generally lises than 3 feet linkic.
- Owd WEATHERED DIABABE—Sity slay to clayey sand; yollow, reddish yollow, light gray; some to many angular to subrounded pebbles, cobbles, and small boulders of diabase. A few quart, chert, and ironstone pebbles and cobbles slift from erosion of sufficial deposits may be present on the surface and in the upper several feet. As much as 20 feet thick,

MAP SYMBOLS

- Contact-Contacts of alluvium, swamp deposits, and lower terrace deposits are well-defined by landforms and are drawn from 1:12,000 scale serial stereophotos. Contacts of other units are approximately located based on both landforms and field observation points.
- Material observed in hand-auger hole, exposure, or excavation
- Shallow topographic basin--Of probable periglacial origin.
- Well or boring-Upper number (Italicized) is identifier, lower number is thickness of surficial material, in feet. Identifiers of the form '28-xxxx' are N. J. Department of Environmental Protection well permit numbers. Identifiers of the form 'Wxxx' are monitoring wells filed under permit numbers 28-31109 to 28-31122. Identifiers of the form '28-xxxx' are N. J. Atas Sheet grid locations of entries in the N. J. Geological Survey permanent note collection. Borings identified by 'H' are N. J. Department of Transportation borings from Harper (1984).
- Δ10 Thickness of surficial material—From geophysical survey (D. L. Jagel and D. W. Hall, N. J. Geological Survey, 1995)
- 20 Elevation of base of Pensauken Formation-In feet above sea level. Contour Interval 20 feet. Dashed where eroded Topography of the base of the Pensauken in the Kingston area shows abrupt thickening along the trace of the Kingston Fault, suggesting fault offset of the Pensauken (Stanford and others, 1995). See section AA'.
- ----- Trace of Kingston Fault--From Parker and Houghton (1990).
 - ---- Bedrock strike ridge--Low ridge parallel to strike of bedrock. Drawn from airphotos.
- Beacon Hill lag-Pebbles and cobbles of quartz, quartzite, chert, and ironstone left from erosion of the Beacon Hill Gravel, a late Miocene fluvial deposit that formerly covered the quadrangle above an elevation of 320 feet.
- Sparse Beacon Hill lag--Pebbles and cobbles as above, but sparsely distributed.
- Pensauken lag-Pebbles and a few cobbles of quartz, quartzite, and chert left from erosion of the Pensauken Formation. Only concentrated lags are mapped; sparsely distributed lag pebbles are widespread below 140 feet in elevation.
- Upper terrace lag-Pebbles and a few cobbles of quartz and quartzite left from erosion of upper stream terrace deposits. Marks level of Millstone River in the middle Pleistocene.
 - Fluvial scarp--Line at top, ticks on slope. Cut into shale. On grade with upper terrace lag. Marks level of Millstone River in the middle Pleistocene.



REFERENCES

Harper, D. P., 1984, Geologic compilation map of the Monmouth Junction quadrangle, New Jersey: N. J. Geological Survey Open-File Map 1, scale 1:24,000.

Parker, R. A., and Houghton, H. F., 1990, Bedrock geologic map of the Monmouth Junction quadrangle, New Jersey: U. S. Geological Survey Open-File Report 90-219, scale 1:24,000.

Stanford, S. D., Jagel, D. L., and Hall, D. W., 1995, Possible Pilocene-Pleistocene movement on a reactivated Mesozoic fault in central New Jersey: Geological Society of America Abstracts with Programs, v. 27, no. 1, p. 83.







Figure 2.5-216— {Ramapo Seismic Zone}

projected earthquakes 2007 20125100 tar 5 V2D ear Services, LLC. All rights reserved.



Figure 2.5-217— {Ramapo Seismicity Cross Section}



Figure 2.5-218— {Field and Aerial Reconnaissance Map for CCNPP Unit 3}

Figure 2.5-219— {(A) Generalized Geological Map and (B) Schematic Cross Section of the Northern Chesapeake Bay}



B)



Note: (A) and (B) modified from Pazzaglia (1993a and 1993b).

Figure 2.5-220— {Generalized Top-of-Basement Structure Contour Map of the Northern Chesapeake Bay}



Reproduced from Edwards and Hansen (1979)







Figure 2.5-222— {Seismic Reflection Line St. M-1 Showing Hillville Fault of Hansen (1978)}

N..0.0.17

N..0.0007





SURFICIAL GEOLOGY OF THE MONMOUTH JUNCTION QUADRANGLE, SOMERSET, MIDDLESEX, AND MERCER COUNTIES, NEW JERSEY by Scott D. Stanford 2002

MAP SYMBOLS

MAP UNITS

- Contact-Contacts of alluvium, swamp deposits, and lower terrace deposits are well-defined by landforms and are drawn from 1:12,000 scale aerial stereophotos. Contacts of other units are approximately located based on both landforms and field observation points.
- Material observed in hand-auger hole, exposure, or excavation •
- Shallow topographic basin--Of probable periglacial origin. ₽
- Well or boring-Upper number (italicized) is identifier, lower number is thickness of surricial material, in feet. Identifiers of the form '28-xxxx' are N. J. Department of Environmental Protection well permit numbers. Identifiers of the form 'Mxxx' are monitoring wells filed under permit numbers 28-31109 to 28-31122. Identifiers of the form '28-xxxx' are N. J. Atlas Sheet grid locations of entries in the N. J. Geological Survey permanent note collection. Borings identified by 'H' are N. J. Department of Transportation borings from Harper (1984). 28-2459

Stanford, S. D., Jagel, D. L., and Hall, D. W., 1995, Possible Pliocene-Pleistocene movement on a reactivated Mesozoic fault in central New Jersey: Geological Society of America Abstracts with Programs, v. 27, no. 1, p. 83.

Harper, D. P., 1984, Geologic compilation map of the Monmouth Junction quadrangle, New Jersey: N. J. Geological Survey Open-File Map 1, scale 1:24,000.

REFERENCES

Parker, R. A., and Houghton, H. F., 1990, Bedrock geologic map of the Monmouth Junction quadrangle, New Jersey: U. S. Geological Survey Open-File Report 90-219, scale 1:24,000.

- Thickness of surficial material--From geophysical survey (D. L. Jagel and D. W. Hall, N. J. Geological Survey, 1995) A10
- Elevation of base of Pensauken Formation-In feet above sea level. Contour interval 20 feet. Dashed where eroded Topography of the base of the Pensauken in the Kingston area shows abrupt thickening along the trace of the Kingston Fault, suggesting fault offset of the Pensauken (Stanford and others, 1995). See section AA'. 20
- Trace of Kingston Fault--From Parker and Houghton (1990).
- Bedrock strike ridge--Low ridge parallel to strike of bedrock. Drawn from airphotos.
- Beacon Hill lag-Pebbles and cobbles of quartz, quartzite, chert, and ironstone left from erosion of the Beacon Hill Gravel, a late Miocene fluvial deposit that formerly covered the quadrangle above an elevation of 320 feet
- Sparse Beacon Hill lag--Pebbles and cobbles as above, but sparsely distributed.
- Pensauken lag-Pebbles and a few cobbles of quartz, quartzite, and chert left from erosion of the Pensauken Formation. Only concentrated lags are mapped; sparsely distributed lag pebbles are widespread below 140 feet in elevation
 - Upper terrace lag--Pebbles and a few cobbles of quartz and quartzite left from erosion of upper stream terrace deposits. Marks level of Millstone River in the middle Pleistocene.
- Fluvial scarp--Line at top, ticks on slope. Cut into shale. On grade with upper terrace lag. Marks level of Millstone River in the middle Pleistocene. t
- Quarry-Line marks perimeter of excavated area at time of mapping. Diabase and hornfels outcrop, quarried rock, and stripped surficial material occur within perimeter.
 - ø



d quartzite with some chert diabase, and some As much as 145 feet thick it gray; some to many w quartz, chert, and present on the surface and In brown, yellowish brown, nale fragments with some tone, with minor diabase, aces 5 to 20 feet above the th brown, reddish yellow, rally less than 10 feet thick stal Plain bedrock hert, and ironstone pebbles e upper several feet of the iish yellow; pebble gravel / quartz with some sh yellow, reddish brown, et thick. Forms small fans anic silt, sand, and clay indy, silty clay; reddish , and small boulders of : and quartzite. As much a frels, and Beacon Hill lag. sh yellow, gray; some to stone pebbles left from feet thick. COLLUVIUM AND ALLUVIUM (Holocene and late Pleistocene)-Interbedded alluvium and colluvium in headwater valleys. As much as 15 feet thick. ry pale brown to reddish As much as 15 feet thick Age of unit indicated in parentheses. For units spanning more than one period, principal age is listed first. include angular fragmen s (concrete, brick, aspha reas are not shown. dolocene and late Pleistocenej—Sand, silt, ciay, peat; yellowish brown, reddish brown, dr and poble-to-cobble gravel. Abundant organic matter, Sanal is chiefly quariz and shale filt some glauconite and mica. Gravel is quariz, state fragments, and quarizine with minr forstone. As much as 20 feet thick. Deposited in floodplains, channels, and groundwate ny angular chips and lent of weathered shale sequence. MP AND MARSH DEPOSITS (Holocene and late Pleistocene)-Peat and org brown to black. As much as 10 feet thick. reddish yellow, light ers of diabase. A few Sand, silt; browni: As much as 15 fe ATIONS--Exposed sand and clay of Coa patchy alluvium and colluvium. Quartz, ch may be present on the surface and in the WEATHERED DIABASE-Silty clay to clayey sand; yellow, reddish yellow, ligh angular to subrounded pebbles, cobbles, and small boulders of diabase. A fe ironstone pebbles and cobbles left from erosion of surficial deposits may be J Order of map units in list does not necessarily indicate chronologic oebble gravel. Sand is chiefly quartz and red and gray sh: Gravel is quartz, quartzite, gray and red shale and siltsto • much as 30 feet thick. Forms stream terraces with surfa pale red, reddis COLLUVIUM (late Pleistocene)—Sand, slift, minor clay; yellow, yellow, ay; some quartz and ironstone pebbles. As much as 15 feet thick, gen ted by downslope movement of Cretaceous sand and clay. rosion of surficial deposits. As much as 10 feet thick, generally less than 3 f DEPOSITS (late Pleistocene and Holocene)-Fine-to-medium sand, v Sand is chiefly quartz and shale fragments with minor mica in places mav redd Sandy, clayey silt to inded pebbles. cobble cobbles of quar of fill in urbai yellow to a. Gravel is chiefly qua gneiss, and diabase. Gn hered. Locally iron-cem -Sandy, clayey silt; reddish brov thick. Deposited by downslope silt: a minor and red red sha vellowish r silt and clay; brown, matter. areas c Pleistocene)—Sand and . Sand is chiefly quartz ar ALLUVIUM (Holocene and late Pleistocene)--Sand, silt, brown, gray; and pebble-to-cobble gravel. Abundant or sandy silt; reddish gray, ALLUVIAL FAN DEPOSITS (Holocene and late Pleisto brown; and pebble gravel. Minor amounts of organic at mouths of steep streams. ent of May a Many nudstone Pleistocene)--Sandy, uch as 10 feet thick. D ED COASTAL PLAIN FORMATIONS PETRCAS late Plei move ARTIFICIAL FILL--Sand, slit, clay, gravel; b of shale, sandstone, and diabase bedrock. glass) and trash. As much as 30 feet thick. usione, clasts are ucepi ints of a dissected river by thin, particity of the provided of the prov TERRACE DEPOSITS (late yellow; and pebble gravel. \$ E-Silty clay to and a down DIABASE COLLUVIUM (middle PENSAUKEN FORMATION (PI aprons on grade with May be overlain osion of surficial gray nornters, Deposited by COLLUVIUM (late SHALE COLLUVIUM (late ert. As SHAL nd sheets. rem **VEATHERED** pue floo e and thick VEATHER SWAMP EOLIAN OWFR LOWER 25 feet seepai gneiss -orms ragn lark Qwcp Qwd QWS Qs Qcal Qcd Qal Qaf ő Qcs Ч Ŧ ő

angular to subrounded pebbles, cobbles, and sm ironstone pebbles and cobbles left from erosion in the upper several feet. As much as 20 feet thicl







Figure 2.5-227— {Calculated Maximum Strains Based on Initially Adopted EPRI Curves}





Figure 2.5-229— {Settlement Monitoring Instrumentation at the Intake Area}

CHESAPEAKE BAY

200 FEET



50 ——Adjusted FIRS (39 ft Depth - RB36) - Horizontal	4		- Adjusted FIRS (39 ft Depth - RB26) - Vertical	S5	30 ——Site SSE (Horizontal and Vertical)									0.1 10 100	Frequency [Hz]
0.50	0.45	0,40	: ; [6] ເ	ratioi .35	0.30 0.30	A IB'I ⊂ ″	; ; ; ;	0.70 0.70 0.70	лаг 	ς ς γ%	0.10	0.05	00 0		

Figure 2.5-231— {CCNPP Unit 3 Strain - Compatible Profiles for NI Common Basemat Structures -RB36 Soil Column}



Figure 2.5-232— {CCNPP Unit 3 Strain - Compatible Profiles for NI Common Basemat Structures -RB26 Soil Column}



Figure 2.5-233— {Shear-Wave Velocity Profiles Strain-Compatible with FIRS for the RB36 Soil Column}



Figure 2.5-234— {Shear-Wave Velocity Profiles Strain-Compatible with FIRS for the RB26 Soil Column}



FSAR: Section 2.5



CCNPP Unit 3



Figure 2.5-236— Comparison of Plots of Shear Wave Velocity Beneath Structural Fill for B-301

2-1365 © 2007-2012 UniStar Nuclear Services, LLC. All rights reserved. COPYRIGHT PROTECTED