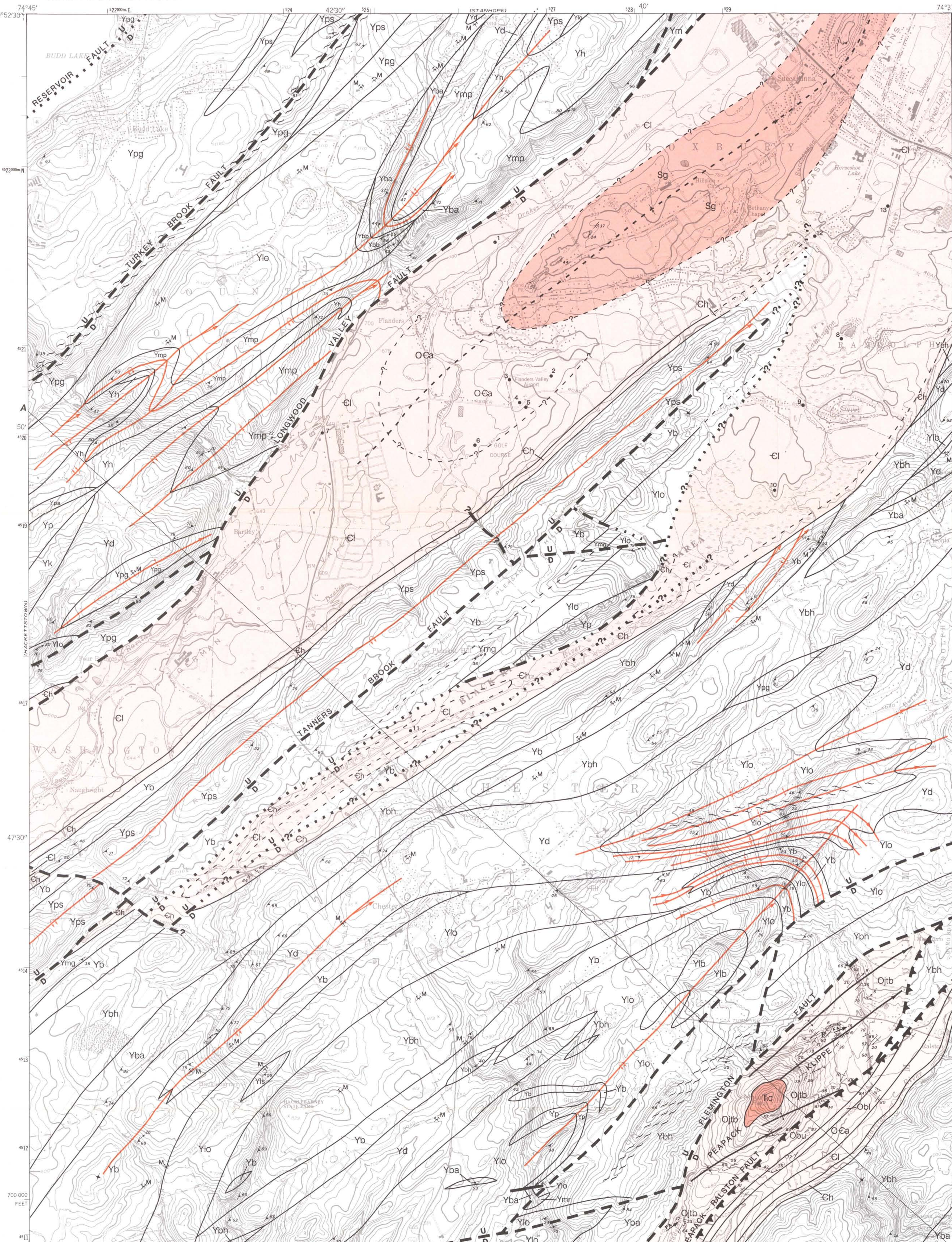


Base map from U.S. Geological Survey, 1954
Photorevised 1981
10,000-foot grid based on New Jersey Coordinate System
1000-meter Universal Transverse Mercator grid ticks, zone 18

UTM GRID AND 1981 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE LOCATION

Mesozoic geology mapped by R.A. Volkert, 1987
Field assisted by H.F. Houghton
Paleozoic geology mapped by R.A. Volkert, 1985, 1986;
F.J. Markewicz, 1958, 1962;
A.A. Drake, Jr., 1978, 1985
Proterozoic geology mapped by R.A. Volkert, 1986;
Some data compiled from H.B. Kummel, ca. 1900

Reviewed by A. Nelson and P. Lyttle
Cartography by M. Fiorentino

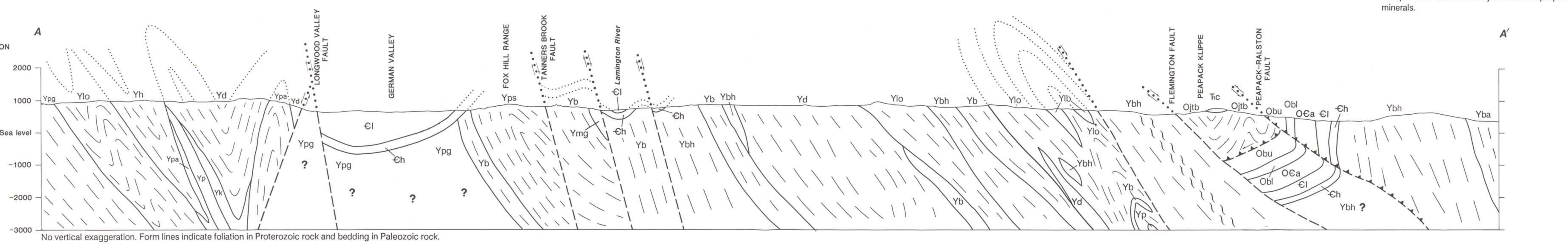
[1] New Jersey Geological Survey
[2] New Jersey Geological Survey (Retired)
[3] U.S. Geological Survey

BEDROCK GEOLOGIC MAP OF THE CHESTER QUADRANGLE, MORRIS COUNTY, NEW JERSEY

by

Richard A. Volkert[1], Frank J. Markewicz[2], and Avery A. Drake, Jr.[3]

1990



No vertical exaggeration. Form lines indicate foliation in Proterozoic rock and bedding in Paleozoic rock.

CORRELATION OF MAP UNITS

Rocks of the Newark Basin

TRc — Upper Triassic — Triassic — Mesozoic

UNCONFORMITY

Rocks of the Green Pond Mountain Region

Sg — Middle and Lower Silurian — Silurian — Paleozoic

UNCONFORMITY

Rocks of the Peapack Klippe

Ojtb — Lowest Middle and upper Lower Ordovician — Ordovician

THRUST FAULT

Rocks of the Lehigh Valley Sequence

Kittatinny Supergroup:
- Beekmantown Group: Obu, Obl — Lower Ordovician
- O€a — Lowest Lower Ordovician and Upper Cambrian
- €l — Middle and Lower Cambrian — Cambrian
- €h — Lower Cambrian

UNCONFORMITY

Rocks of the Reading Prong — Middle Proterozoic — Precambrian

Intrusive Rocks

Byram Intrusive Suite: Ybh, Yba, Ybb
Lake Hopatcong Intrusive Suite: Ypg, Yps, Ypa

INTRUSIVE CONTACTS

Metasedimentary Rocks

Yp, Ymp, Yk, Yb, Ymr, Ym

UNCONFORMITY

Losee Metamorphic Suite

Ylo, Yls, Ylb

Rocks of Uncertain Origin

Yh, Yd, Ymg

DESCRIPTION OF MAP UNITS

Rocks of the Newark Basin

TRc — **Quartz pebble conglomerate** - Dark-red to reddish-brown conglomerate with mostly pebble-size subrounded quartz clasts in a sand-to-silt matrix. Unit does not crop out, but occurs as thin residuum and slope wash along the crest and west and south slopes of Mt. Paul.

Rocks of the Green Pond Mountain Region

Sg — **Green Pond Conglomerate** - Massive, medium- to thick-bedded, unfossiliferous, purple-red quartz pebble conglomerate interbedded with purple-red, tan, white, gray, and pink planar to cross-bedded, ripple-marked sandstone and quartzite.

Rocks of the Peapack Klippe

Ojtb — **Jutland klippe upper unit B (Perissoratis and others, 1979; Lyttle and Epstein, 1987; Drake and others, 1988)** - Heterogeneous sequence of interbedded red and green shale, interlaminated dolomite and shale, interbedded fine-grained graywacke siltstone and shale, yellow, red, green, tan, and gray shale, and light-gray to pale pinkish-gray quartzite and quartz pebble conglomerate. Much of the rock is an autoclastic melange in a scaly-cleaved matrix. Some shale beds contain conodonts (Ethington and others, 1958) and sparse graptolite and brachiopod fragments. The dolomite contains conodonts of the North Atlantic Province fauna high E to 2, and are of late Ibexian to early Whiterockian (Arenigian) age. Thickness varies due to structural complexity, but may be about 1,500 to 1,800 feet in map area.

Rocks of the Lehigh Valley Sequence

Obu — **Beekmantown Group, upper part** - Locally preserved thin- to thick-bedded, aphanitic to medium-grained, medium-light to medium-gray dolomite, weathering light- to medium-gray to yellowish-gray; locally laminated and slightly fetid. Grades downward into medium- to thick-bedded, medium- to coarse-grained, medium-dark- to dark-gray dolomite; strongly fetid, with a mottled, weathered surface and contains pods and lenses of dark-gray to black chert. Contains North American Midcontinent Province conodont fauna high C through low D, so unit is of Ibexian (Tremadocian) age. Unit includes the Rickenbach Formation and Epler Formation of Drake and Lyttle (1985) and Drake and others (1985), and is the Ontelaunee Formation of Markewicz and Dalton (1977).

Obl — **Beekmantown Group, lower part** - Very thin- to thick-bedded, interbedded dolomite and minor limestone. Upper laminated, fine- to medium-grained dolomite is very-thin- to thick-bedded, light-olive-gray to dark-gray and at places weathers dark-yellowish-orange. Middle sequence is fine-grained dolomite having silty dolomite laminae, and thin- to medium-bedded, fine-grained limestone. The dolomite is dark-gray, aphanitic to fine-grained, weathers olive-gray, light-brown and dark-yellowish-orange and is locally well laminated. The limestone is medium- to dark-gray, weathers light-gray to light-bluish-gray typically with dolomitic reticulate mottling and characterized by anastomosing, light-olive-gray to grayish-orange laminae surrounding lenses of limestone. Lower sequence consists of aphanitic to coarse- grained, thinly-laminated to thick-bedded dolomite having quartz-sand laminae and local very-thin to thin black, chert beds. The dolomite is medium- to medium-dark-gray, massive, locally mottled and slightly fetid. Floating quartz sand and quartz sand stringers are more abundant towards the lower, gradational contact. Contains North American Midcontinent Province conodont fauna A to mid C, so unit is of Ibexian (Tremadocian) age. Unit is the Stonehenge Formation of Drake and Lyttle (1985) and Drake and others (1985), and includes the Rickenbach Formation and Epler Formation of Markewicz and Dalton (1977).

O€a — **Allentown Dolomite** - Light- to dark-gray, fine- to medium-crystalline, thin- to medium-bedded, rhythmically bedded, dolomitic mudstone, oolitic grainstone and dolomite containing ripple marks, algal stromatolites, cross beds, mud cracks, and chip conglomerates.

€l — **Leithsville Formation** - Light- to dark-gray-weathering, fine- to medium-crystalline, thin- to medium-bedded dolomite interbedded with thin dolomitic shale and dolomitic sandstone. Archaeocyathids of Early Cambrian age occur in the formation elsewhere in New Jersey, suggesting an intraformational disconformity so that both Middle and Early Cambrian time are represented by the unit (Palmer and Rozanov, 1976).

€h — **Hardyston Quartzite** - Medium- to light-gray, fine-grained quartzite, arkosic sandstone, and dolomitic sandstone. In most of map area occurs as float only. Contains trilobites of Early Cambrian age elsewhere in New Jersey.

Rocks of the Reading Prong

Byram Intrusive Suite

Ybh — **Hornblende granite** - Medium- to coarse-grained, pink to buff, gneissoid to indistinctly foliated granite and sparse granite gneiss composed principally of microcline microperthite, quartz, oligoclase, and hornblende. Includes small bodies of pegmatite and amphibolite not shown on map.

Yba — **Microperthite alaskite** - Medium- to coarse-grained, pink to buff, gneissoid to indistinctly foliated granite composed principally of microcline microperthite, quartz, and oligoclase. Includes small bodies of amphibolite not shown on map.

Ybb — **Biotite granite** - Medium-grained, pink to buff, massive, moderately foliated granite composed of microcline microperthite, quartz, oligoclase, and biotite.

Lake Hopatcong Intrusive Suite

Ypg — **Pyroxene granite** - Medium- to coarse-grained, gray to buff or white-weathering, greenish-gray, massive, gneissoid to indistinctly foliated granite composed of mesoperthite to microantiperthite, quartz, oligoclase, and clinopyroxene. Common accessories include sphene, magnetite, apatite, and trace amounts of sulfide. Some phases of this unit are quartz monzonite, quartz monzodiorite, or granodiorite. Locally includes small bodies of amphibolite not shown on map.

Yps — **Pyroxene syenite** - Medium- to coarse-grained, gray to buff- or tan-weathering, greenish-gray, massive, moderately to indistinctly foliated rock composed of mesoperthite to microantiperthite, oligoclase, and clinopyroxene. Contains sparse accessory quartz, sphene, magnetite, and trace sulfide. Unit underlies much of the Fox Hill Range.

Ypa — **Pyroxene alaskite** - Medium- to coarse-grained, greenish-buff- to pale pinkish-gray, massive, moderately foliated granite composed of mesoperthite to microantiperthite, oligoclase, and quartz. Common accessories are clinopyroxene, sphene, and magnetite. Locally includes small bodies of amphibolite not shown on map. Relative age and relationship of Ypg, Yps, and Ypa to rocks of the Byram Intrusive Suite unknown.

Metasedimentary Rocks

Yp — **Pyroxene gneiss** - Medium-fine- to medium-grained, greenish-gray, white- to tan-weathering, well-layered gneiss composed of oligoclase, clinopyroxene, variable amounts of quartz, and trace amounts of opaque minerals and sphene.

Ymp — **Clinopyroxene-quartz-microcline gneiss** - Medium-fine- to medium-grained, white to pale pinkish-white or light-gray, massive to moderately well-layered gneiss composed of microcline microperthite, quartz, oligoclase, clinopyroxene, and trace amounts of sphene and opaque minerals. Unit contains locally abundant hornblende south of Conkling Pond and biotite north of Bartley. Sparse thin layers of garnet occur where the unit contains biotite.

Yk — **Potassic feldspar gneiss** - Medium-fine- to medium-grained, pinkish-white to pinkish-gray or buff, moderately foliated gneiss and lesser granofels composed of quartz and potassic feldspar with local accessory biotite and opaque minerals.

TABLE 1. Records of wells bottoming in dolomite in German Valley and Lamington River Valley

Well number	Well permit number	Owner/Name	Year drilled	Total depth (feet)	Yield (gpm)	Log and/or bedrock formation (depth in feet)
1	--	Roxbury Water Co.	1988	--	250 - 300	Bottomed in Leithsville Formation
2	--	"	--	400	< 60	Bottomed in Allentown Dolomite
3	--	"	--	250	poor	Bottomed in Allentown Dolomite
4	--	"	--	--	450 - 500	Bottomed in Allentown Dolomite
5	26 - 09869	Morris County MUA Flanders test well 1	1986	250	100	0 - 152 - Gravel, sand, silt, clay 152 - 178 - AllentownDolomite 178 - 250 - Leithsville Formation
6	26 - 09868	Morris County MUA Flanders test well 2	1987	303	60	0 - 125 - Gravel, sand, silt, clay 125 - 180 - Allentown Dolomite 180 - 303 - Leithsville Formation
7	25 - 13051	Mt. Olive Water Co.	1965	--	--	Bottomed in Leithsville Formation
8	25 - 32501	Alamatong test well 3B	1988	708	610	0 - 275 - Gravel, sand, silt, clay 275 - 450 - Allentown Dolomite 450 - 708 - Leithsville Formation
9	25 - 25610	Alamatong test well 5	1985	504	750	0 - 200 - Gravel, sand, silt, clay 200 - 504 - Leithsville Formation
10	25 - 32538	USGS test well BR - 3	1988	422	10	0 - 195 - Gravel, sand, silt, clay 195 - 422 - Leithsville Formation
11	25 - 32964	USGS test well BR - 4	1989	242	400	0 - 155 - Gravel, sand, silt, clay 155 - 242 - Leithsville Formation
12	25 - 33188	Roxbury Water Co. well 1A	1989	700	240	0 - 122 - Gravel, sand, silt, clay 122 - 603 - Dolomite (Epler Fm - *per* Markewicz) 603 - 607 - Voids
13	25 - 33680	NJGS Horseshoe Lake well	1989	154	6.6	0 - 211 - Gravel, sand, silt, clay 211 - 223 - Weathered dolomite

Yb — **Biotite-quartz-feldspar gneiss** - Medium-fine- to medium-coarse-grained, gray to tan, commonly rusty-weathering, moderately layered and foliated gneiss which is variable in texture and composition. Rock is composed principally of oligoclase, microcline microperthite, quartz, and biotite. Locally contains garnet, graphite, and sillimanite.

Ym — **Microcline gneiss** - Medium-fine- to medium-grained, tan to pinkish-white, well layered and foliated rock composed principally of quartz and microcline and lesser oligoclase. Common accessories include biotite, garnet, magnetite, and local sillimanite.

Ymr — **Marble** - Coarsely-crystalline, white calcite marble with accessory clinopyroxene, serpentine, and phlogopite.

Losee Metamorphic Suite

Ylo — **Quartz-oligoclase gneiss** - Medium- to medium-coarse-grained, white- to light-greenish-gray, indistinctly foliated gneiss composed of quartz and oligoclase or andesine and local biotite, hornblende, and (or) clinopyroxene. Contains thin amphibolite layers.

Yls — **Albite-oligoclase syenite** - Medium-grained, white- to light-gray or pale pinkish-gray, massive, moderately foliated syenite composed of albite or oligoclase with accessory hornblende and magnetite. Unit is confined to a small body along the Lamington River at the abandoned Gulick magnetite mine at Hacklebarney.

Ylb — **Biotite-quartz-oligoclase gneiss** - Medium-fine- to medium-coarse-grained, light- to medium-gray or greenish-gray, massive, moderately layered and foliated gneiss containing oligoclase or andesine, quartz, biotite, and local garnet and sparse graphite. Commonly interlayered with amphibolite.

Rocks of Uncertain Origin

Yh — **Hypersthene-quartz-andesine gneiss** - Medium-grained, moderately layered and foliated, greenish-gray- to greenish-brown, greasy lustered gneiss of charnockitic affinity composed of andesine or oligoclase, quartz, clinopyroxene, hornblende, and sparse hypersthene. Commonly interlayered with amphibolite and mafic-rich quartz-plagioclase gneiss.

Yd — **Diorite** - Medium- to medium-coarse-grained, greenish-gray- to brownish-gray, greasy lustered, massive, moderately foliated diorite to quartz diorite containing andesine or oligoclase, clinopyroxene, hornblende, hypersthene, sparse biotite and quartz. Amphibolite and mafic-rich quartz-plagioclase gneiss layers are common. Unit may be related to rocks of the Losee Metamorphic Suite and possibly the hypersthene-quartz-andesine gneiss, but evidence is equivocal.

Ymg — **Monazite gneiss** - Medium-fine- to medium-grained, buff-weathering, light-greenish-gray to greenish-buff, massive, flaggy, moderately foliated, well lineated gneiss composed of microcline microperthite, quartz, oligoclase, biotite, and monazite. Accessories include hornblende, zircon, and opaque minerals. Quartz grains are typically stretched and rod-like giving this rock the appearance of an L-tectonite. Unit occurs in a thin linear belt along Tanners Brook and along the western side of the Lamington River Valley.

MAP SYMBOLS

Contact - Short dashed where concealed; queried where uncertain.

Faults - Short dashed where concealed; queried where uncertain.

High angle fault - U, upthrown side; **D**, downthrown side

Inclined thrust fault - Sawteeth on upper plate

Shear zone

FOLDS

Folds of Proterozoic age - Folds in foliation and layering

Antiform - Showing crestline and direction of plunge

Synform - Showing troughline and direction of plunge

Overturned antiform - Showing trace of axial surface, direction of dip of limbs, and plunge

Overturned synform - Showing trace of axial surface, direction of dip of limbs, and plunge

Folds of Paleozoic age - Folds in bedding

Syncline - Showing troughline and direction of plunge; short dashed where concealed

Anticline - Showing crestline and direction of plunge

MINOR FOLDS

5 — **Minor asymmetric fold** - Showing bearing and plunge of axis and rotation sense viewed down plunge

5 FA — **Bearing and plunge of fold axis of minor fold in bedding**

PLANAR FEATURES

Strike and dip of bedding

20 — Inclined

Vertical

80 — Overturned

Strike and dip of crystallization foliation

30 — Inclined

Vertical

45 — **Strike and dip of mylonitic foliation**

35 — **Strike and dip of slaty cleavage**

60 — **Strike and dip of crenulation cleavage**

50 — **Strike and dip of spaced cleavage**

LINEAR FEATURES

20 — **Bearing and plunge of mineral lineation in Proterozoic rocks**

15 — **Bearing and plunge of intersection of bedding and slaty cleavage**

30 — **Bearing and plunge of crenulations**

F — **Fossil locality (conodonts)**

M — **Abandoned magnetite mine**

13 — **Well bottoming in dolomite in the German Valley or Lamington River Valley**

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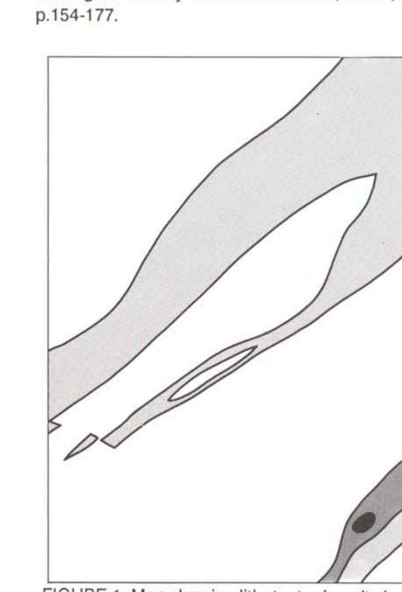

FIGURE 1. Map showing lithotectonic units in the Chester quadrangle

Rocks of the Newark Basin
Rocks of Lehigh Valley sequence and Green Pond Mountain region
Rocks of the Peapack klippe
Rocks of the Reading Prong