

Description of geologic map units in Amelia County, Virginia

(From Virginia Division of Mineral Resources, 2003, Digital representation of the 1993 geologic map of Virginia – Expanded Explanation: Virginia Division of Mineral Resources Publication 174, compact disc; for more information and specific citations, please consult this publication.)

Mapped Units of the Mesozoic Basins

Intrusive Igneous Rocks

d *diabase* (Lower Jurassic). Fine- to coarsely-crystalline, subaphanitic or porphyritic with aphanitic margins; dark-gray mosaic of plagioclase laths and clinopyroxene, with some masses characterized by olivine or bronzite, others granophyric. Also occurs as dikes and sills in the Valley and Ridge, Piedmont, and Blue Ridge physiographic provinces.

Newark Supergroup, Upper Triassic (Redfield, 1856; Olsen, 1978; Froelich and Olsen, 1984)

TRc *conglomerate, mixed clasts*. Rounded to subangular pebbles, cobbles, and boulders of mixed lithologies including quartz, phyllite, quartzite, gneiss, schist, greenstone, and marble in a matrix of medium- to very-coarse-grained, reddish-brown to gray, locally arkosic, sandstone.

TRcs *sandstone, siltstone, shale, and coal, interbedded* (Upper Triassic, Newark Supergroup, Froelich and Olsen, 1984). Sandstone, fine- to coarse-grained, reddish-brown to gray, arkosic in places, micaceous; displays channel-type primary features. Siltstone, light- to dark-gray, micaceous. Shale, light- to dark-gray, carbonaceous, micaceous, fossiliferous. Coal, bituminous, banded, moderate- to well-developed fine- to medium-bleat, partings and inclusions of shale, siltstone, and sandstone; high methane concentrations recorded in the Richmond and Taylorsville basins. This lithologic unit occurs in the Richmond, Taylorsville, Farmville, Briery Creek, and Danville basins.

TRs1 *sandstone, arkosic* (Upper Triassic, Newark Supergroup, Froelich and Olsen, 1984). Light gray to light reddish-brown, medium- to coarse-grained, micaceous.

TRss *sandstone, siltstone, and shale, interbedded* (Upper Triassic, Newark Supergroup, Froelich and Olsen, 1984). Sandstone, very fine- to coarse-grained, reddish-brown to gray, micaceous, minor conglomerate beds. Siltstone, reddish-brown to gray, micaceous. Shale, reddish-brown, greenish-gray, gray, yellowish-brown, laminated, fossiliferous. Upward-fining sequences, discontinuous vertically and horizontally.

Rocks of the Southeastern Piedmont

fg *gneissic granite and granodiorite*. Light gray to white, fine- to medium-grained, massive to foliated, muscovite-biotite gneissic granite to granodiorite containing minor garnet, and xenoliths of biotite gneiss and amphibolite. Several different intrusive phases are present.

rbg *biotite gneiss*. Light gray, medium- to coarse-grained, compositionally-layered and locally migmatitic rocks, include interlayered biotite gneiss, muscovite-biotite gneiss, muscovite-biotite schist, and sillimanite-mica schist; also includes minor interlayers and lenses of granitic gneiss, biotite-amphibole gneiss, amphibolite, garnet-mica schist, calc-silicate granofels, and rare ultramafic rocks. This unit correlates with Raleigh belt rocks in North Carolina (Parker, 1979; Geologic Map of North Carolina, 1985).

v *mafic and felsic metavolcanic rocks*. Heterogeneous layered metavolcanic sequence includes crystal and lithic tuff, dacite porphyry, chert, phyllite, and greenstone metabasalt; greenschist-facies metamorphic mineral assemblages occur in the various lithologies. This unit correlates with the Roanoke Rapids volcanogenic complex of the eastern slate belt in North Carolina (Farrar, 1985a, 1985b; Geologic Map of North Carolina, 1985; Horton and Stoddard, 1986). To the extent that correlation with lithologically similar Carolina slate belt rocks is valid, mafic and felsic metavolcanic rocks (v) are Late Proterozoic to Cambrian in age.

Rocks of the Eastern Piedmont

my *mylonite*. Includes protomylonite, mylonite, ultramylonite, and cataclastic rocks. Lithology highly variable, depending on the nature of the parent rock, and on intensive parameters and history of deformation. In most mapped belts of mylonite and cataclastic rock (**my**), tectonized rocks anastomose around lenses of less-deformed or undeformed rock. In the Blue Ridge, some of these lenses are large enough to show at 1:500,000 scale. In many places mylonitic and cataclastic rocks are gradational into less deformed or undeformed adjacent rocks, and the location of contacts between tectonized rocks (**my**) and adjacent units is approximate or arbitrary. These boundaries are indicated on the map by color-color joins with superimposed shear pattern.

Most mapped belts of mylonite represent fault zones with multiple movement histories. In the Blue Ridge, Paleozoic age contractional deformation fabrics are superimposed on Late Precambrian extensional fabrics (Simpson and Kalaghan, 1989; Bailey and Simpson, 1993). Many Piedmont mylonite zones contain dextral-transpressional kinematic indicators that formed during Late Paleozoic collisional tectonics (Bobyarchick and Glover, 1979; Gates and others, 1986). Paleozoic and older faults were reactivated in many places to form extensional faults during the Mesozoic (Bobyarchick and Glover, 1979).

Ppg *pegmatite* (Amelia district pegmatites, Permian). Leucocratic, coarsely crystalline pegmatite, occurs in discordant lens-shaped dikes and pods. Major minerals are quartz, microcline, albite, muscovite, garnet, and minor biotite; locally contains numerous rare and unusual accessory minerals (Pegau, 1932; Dietrich, 1990).

Biotite and muscovite from the pegmatites have yielded Rb-Sr ages ranging from about 261 to 289 Ma (Deuser and Herzog, 1962).

PzYgr *granite gneiss* (Early Paleozoic-Late Proterozoic, Pavlides, 1990). Fine- to medium-grained, light gray to white granite to tonalite gneiss; composed of biotite, oligoclase, quartz, and porphyroblastic microcline, with accessory muscovite, epidote, titanite, and magnetite; hornblende occurs locally within diffuse compositional layering. Inclusions of biotite gneiss and amphibolite are present locally. Unit occurs as irregular lenticular to tabular masses within porphyroblastic biotite gneiss (**Ymd**).

PzYpm *quartzofeldspathic gneiss* (Early Paleozoic-Late Proterozoic, Bobyarchick and others, 1981). Light gray, fine- to coarse-grained, foliated, layered muscovite-bearing quartzofeldspathic gneiss; contains intercalated quartz-muscovite schist.

Mineralogy: quartz + plagioclase + microcline + garnet + muscovite + biotite.

Yms *muscovite schist and gneiss* (Proterozoic). Light gray to silvery gray, medium-grained, strongly foliated quartz-muscovite schist; occurs as discontinuous lenses within porphyroblastic garnet-biotite gneiss (**Ymd**).

Ya *amphibolite, amphibole gneiss, and schist* (Proterozoic). Melanocratic, fine- to coarse-grained, weakly to strongly foliated, irregularly layered amphibole-rich gneiss and schist.

Mineralogy: hornblende + clinopyroxene + plagioclase + magnetite + biotite ± scapolite ± garnet ± quartz ± epidote.

Geophysical signature: narrow, strike-elongate, positive magnetic anomaly.

Lenses and layers of amphibolite and amphibole gneiss are interlayered with porphyroblastic garnet-biotite gneiss (**Ymd**). The mafic rocks constitute 50 percent or more of the section in a zone about 0.62 mile wide surrounding outcrop areas of State Farm gneiss (**Ysf**); farther away from the State Farm contact, lenses and layers of amphibolite and amphibole gneiss are more widely scattered, but are laterally persistent and outline map-scale structures (Marr, 1985).

Amphibolite and interlayered biotite gneiss adjacent to the State Farm gneiss were named the Sabot amphibolite by Poland (1976), who characterized the formation as a tabular sheet 0.7 to 1.0 km thick. He and Goodwin (1970) interpreted these amphibolites as metamorphosed mafic volcanic or pyroclastic rocks. Glover and others (1989 and references therein) report a low-angle regional discordance between the base of the Sabot and the compositional layering in the underlying State Farm Gneiss.

Ymd *porphyroblastic garnet-biotite gneiss* (Proterozoic). Heterogeneous layered sequence is dominantly garnetiferous biotite gneiss and porphyroblastic gneiss, migmatitic in part, with subordinate interlayered amphibolite and amphibole gneiss (**Ya**), pelitic-composition gneiss, calc-silicate gneiss, biotite hornblende-quartz-plagioclase gneiss, and garnetiferous leucogneiss. These lithologies contain amphibolite-facies metamorphic mineral assemblages consistent with rock chemistry. Farrar (1984) reports relict granulite-facies assemblages in some rocks.

This unit underlies a wide area that surrounds the State Farm antiform (Poland, 1976; Reilly, 1980; Farrar, 1984) and two subsidiary antiforms to the northeast; the unit includes the Maidens gneiss and portions of the Sabot amphibolite of Poland (1976), the eastern gneiss complex and Boscobel granodiorite gneiss of Bobyarchick (1976), and the Po River Metamorphic Suite of Pavlides (1980).

Poland (1976) and Reilly (1980) proposed that the Maidens gneiss and Sabot amphibolite were a Late Precambrian to Early Paleozoic-age volcanic-sedimentary cover sequence unconformably overlying the State Farm gneiss. Farrar (1984) interpreted relict granulite-facies mineral assemblages to have equilibrated during Grenville-age regional metamorphism; this contributed to his conclusion that the Sabot and Maidens, in addition to the State Farm, are Grenville or pre-Grenville in age.

Porphyroblastic garnet-biotite gneiss (**Ymd**) is intruded by rocks of the Carboniferous-age Falmouth Intrusive Suite (Pavlides, 1980).

um *ultramafic rocks*. Gray to greenish-gray, medium- to coarse-grained, locally porphyroblastic chlorite-tremolite and tremolite-talc schist; occurs as pods and small plutons within porphyroblastic garnet-biotite gneiss (**Ymd**).

Rocks of the Central Piedmont

peg *granite pegmatite*. Typically leucocratic and coarse-grained; consists of lenticular bodies that are generally concordant with the regional foliation. Mineralogy includes microcline, albite, quartz, muscovite, biotite, garnet, and tourmaline.

um *ultramafic rocks*. Dark greenish-gray, medium- to coarse-grained, talc-tremolite or actinolite-chlorite schist and granofels; and, locally, serpentinite.

ga *gabbro, hornblendite, and norite*. Dark gray to greenish-black, fine- to coarse-grained, massive to foliated metamorphosed mafic plutonic rocks.

Mineralogy: hornblende + biotite + plagioclase + quartz + magnetite + apatite; relict pyroxene is present locally.

Geophysical signature: circular positive magnetic anomalies.

bgr *Burkeville pluton*. Grayish-blue, fine- to medium-grained, massive to faintly foliated; composition ranges from granodiorite to monzonite.

Mineralogy: oligoclase + microcline + quartz + biotite + epidote + apatite + zircon.

Geophysical signature: diffuse pattern of negative magnetic and circular positive radiometric anomalies.

The pluton was originally referred to as the Burkeville granite (Husted, 1942), and is the “granite in the Burkeville granite quarry” of Steidtmann (1945); the pluton intrudes migmatitic paragneiss (**mpg**).

fgb *biotite granite gneiss*. Light gray, medium-grained, equigranular, broadly-layered, locally migmatitic.

Mineralogy: quartz + plagioclase + microcline + biotite + muscovite + hornblende; apatite and zircon are accessory minerals.

Geophysical signature: diffuse pattern of positive radiometric anomalies.

amr *amphibolite and amphibole-bearing gneiss and schist*. Dark gray to black, medium-grained, strongly foliated and lineated.

Mineralogy: hornblende + plagioclase + biotite + quartz + epidote; apatite, titanite, and magnetite are accessory minerals.

Geophysical signature: strike-elongate positive magnetic anomalies.

These rocks are interlayered with migmatitic paragneiss (**mpg**).

bgp *porphyroblastic biotite gneiss*. Light gray, medium-grained, segregation-layered gneiss, contains prominent potassium feldspar porphyroblasts.

Mineralogy: quartz + biotite + plagioclase + potassium feldspar + muscovite ± hornblende; accessory minerals include epidote, apatite, and opaque minerals.

mpg *migmatitic paragneiss*. Leucocratic to mesocratic, medium- to coarse-grained layered gneiss contains interlayered biotite-rich and quartzo-feldspathic zones, locally migmatitic; includes lesser amounts of biotite schist, muscovite schist, and thin lenticular amphibolite bodies.

Mineralogy: biotite + muscovite + plagioclase + potassium feldspar + garnet ± hornblende.