North Carolina Department of Environmental Quality
Policy and Innovation Group

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North Carolina Geological Survey
Open File Report 2017-13

79° 22' 30" — 36° 30' 00" — 79° 15' 00" — 36° 22' 30"

Providence · Purley · Covington · Hamer · Yanceyville · Pleasant Grove · Topnot

Maps: CGS 1.3 · CGS 1.2 · CGS 1.1 · CGS S.1

EXPLANATION OF MAP SYMBOLS

CONTACTS AND OTHER FEATURES

- inferred
- concealed
- approximate limit of Hyco shear zone (gradational)
- diabase dike contact

- 45 Strike and dip of inclined main phase foliation (Sm)
- Vertical main phase foliation
- 31 Strike and dip of inclined late phase foliation (SL)
- 70 Strike and dip of main phase fold axial plane (FM-axial plane)
- 22 Strike and dip of late phase fold axial plane (FL-axial plane)
- 28 Bearing and plunge of mineral lineation (LM)
- Bearing of mineral lineation (LM)
- 59 Bearing and plunge of main phase fold axis (FM)
- 22 Bearing and plunge of late phase fold axis (FL)

1 Age Date
1 - U-Pb age date - 319.6 +/-0.7 Ma; Farmers Lake granite (Wortman et al., 1998)
2 - U-Pb age date - 335.4 +/-2.2 Ma; Yanceyville granite gneiss (Wortman et al., 1998)

CGS 1.1 2017 Carolina Geological Society field trip stop with number (Hibbard et al., 2017)
CGS S.1 - Semipelitic schist in Country Line Complex
CGS 1.1 - High Rock granite
CGS 1.2 - Country Line Creek Complex
CGS 1.3 - Milton terrain gneiss

INTRODUCTION

This is a compiled geologic map of data from geologic investigations along the Hyco Shear Zone. Detailed discussions of the geologic interpretations are provided in Hibbard et al. (1998), Hibbard et al. (2017) and Shell (1996).

DESCRIPTION OF MAP UNITS

Jd

Jd – Diabase: Black to greenish-black, fine- to medium-grained, diabase; consists primarily of plagioclase, augite and may contain olivine. Occurs as dikes up to 100 ft wide. Typically occurs as spheroidally weathered boulders with a grayish-brown weathering rind.

Alleghanian granitoids (ca. 335-319 Ma)

Pflg

Pflg - Farmers Lake granite: Light grey, weakly to moderately foliated, homogeneous fine- to medium-grained biotite granite. The granite occurs as sporadic stocks and dikes, most of which are too small to be resolved at 1:24,000 scale mapping. It intrudes the Kilgore granite, the Cunningham complex, and the Country Line complex. A U-Pb zircon age date of 319.6 +/-0.7 Ma on the granite is interpreted to reflect the crystallization age of the pluton (Wortman et al. 1998).

Mkg

Mkg - Kilgore orthogneiss: Medium grey, medium to coarse-grained, K-feldspar-plagioclase-quartz-biotite orthogneiss. Locally megacrystic and heterogeneously deformed; feldspar commonly displays a distinct 'clastic' texture. Deformation ranges from a single, weak to moderate foliation to the northwest to an intense, gneissic foliation in the southeast, along the contact between the pluton and adjacent Country Line complex. In most places along the contact, the Kilgore granite gneiss is concordantly interlayered with gneiss of the Country Line complex, although locally, it crosscuts layering in the complex (Shell, 1996). The Kilgore gneiss also contains enclaves of amphibolite and diorite lithically identical to immediately adjacent Country Line complex rocks in the hanging wall. These enclaves range from equidimensional pods in the north to elongate narrow lenses and layers in the south. The mafic enclaves contain a gneissic layering and foliation that is generally oblique to the foliation in the surrounding granitoid. A 327 ± 1.5 Ma U-Pb zircon age from the Kilgore granite (on the Leasburg Quadrangle) is interpreted as the crystallization age for the pluton (Wortman et al., 1998).

Mygg

Mygg - Yanceyville Orthogneiss (included in the Country Line complex): Whitish to light grey, foliated, medium- to coarse-grained biotite granite gneiss. Overprinted by the same sequence of deformation as the surrounding mafic gneisses in the Country Line complex. Contains xenoliths of the enclosing layered mafic gneisses and locally, dikes of the granite gneiss crosscut layering in the mafic gneisses (Shell, 1996). The Yanceyville granite gneiss has a U-Pb zircon age of 335.4 +/- 2.2 Ma (Wortman et al. 1998).

Milton Terrane – Milton-Chopawamsic Arc (ca. 475-450 Ma)

Om

Om – Milton schist and paragneiss: Unit is dominated by a distinctive medium-grained gray to gray-brown biotite ± garnet ± sillimanite schist and paragneiss that commonly contain porphyroclasts of feldspar- quartz ± biotite pegmatite that range from 1 mm up to 60 mm diameter (Shell, 1996). Locally, the biotite schist-paragneiss is interlayered with quartz-muscovite-garnet ± sillimanite schist, thinly layered quartzite, calc-silicate gneiss, intermediate amphibole gneiss, amphibolite, and minor marble. Primary structures in all of these rocks have been completely obliterated by intense tectonism. The Milton schist and paragneiss unit is continuous with schist and paragneiss in nearby Danville, Virginia, that is interlayered with Ordovician metavolcanic rocks (Coler et al., 2000).

Carolina Terrane

The Country Line complex (ca. 614 – 323 Ma)

ZMclm

ZMclm – Neoproterozoic mafic gneiss and amphibolite interlayered with Mississippian pegmatites and orthogneiss: Greenschist to amphibolite facies mafic gneisses with interlayered granitoids and granitic pegmatites; subordinate biotite gneiss and minor metapyroxenite, semipelitic schist, and felsic schist (Shell, 1996). The mafic gneisses range from amphibolites to biotite-amphibole gneisses. Commonly, they are layered on a centimeter to meter scale, although in some places they are massive, with a medium- to coarse-grained gabbro-like texture. The mafic gneisses are extensively interlayered with granitic pegmatites, locally envelope brownish-grey, fine-grained granitoids, and are intruded by cross-cutting granitic pegmatites.

North of the Yanceyville granite gneiss, the complex is characterized by a very regularly layered (centimeter-scale), fine- to medium-grained gray biotite + blackish green amphibole gneiss with interlayered granitic gneiss (Shell, 1996). Locally, over the span of a few meters, the regularly layered gneiss grades into migmatite (sensu lato) with a network of foliated coarse granitoid containing meter scale pods of amphibolite with layering and foliation oblique to that in the granitoid.

Biotite gneiss is a minor component of the Country Line complex; typically it is a fine- to medium-grained equigranular, gray quartz-feldspar-biotite + garnet gneiss. Generally it forms massive and homogeneous lens-shaped bodies that are too small to be resolved at 1:24,000.

Zircon from a layered mafic gneiss sub-unit in the South Boston, VA area has yielded a discordant upper intercept age of 613.9 +/-9.3 Ma that is interpreted to reflect a protolith age for the mafic gneisses. Zircon and sphene from the same sample have yielded a concordant age of ca. 323 Ma (Wortman et al., 1998). Concordantly interlayered pegmatites increase in volume towards the Mississippian Yanceyville orthogneiss, suggesting that the concordant pegmatites are also Mississippian. Thus, the complex is a mixture of Neoproterozoic and Mississippian rocks.

CZqd

CZqd – Quartz diorite plutons: Fine- to coarse-grained, heterogeneously foliated, biotite and/or amphibole bearing, quartz diorite.

Hyco Arc (ca. 635-610 Ma)

Zhrg

Zhrg - High Rock Granite: Whitish-pink, fine- to coarse-grained, weakly to strongly foliated, locally unfoliated, granite. Major minerals include potassium feldspar (orthoclase and microcline), plagioclase, biotite and quartz. Minor minerals include muscovite, garnet, chlorite, sericite, epidote, titanite and zircon. Muscovite increases in abundance and deformation increases northeastward through the stock. Description from Vines et al., (1998). The High Rock granite is undated; however, because it is petrographically identical to the Neoproterozoic Osmond granite (Vines et al., 1998) the two are considered to be mutually correlative.

Zh

Zh - Hyco Formation: Dominantly greenschist facies felsic volcanic and volcaniclastic rocks with subordinate intermediate and mafic components. The formation extends along the eastern margin of the Hyco shear zone. Primary features are well preserved in most of the Hyco Formation. The most common rock type is felsic crystal tuff containing abundant anhedral crystals of either quartz or plagioclase up to 3 mm in diameter. The tuffs are typically interlayered with felsic lapilli tuffs, quartz-muscovite phyllites, pebbly volcanic conglomerate, and intermediate to mafic crystal tuffs. The Hyco Formation records felsic to intermediate magmatism during a ca. 20 m.y. span starting at ca. 633 Ma (Wortman et al., 2000; Bradley and Miller, 2011).

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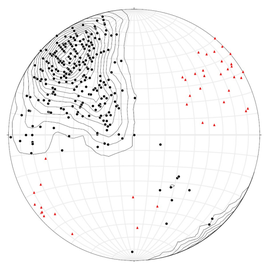
Equal-Area Schmidt Net Projections and Rose Diagram

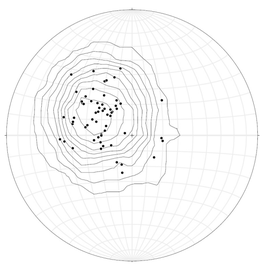
Plots and calculations created using Stereonet v. 8.6.0 based on Allmendinger et al. (2013) and Cardozo and Allmendinger (2013).



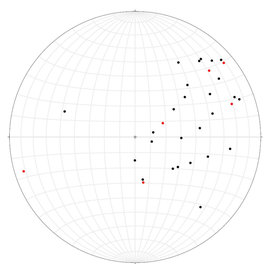
Equal Area Schmidt Net Projection of
Contoured Poles to Main Phase Foliation (SM) [black circles]
and Bearing and Plunge of Main Phase Lineations (LM) [red triangles]

Contour Interval = 2 sigma
Main Phase Foliation N=306
Main Phase lineations N=41

Contours displayed for SM only



Equal Area Schmidt Net Projection of
Contoured Poles to Late Phase Foliation (SL)
Contour Interval = 2 sigma
N =61



Equal Area Schmidt Net Projection of
Bearing and Plunge of Main Phase Fold Axes (FM) [black dots]
and Late Phase Folds Axes (FL) [red dots]

Main Phase Fold Axes N=26
Late Phase Folds Axes N=6

Base map produced by the United States Geological Survey
Modified by the North Carolina Geological Survey for use with this map

North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid: Universal Transverse Mercator, Zone 17S
10 000-foot ticks: North Carolina Coordinate System of 1983

This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands.

Imagery.....NAIP, June 2014
Roads..... U.S. Census Bureau, 2015 - 2016
Names.....GNIS, 2016
Hydrography.....National Hydrography Dataset, 2014
Contours.....National Elevation Dataset, 2008
Boundaries.....Multiple sources; see metadata file 1972 - 2016

MN 8° 53' 158 MILS · GN 1° 0' 18 MILS
UTM GRID AND 2016 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET
For Yanceyville, NC

U.S. National Grid
100,000-m Square ID
PA
Grid Zone Designation
17S

SCALE 1:24 000

1 0.5 0 KILOMETERS 1 2
1000 500 0 METERS 1000 2000
1 0.5 0 MILES 1
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000 FEET

CONTOUR INTERVAL 20 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

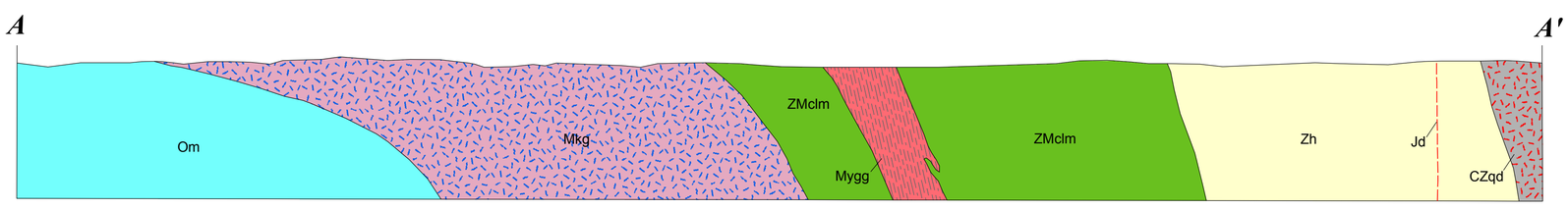
This map was produced to conform with the National Geospatial Program US Topo Product Standard, 2011.
A metadata file associated with this product is draft version 0.6.19

NORTH CAROLINA — QUADRANGLE LOCATION

ROAD CLASSIFICATION
Expressway · Secondary Hwy · Ramp · Local Connector · Local Road · 4WD · Interstate Route · US Route · State Route

1 Danville · 2 Ringgold · 3 Milton · 4 Park Spring · 5 Leasburg · 6 Cherry Grove · 7 Anderson · 8 Ridgeville · 9 Yanceyville
ADJOINING QUADRANGLES

YANCEYVILLE, NC
ANDERSON, NC



Environmental Quality

NC STATE UNIVERSITY

Compiled Geologic Map of the Hyco Shear Zone Portions of the Yanceyville and Anderson 7.5-Minute Quadrangles, Caswell County, North Carolina

Geology by: Glenn S. Shell and James P. Hibbard

Digital Cartography by: Michael A. Medina, Brandon T. Peach and Philip J. Bradley

2017

This is an Open File Map. It has been reviewed internally for conformity with North Carolina Geological Survey mapping standards and with the North American Stratigraphic Code. Further revisions or corrections to this Open File map may occur.

ACKNOWLEDGEMENTS

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