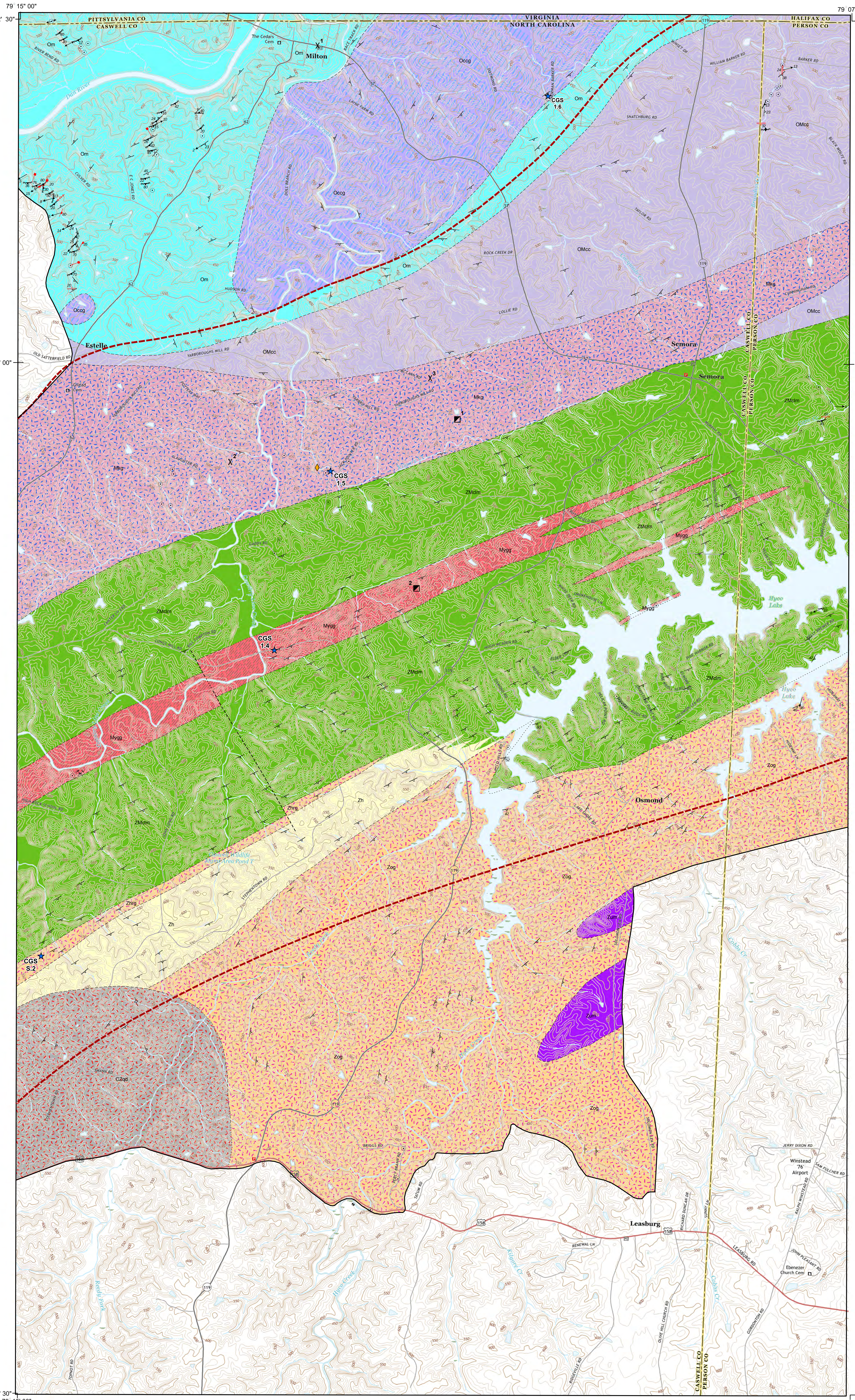

Base map produced by the United States Geological Survey
Modified by the North Carolina Geological Survey for use with this map

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
Wetlands.....FWS National Wetlands Inventory 1977 - 2014

UTM GRID AND 2016 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET
For Leasburg Quadrangle
U.S. National Grid
100,000-m Square ID
PA
Grid Zone Designation
17S

SCALE 1:24 000

CONTOUR INTERVAL 10 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

QUADRANGLE LOCATION

ADJOINING QUADRANGLES
1 Ringgold
2 Milton
3 Alton
4 Yanceyville
5 Olive Hill
6 Anderson
7 Ridgeville
8 Hurdle Mills
9 Leasburg

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

MILTON, NC/VA
LEASBURG, NC

EXPLANATION OF MAP SYMBOLS

CONTACTS AND OTHER FEATURES

- inferred
- concealed
- fault inferred
- approximate limit of Hyco shear zone (gradational)
- Appropriate strike and dip direction of main phase foliation (Sm), dip not provided (data of Kevin Wilkins)
- Strike and dip of inclined main phase foliation (Sm)
- Vertical main phase foliation
- Strike and dip of inclined main phase foliation and layering (SM + LYR)
- Vertical main phase foliation and layering
- Strike and dip of late pegmatite dike
- Strike and dip of late pegmatite dike (multiple observations at one location)
- Strike of late pegmatite dike (multiple observations at one location)
- Strike and dip of main phase fold axial plane (FM-axial plane)
- Bearing and plunge of mineral lineation (LM)
- Horizontal mineral lineation
- Bearing and plunge of minor fold hinge (FL)
- Horizontal late phase fold axis
- Observation station location
- Blanch Prison Quarry (abandoned)

Prospect
1 - Angie Prospect (mica)
2 - J. G. Slaughter Prospect (mica)
3 - O. W. Barker Prospect (mica)

Mine
1 - Yarboro No. 1 Mine (mica)
2 - Yarboro No. 2 Mine (feldspar)

U-Pb age date - 327 +/-1.5 Ma; Kilgore granite (Wortman et al., 1998)

2017 Carolina Geological Society field trip stop location with number (Hibbard et al., 2017)
CGS S.2 - High Rock Granite wing in Hyco shear zone
CGS 1.4 - Alleghanian granitoid in Hyco shear zone
CGS 1.5 - Kilgore Granite gneiss
CGS 1.6 - Connelly Church orthogneiss

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) and Hibbard et al. (2017). Geologic information from Wilkins (1994) and unpublished station maps were used in this compilation. Prospect and mine locations from USGS Mineral Resources Data System (MRDS).

UNIT DESCRIPTIONS

Alleghanian granitoids (ca. 335-319 Ma)

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 hangingwall. 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 is interpreted as the crystallization age for the pluton (Wortman et al., 1998).

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) (on the Yanceyville Quadrangle).

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

Occg – Connally Church orthogneiss: Light grey, foliated, fine- to medium-grained, granitic gneiss. Locally, garnet and magnetite bearing. Correlated with the Shelton Igneous suite of Henika (2002), which includes granite gneiss dated at ca. 450 Ma (Coler et al., 2000) nearby in Virginia.

OMcc - Cunningham complex: Heterogeneous mixture of medium to dark grey biotite gneiss and biotite schist ranging from massive, equigranular granitic gneiss to layers and lenses of biotite ± garnet ± sillimanite schist. The most common rock type is biotite gneiss that represents a hybrid between these two end-members, although distinct irregular-shaped areas of either end-member can be found. The granitic gneiss is locally K-feldspar megacrystic with crystals up to 50 mm long. Layering, at centimeter to meter scale, is defined by feldspar porphyroclast concentration as well as biotite content; it is generally subtle in most of the unit, but it is accentuated near the contact of the gneisses with the Country Line complex. Locally, meter-scale pods of amphibolite, dioritic gneiss, and calc-silicate gneiss are enveloped in a matrix of biotite gneiss. The granitic gneiss is compositionally similar to and appears to grade into the Carboniferous Kilgore orthogneiss. The biotite schist is similar to, and appears to grade into the Ordovician(?) Milton schist and paragneiss. Thus the complex appears to be a mixture of Ordovician and Mississippian rocks.

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. Northwest of the Dan River, the area is dominantly mafic gneiss and amphibolite. 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 - 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 – Quartz diorite plutons: Fine- to coarse-grained, heterogeneously foliated, biotite and/or amphibole bearing, quartz diorite.

Hyco Arc (ca. 635-610 Ma)

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.

Zog - Osmond Granite: Light grey, fine- to medium-grained, foliated biotite granite. Wortman et al. (2000) reported a U-Pb age upper intercept date of 612.4 +5.2/-1.7 Ma.

Zum - Caswell County Mafic-Ultramafic suite: Medium to coarse-grained, massive to well foliated, composed mainly of hornblende, actinolite, epidote, chlorite and tremolite (Wilson, 1975). Enstatite, serpentine, chromite, talc, sphene, pyrite and other opaque minerals are locally present in variable amounts. Description from Butler (1989).

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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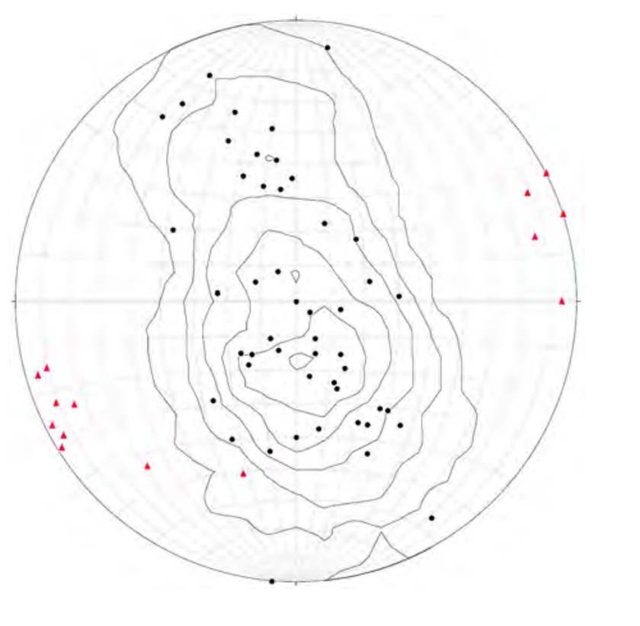
Equal-Area Schmidt Net Projections and Rose Diagram

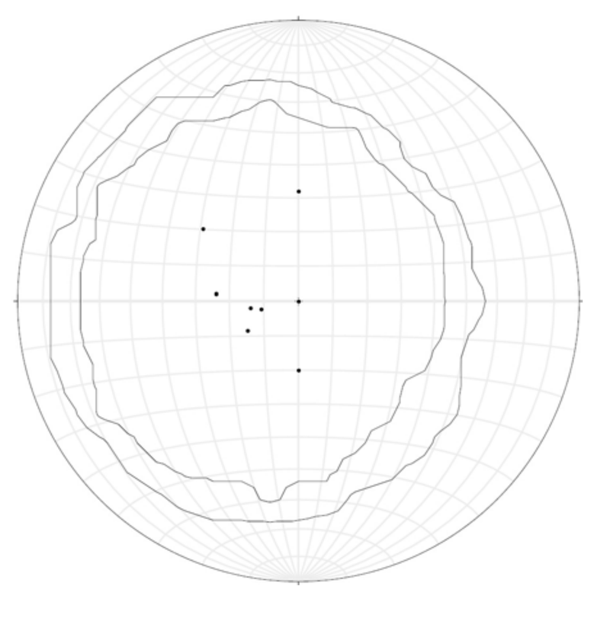
Plots and calculations created using Stereonet v. 8.6.0 based on Allmendinger et al. (2013) and Cardozo and Allmendinger (2013).



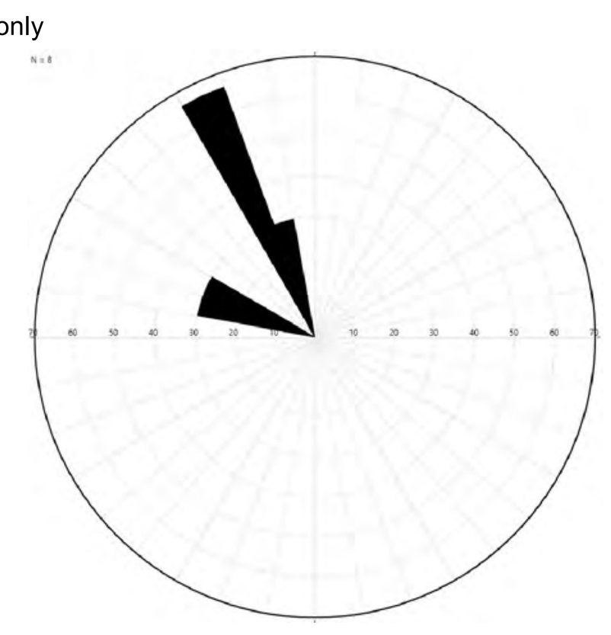
Equal Area Schmidt Net Projection of Contoured Poles to Main Phase Foliation (SM) [black circles] and Bearing and Plunge of Main Phase Lineations (LM) [red triangles]

Contour Interval = 2 sigma
Main Phase Foliation N=53
Late Phase lineations N=14

Contours displayed for SM only



Equal Area Schmidt Net Projection of Contoured Poles to Late Phase Foliation (SL)
Contour Interval = 2 sigma
N = 8



Unidirectional Rose Diagram of Late Pegmatite Dikes
N = 8
Outer Circle = 70%
Mean vector = 324 degrees

Compiled Geologic Map of the Hyco Shear Zone Portions of the Milton and Leasburg 7.5-Minute Quadrangles, Caswell and Person Counties, North Carolina

Geology by: Kevin Wilkins and James P. Hibbard

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

2017

Environmental Quality
GEOLOGICAL SURVEY N.C. 1823
NC STATE UNIVERSITY

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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