NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF LAND RESOURCES
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NORTH CAROLINA GEOLOGICAL SURVEY
OPEN FILE MAP 2011-05

Geologic Map of the Orange County and Adjacent Portions of the Burlington NE 7.5-Minute Quadrangle, Orange, Alamance and Caswell Counties, North Carolina
Open File Map 2011-05

MAP UNITS

QUATERNARY

Qal
Alluvium

JURASSIC

Jd
Diabase

PALEOZOIC(?)

Padid
Andesite to diorite dikes

CAMBRIAN to NEOPROTEROZOIC

Prospect Hill pluton
Interpreted to be related to Roxboro pluton ca. 546 ma (Wortman et al., 2000)

CZtgd — tonalitic granodiorite (CZtgd)
CZgr-gd — granite to granodiorite (CZgr-gd)

NEOPROTEROZOIC

Hyco Formation Metavolcanic Units
ca. 615 to 633 ma (Wortman et. al, 2000; Bradley and Miller, 2011)

Zhe/p
Mixed epiclastic-pyroclastic rocks

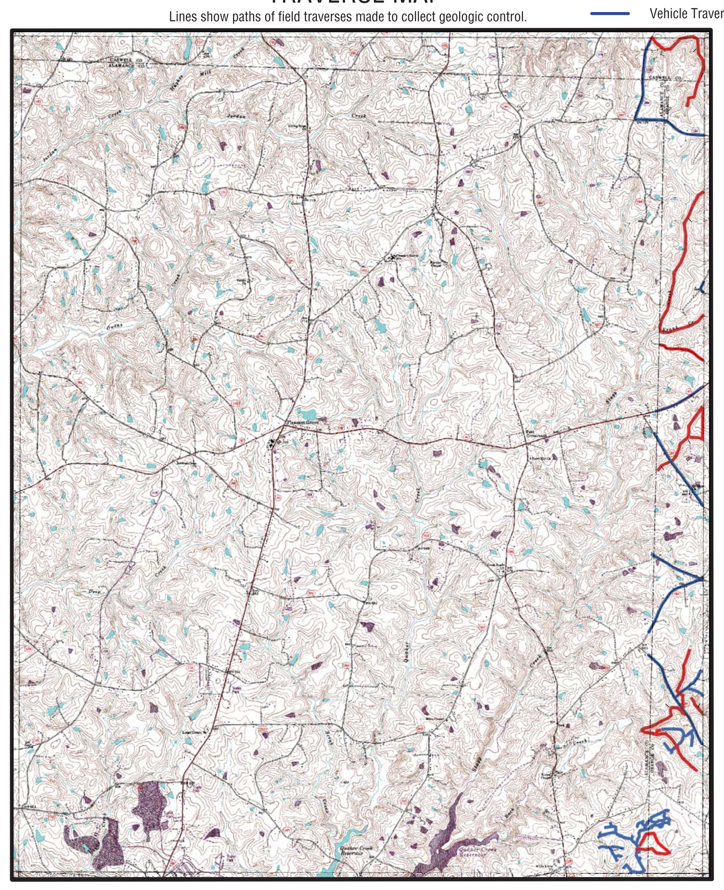
Zhft (l)
Felsic tuffs

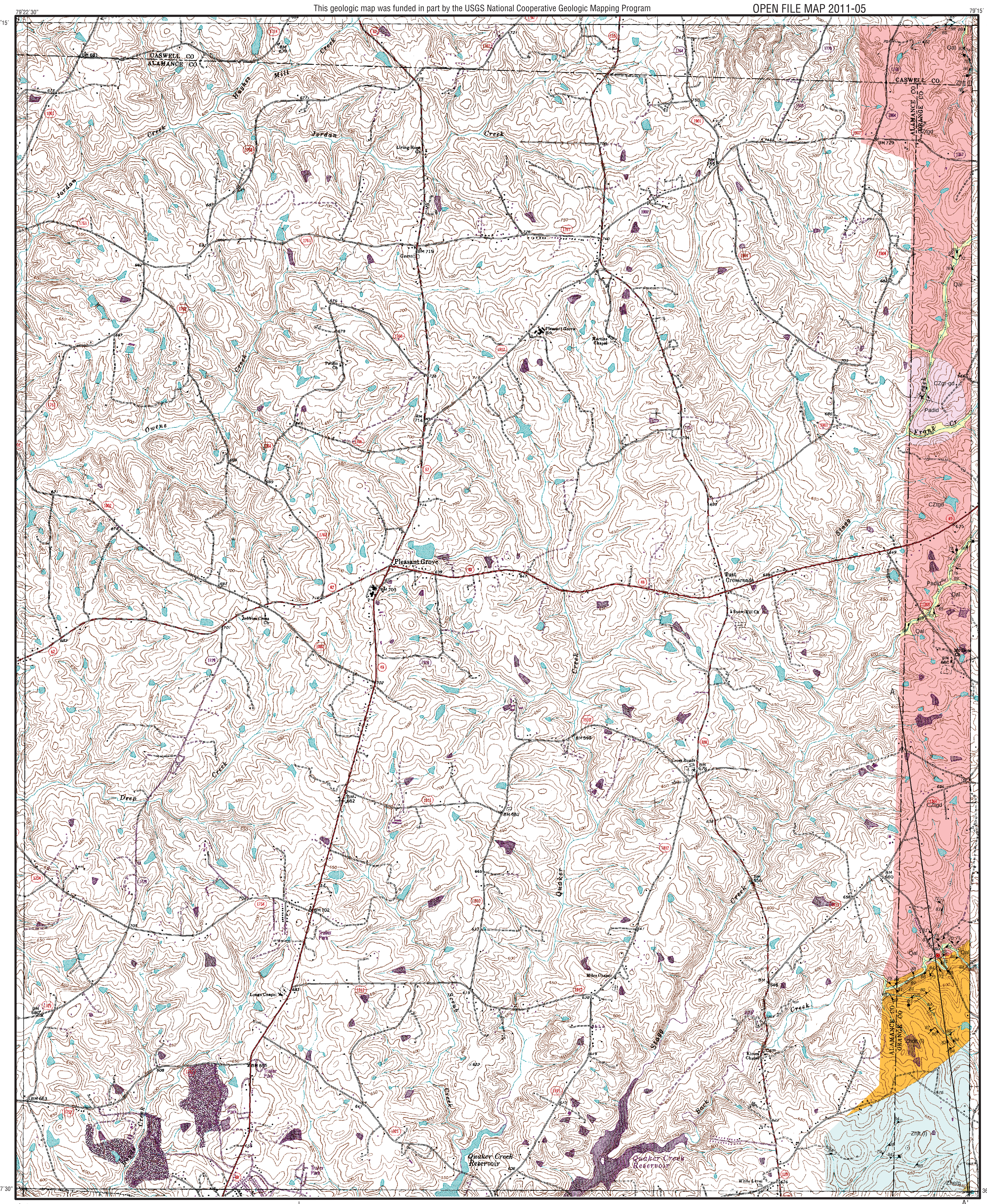
Zhdlt (l)
Dacitic lavas and tuffs

TRAVERSE MAP

Lines show paths of field traverses made to collect geologic control.

Foot Traverse
Vehicle Traverse





79°22´30" 36°15´ 79°15´ 36°07´30" A A'

Topography mapped, edited and published by the U.S. Geological Survey

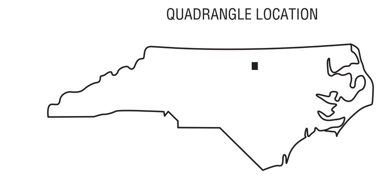
Control by USGS and NOS/NOAA

Topography by photogrammetric methods from aerial photographs taken 1967. Field checked 1969

MN
8 1/2°
2004 MAGNETIC NORTH DECLINATION
FROM CENTER OF NEARBY CHAPEL HILL QUADRANGLE

SCALE 1:24000
1 0.5 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0.5 0 1 KILOMETER
CONTOUR INTERVAL 10 FEET

QUADRANGLE LOCATION



BURLINGTON NE, N.C.
36079-B3-TF-024
1969
REVISED 1994
DMA 5156 III NE-SERIES V842

This Open-File Map is preliminary. It has been internally reviewed for conformity with the North Carolina Geological Survey editorial standards. Further revisions or corrections to this Open File map may occur.

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The Orange County portion and adjacent areas of this quadrangle were mapped as part of a larger multi-year project to provide detailed geologic data to Orange County.

EXPLANATION OF MAP SYMBOLS

Lithologic contacts - Distribution and concentration of station and structural symbols indicates degree of reliability

Contact - location inferred
Contact - location concealed
Qal Contact - location inferred
Padid Dike - location inferred
Inferred fold hinge of overturned anticline, plunging and non-plunging, dotted where concealed

STRIKE AND DIP OF PLANAR FEATURES

Observation sites are centered on the strike bar, or at the intersection point of multiple symbols.

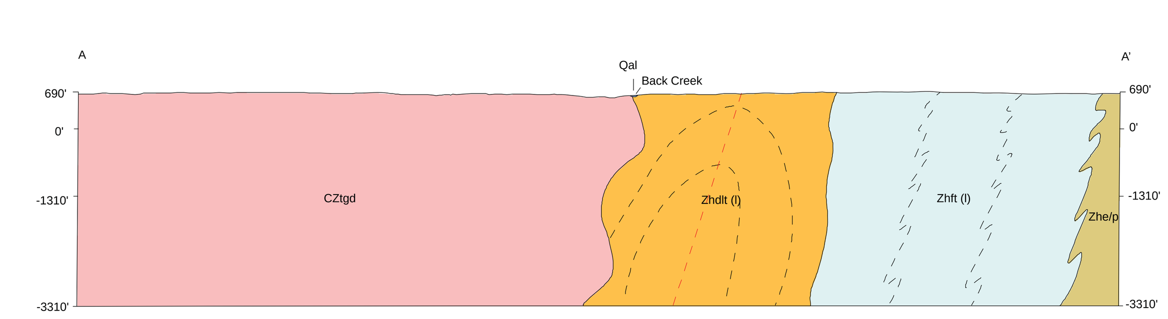
33 Strike and dip of primary bedding and layering
88 Strike and dip of primary volcanic compaction and/or welding foliation
52 Strike and dip of foliation
Strike of vertical foliation
78 Strike and dip of cleavage
76 Strike and dip of magmatic foliation
88 Strike and dip of joint
Stike of vertical joint
85 Strike and dip of compositional banding
82 Strike and dip of xenolith foliation
69 Strike and dip of andesite to diorite dike trend
Strike of vertical andesite to diorite dike trend

NON-STRUCTURAL FEATURES

Observation station location
Diabase station location

EXPLANATION OF CROSS SECTION SYMBOLS

In cross section, inferred axial trace of large-scale fold
In cross section, interpreted fold form lines of non-cylindrical asymmetric folds



Geologic Map of the Orange County and Adjacent Portions of the Burlington NE 7.5-Minute Quadrangle, Orange, Alamance and Caswell Counties, North Carolina

By
Heather D. Hanna and Philip J. Bradley

Geologic data collected in Fall 2010 through Summer 2010. Map preparation, digital cartography and editing by Michael A. Medina, Heather D. Hanna and Philip J. Bradley.
2011

INTRODUCTION

Pre-Mesozoic crystalline rocks in the Burlington NE Quadrangle are part of the Neoproterozoic to Cambrian Carolina terrane. In the vicinity of the map area, the Carolina terrane can be separated into two lithotectonic sequences: 1) the Neoproterozoic Virgilina sequence and 2) Neoproterozoic to early Cambrian plutonic rocks. The Virgilina sequence consists of ca. 615 to 633 Ma (Wortman et. al, 2000; Bradley and Miller, 2011) layered volcaniclastic rocks and plutonic rocks. In southern Orange County, Virgilina sequence layered lithologies are intruded by the ca. 579 Ma (Tadlock and Loewy, 2006) East Farrington pluton and associated West Farrington pluton. The Virgilina sequence was folded and subjected to low grade metamorphism during the ca. 578 to 554 Ma (Pollock, 2007) Virgilina deformation (Glover and Sinha, 1973; Harris and Glover, 1985; Harris and Glover, 1988; and Hibbard and Samson, 1995). In the map area, Virgilina sequence lithologies are interpreted to be steeply dipping due to open to isoclinal folds that are locally overturned to the southeast. In the Roxboro, NC area, folded Virgilina sequence lithologies were intruded by the ca. 546 Ma Roxboro pluton (Wortman et. al, 2000). In the map area, the Prospect Hill tonalitic granodiorite pluton is interpreted to be related to the Roxboro pluton.

Unit descriptions common to Hanna et al. (2010) from the Cedar Grove geologic map were used for conformity with on strike units in adjacent quadrangles. All pre-Mesozoic rocks of the Burlington NE quadrangle have been metamorphosed to at least the chlorite zone of the greenschist metamorphic facies. Many of the rocks display a weak or strong metamorphic foliation. Although subjected to metamorphism, the rocks retain relict igneous, pyroclastic, and sedimentary textures and structures that allow for the identification of protolith rocks. As such, the prefix "meta" is not included in the nomenclature of the pre-Mesozoic rocks described in the quadrangle. Jurassic diabase dikes are unmetamorphosed.

The nomenclature of the International Union of Geological Sciences subcommission on igneous and volcanic rocks (IUGS) after Le Maitre (2002) is used in classification and naming of the units. The classification and naming of the rocks is based on relict igneous textures, modal mineral assemblages, or normalized mineral assemblages when whole-rock geochemical data is available. Past workers in the Bynum quadrangle and adjacent areas (Allen and Wilson, 1968 and Wilson, 1975) have used various nomenclature systems for the igneous rocks. The raw data, when available, of these earlier workers was recalculated and plotted on ternary diagrams and classified based on IUGS nomenclature. Pyroclastic rock terminology follows that of Fisher and Schmincke (1984).

DESCRIPTION OF MAP UNITS

SEDIMENTARY UNITS

Qal – Alluvium: Unconsolidated poorly sorted and stratified deposits of angular to subrounded clay, silt, sand and gravel- to cobble-sized clasts, in stream drainages. May include point bars, terraces and natural levees along larger stream floodplains. Structural measurements depicted on the map within Qal represent outcrops of crystalline rock inliers surrounded by alluvium.

INTRUSIVE AND META-INTRUSIVE UNITS

Jd – Diabase: Black to greenish-black, fine- to medium-grained, dense, consists primarily of plagioclase, augite and may contain olivine. Diabase typically occurs as spheriodally weathered boulders with a grayish-brown weathering rind. Red station location indicates outcrop or boulders of diabase.

Padid – Andesite to diorite dikes: Melanocratic to Mesocratic (CI ~50 to greater than 50), dark green to green gray, aphanitic to medium-grained, metamorphosed andesite to diorite. Andesites and diorites are locally plagioclase porphyritic. Typically occur in map area as resistant spheroidal boulders. Locally maybe basaltic to gabbroic. Dike trend lines indicated were strike of dike measured in outcrop or interpreted from adjacent stations. Occur as infestation in CZtgd unit and are present in many more locations than displayed on map.

CZtgd – Prospect Hill tonalitic granodiorite pluton: Unfoliated to locally very weakly foliated, leucocratic (CI<10), very light gray to yellowish gray, medium- to coarse-grained, hypidiomorphic granular, metamorphosed tonalitic granodiorite to tonalite. Mafic minerals present in rock are most commonly biotite intergrown with chlorite and/or hornblende intergrown with actinolite. Biotite books (± magnetite intergrowths) up to 2 cm commonly occur in north of Cedar Grove Quadrangle. Locally muscovite bearing. Cross cutting pegmatitic dikes of similar mineralogy present in some areas. Locally biotite forms (magmatic?) foliation. Weathering of rock produces distinctive coarse quartz sand grains in soil. Andesite to diorite dikes (Padid) are common throughout the pluton and typically occur as resistant spheroidal boulders. Pluton map pattern truncates Virgilina sequence volcanics and pluton contains foliated xenoliths of volcanic rocks; as such, the pluton is interpreted to be related to the Ca. 546 ma Roxboro pluton (Wortman et al., 2000).

CZgr-gd – Granite to granodiorite of the Prospect Hill pluton: Unfoliated, leucocratic (CI<10), pinkish gray hued, very light gray to yellowish gray, fine- to medium-grained, equigranular to locally plagioclase porphyritic, hypidiomorphic granular, metamorphosed granite to granodiorite. Major minerals include white feldspars, quartz and ± pink feldspars. Mafic minerals consist of fine-grained biotite/chlorite intergrowths that occur as amorphous masses and acicular shaped zones that resemble amphiboles in hand sample. Mafic mineral clots locally are aligned forming a weak (magmatic?) foliation.

METAVOLCANIC UNITS

Hyco Formation -- Upper Portion

Zhe/p - Mixed epiclastic-pyroclastic rocks: Grayish-green to greenish-gray; tuffaceous sandstones, conglomeratic sandstones, siltstones and minor phyllite. The siltstones typically are weakly phyllitic. Contains lesser amounts of fine to coarse tuff and lapilli tuff. Minor andesitic to basaltic lavas and tuffs present. Silicified and/or sericitized altered rock similar to Zhat unit are present near contacts with other units. Distinctive plagioclase + quartz crystal tuff present in lower zones of unit near contact with Zhft unit.

Hyco Formation -- Lower Portion

Zhft (l) - Felsic tuffs: Grayish- green to greenish-gray and silvery-gray, massive to foliated, volcaniclastic pyroclastic rocks consisting of fine- to coarse tuffs, lapilli tuffs and minor welded tuffs. Layering ranges from massive to thinly bedded. Contains lesser amounts of volcaniclatic sedimentary rocks consisting of volcanic sandstones, and greywackes with minor siltstones and phyllite. Minor andesitic to basaltic lavas and tuffs. Distinctive plagioclase + quartz crystal tuff present in unit in higher stratigraphic zones near the Zhe/p unit.

Zhdlt (l) - Dacitic lavas and tuffs: Distinctive dark-gray to black, siliceous, cryptocrystalline dacite, porphyritic dacite with plagioclase ± quartz phenocrysts, and flow banded dacite. Welded and non-welded tuffs associated with the lavas include: greenish-gray to grayish-green, fine tuff, coarse plagioclase crystal tuff; lapilli tuff; and tuff breccia. The dacites are interpreted to have been coherent magma that were extrusive or very shallow intrusions associated with dome formation. The tuffs are interpreted as episodic pyroclastic flow deposits, air fall tuffs or reworked tuffs generated during formation of dacite domes. Wortman et al. (2000) report a 632.9 +2.6/-1.9 Ma zircon date from a sample within the unit in the Chapel Hill quadrangle.

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