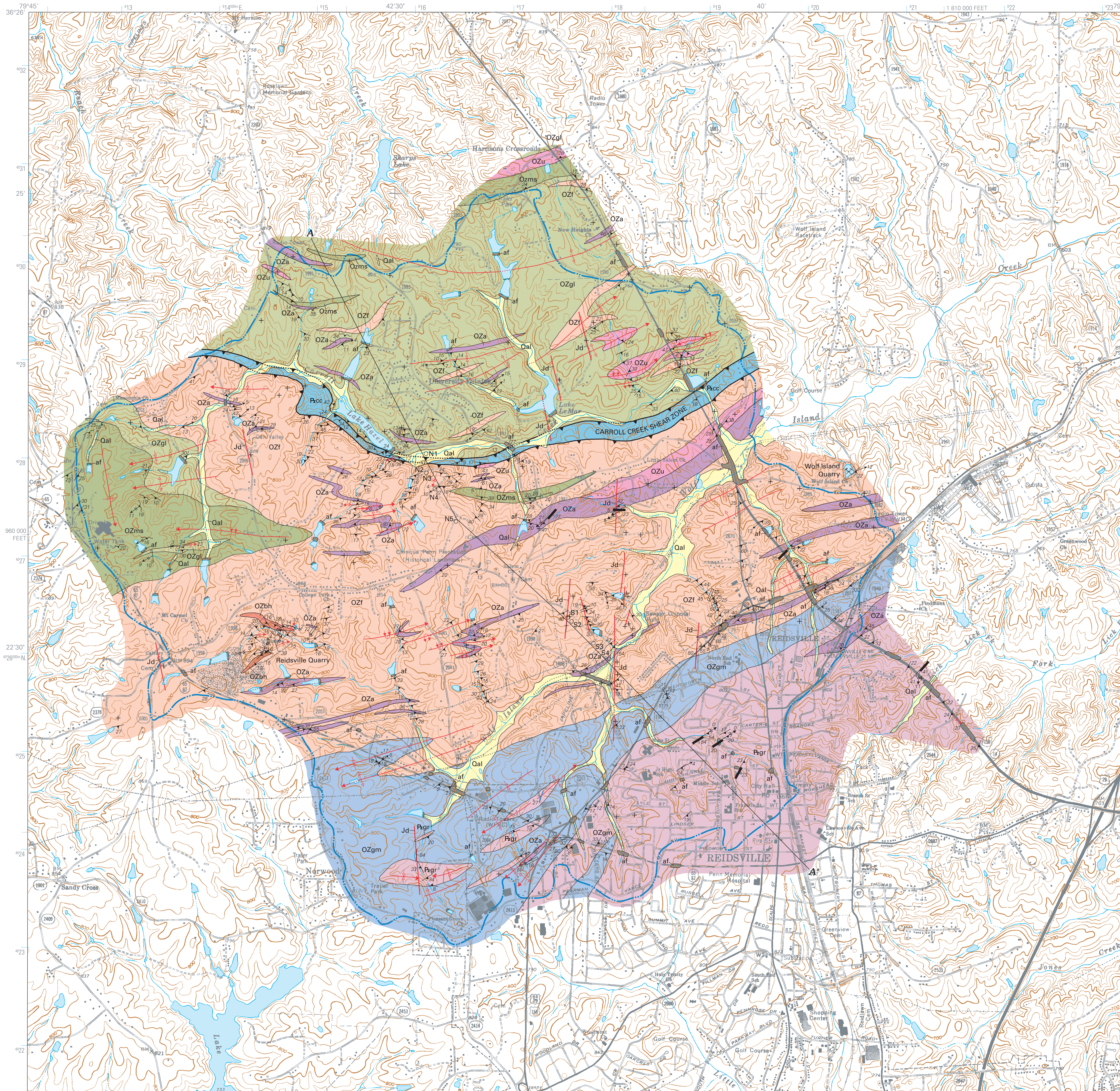
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Prepared in cooperation with the
NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES,
DIVISION OF WATER QUALITY

SCIENTIFIC INVESTIGATIONS MAP 2871
Refer to explanatory text file on this CD-ROM



Base from U.S. Geological Survey, 1:24,000
Reidsville (1972, revised 1994) and Southeast Eden (1971, revised 1994)

Lambert Conformal Conic projection. 1927 North American Datum

10,000-foot grid ticks based on North Carolina coordinate system.
1,000-meter Universal Transverse Mercator grid ticks, zone 17, shown in blue

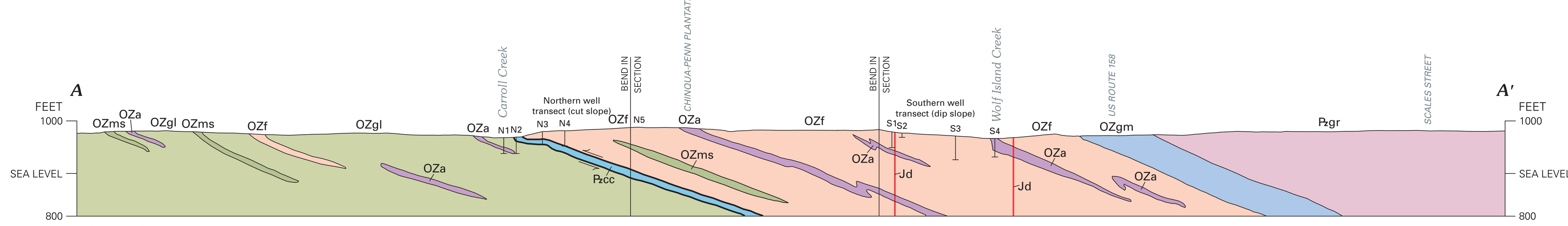
APPROXIMATE MEAN DECLINATION, 2006

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

MAP LOCATION

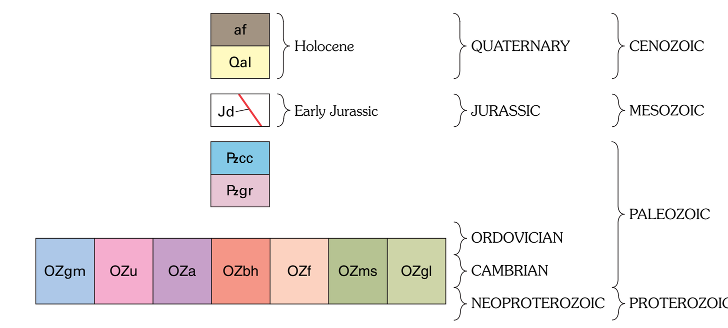
Geology mapped in 2001 and 2002
Digital compilation by James E. Reddy and Boris J. Barrios



1000 feet = 305 meters
Surficial deposits not shown

NO VERTICAL EXAGGERATION

CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

af — **Artificial fill**—Unconsolidated material placed as fill for construction of roads, dams, and buildings

Qal — **Alluvium (Holocene)**—Unconsolidated deposits of clay, silt, sand, gravel, cobbles, and boulders underlying flood plains of Wolf Island Creek and Carroll Creek and their tributaries

Jd — **Diabase dikes (Early Jurassic)**—Dark-gray to grayish-black, fine- to medium-grained olivine diabase, having uniform composition and texture. Composed of labradorite, augite, olivine, and accessory disseminated magnetite. Commonly ophitic; unmetamorphosed. Dikes of this suite have ages of about 200±1 Ma (Sutter, 1988; Hames and others, 2000). They parallel north- to north-northwest-striking joints and range from several inches to 16 ft in thickness. Commonly found as linear trains of spheroidally weathered residual boulders and cobbles having characteristic rusty weathering rind. Dotted where concealed

Pzcc — **Variably mylonitic white-mica schist and gneiss (Paleozoic)**—White-mica schist is light-gray to yellowish-gray, fine- to coarse-grained, and has undulatory schistosity, mica fish, and shear bands. Schist is composed of 30 to 54 percent white mica and 25 to 47 percent quartz (± plagioclase); variable lesser amounts of biotite (0–17 percent), garnet (0–20 percent), staurolite (0–5 percent), kyanite (0–1 percent), opaque minerals (0–10 percent), and rare tourmaline (0–2 percent); and traces (<1 percent) of chlorite. Chlorite occurs as partial pseudomorphic replacement of garnet and is not parallel to schistosity. Unit also includes mylonitic equivalents of adjacent gneisses. Occurs in Carroll Creek shear zone

Pzgr — **Granite of Reidsville (informal name) (Paleozoic)**—Very light gray, inequigranular, fine- to medium-grained and locally coarse-grained, poorly foliated to well foliated, muscovite-biotite granite and biotite granite. Peraluminous on the basis of preliminary geochemistry. Composed of oligoclase (30–40 percent), microcline (26–35 percent), quartz (25–27 percent), lesser amounts of biotite (5–8 percent), and commonly minor muscovite (0–5 percent). Trace minerals (<1 percent) include titanite, epidote-clinozoisite, apatite, zircon, and locally garnet. Granite contains the earliest foliation (S_1) and was deformed by the earliest folds (F_1)

Chinqua-Penn metamorphic suite (informal name) (Ordovician to Neoproterozoic)

OZgm — **Migmatitic biotite gneiss**—Light-gray to dark-gray, fine- to coarse-grained, layered biotite gneiss of granitic composition, variably migmatitic. Composed mainly of oligoclase, microcline, and quartz in nearly equal amounts; lesser amounts of biotite (10–12 percent), epidote (3–5 percent), and titanite (1–2 percent); and traces (<1 percent) of garnet and apatite. Contains concordant layers and discordant dikes of foliated granite and pegmatite, so migmatization of the gneiss and emplacement of the granite of Reidsville may have been coeval. Amphibolite interlayers are present but sparse

OZu — **Ultramafic rock**—Dark-greenish-gray, fine- to coarse-grained actinolite rock and chlorite-actinolite schist; and light-gray to yellowish-gray, fine- to medium-grained tremolite rock and tremolite-talc schist. Metamorphosed and well foliated to almost massive. Occurs as lenses and pods in gneiss units. Occurrence of one body adjacent to amphibolite suggests that this body originated as metamorphosed igneous cumulate

OZa — **Amphibolite**—Dark-gray to dark-greenish-gray, fine- to medium-grained hornblende amphibolite and minor epidote-hornblende amphibolite. Composed of plagioclase (47–55 percent) and hornblende (25–50 percent), and variable lesser amounts of epidote-clinozoisite (0–20 percent), quartz (0–15 percent), and titanite (0–3 percent). Thinly to thickly layered, locally grading into less-mafic hornblende gneiss. Quartz, where present, is mainly in felsic interlayers. Amphibolite occurs as layers and lenses in other gneiss units

OZbh — **Biotite-hornblende-quartz-oligoclase gneiss**—Medium-light-gray to medium-dark-gray, mostly fine-grained, foliated, thinly to thickly layered gneiss. Composed mainly of plagioclase (39–48 percent), quartz (25–30 percent), hornblende (5–30 percent), and biotite (5–18 percent) in proportions that vary from layer to layer. Locally contains accessory garnet (0–1 percent), opaque minerals (0–2 percent), and traces (<1 percent) of epidote, apatite, and zircon. Amphibolite interlayers are common. Exposed as a layer in the felsic gneiss (OZf) in the Reidsville Quarry

OZf — **Felsic gneiss**—Very light gray to light-gray to pinkish-gray, fine- to medium-grained, muscovite-biotite-quartz-microcline-plagioclase gneiss, ranging from rhyolite to dacite (monzogranite to granodiorite) in composition. Peraluminous on the basis of preliminary geochemistry. Commonly leucocratic; thinly to thickly layered. Composed of oligoclase (30–54 percent), microcline (10–30 percent), and quartz (25–30 percent); variable lesser amounts of biotite (2–7 percent), muscovite (0–3 percent), opaque minerals (0–2 percent), hornblende (0–2 percent), titanite (0–1 percent), zoisite (0–1 percent), and fluorite (0–1 percent); and traces (<1 percent) of apatite, monazite, chlorite, and secondary calcite. Amphibolite interlayers are common and widespread, and range in thickness from a few millimeters to tens of meters. Interlayering of felsic and mafic igneous compositions suggests a bimodal volcanic origin, at least in part, and intrusive components may also be present. The only map unit known to contain purple fluorite, locally, as interstitial grains and fracture coatings. Presence of fluorite in rocks that contain apatite is consistent with the interpretation of fluorite as a secondary mineral. Unit resembles felsic gneiss (metarhyolite) in the Milton terrane near Danville, Va. (Henika and Thayer, 1977), which has zircon U/Pb age of 458.5+3.8/-1.0 Ma (Coler and others, 2000)

OZms — **White-mica schist**—Medium-light-gray to yellowish-gray, fine- to coarse-grained schist composed of quartz (32–50 percent), white mica (19–50 percent), biotite (10–15 percent), and plagioclase (0–25 percent). Accessory minerals include garnet (0–2 percent), opaque minerals (0–2 percent), and rare tourmaline (0–1 percent) elongate in the plane of foliation. Local mylonitic fabrics include shear bands, mica fish, and polycrystalline quartz ribbons

OZgl — **Mica gneiss and schist**—Interlayered, heterogeneous biotite-quartz-feldspar gneiss, muscovite-biotite-quartz-feldspar gneiss, and lesser amounts of hornblende-biotite gneiss, biotite-muscovite schist, amphibolite, and felsic gneiss. Local accessory minerals include garnet and tourmaline. Unit is interpreted to be metasedimentary and metavolcanic, at least in part. Large area of exposure is north of, and structurally beneath, the Carroll Creek shear zone

EXPLANATION OF MAP SYMBOLS

Contact—Approximately located; dotted where concealed. Distribution and concentration of structural symbols indicate reliability of contact

Thrust fault—Approximately located; dotted where concealed. Sawteeth on upper plate. Distribution and concentration of structural symbols indicate reliability of fault. In cross section, arrows show relative direction of movement

Watershed boundary

FOLDS

[Showing trace of axial surface, direction of dip of limbs, and direction of plunge where known. Folds are dotted where concealed]

Overturned antiform (F_2)

Overturned synform (F_2)

Late (post-F_2) antiform

Late (post-F_2) synform

PLANAR FEATURES

[Where planar and (or) linear features are combined, intersection of symbols marks point of observation]

22 **Strike and dip of earliest foliation or schistosity (S_1), which is the dominant foliation throughout the map area**—Where dip angle is unspecified, symbol shows general dip direction

Strike and dip of earliest foliation (S_1) and parallel gneissic compositional layering (S_0)

45 Inclined

Vertical, horizontal—Not shown on map; see Arc/Info database on SIM 2871 CD-ROM

33 **Strike and dip of second foliation or schistosity (S_2), where distinguishable from S_1 in F_2 fold hinge**—Where dip angle is unspecified, symbol shows general dip direction

38 **Strike and dip of crenulation cleavage**

35 **Strike and dip of main mylonitic foliation (S_{MC})**

35 **Strike and dip of internal schistosity (S_{MS}) of mica fish within mylonite**

45 **Strike and dip of minor fault**

27 **Strike and dip of quartz vein**

Strike and dip of early Jurassic diabase dike

84 Inclined—Where dip angle is unspecified, symbol shows general dip direction

Vertical

77 **Strike and dip of earliest (F_1) minor fold axial surface**—Parallel to earliest foliation, S_1

41 **Strike and dip of F_2 minor fold axial surface**—Deforms earliest foliation, S_1

LINEAR FEATURES

[Where planar and (or) linear features are combined, intersection of symbols marks point of observation]

12 **Bearing and plunge of mineral elongation**

7 **Bearing and plunge of crenulation axis**

11 **Bearing and plunge of earliest (F_1) minor fold axis**—Within axial surface parallel to earliest foliation, S_1

3 **Bearing and plunge of F_2 minor fold axis**—Deforms earliest foliation, S_1

20 **Bearing and plunge of late minor fold axis**—Includes upright folds and folds in mylonite

OTHER FEATURES

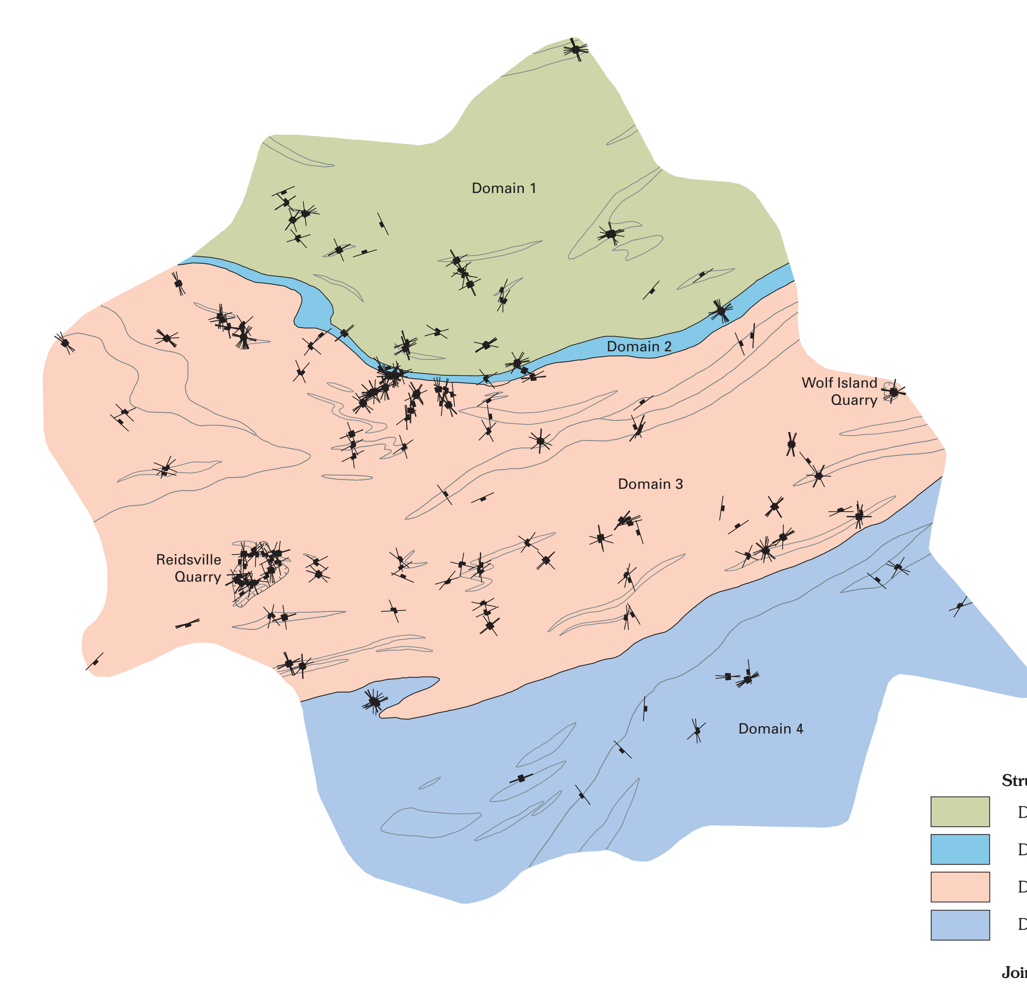
Rock unit known from float

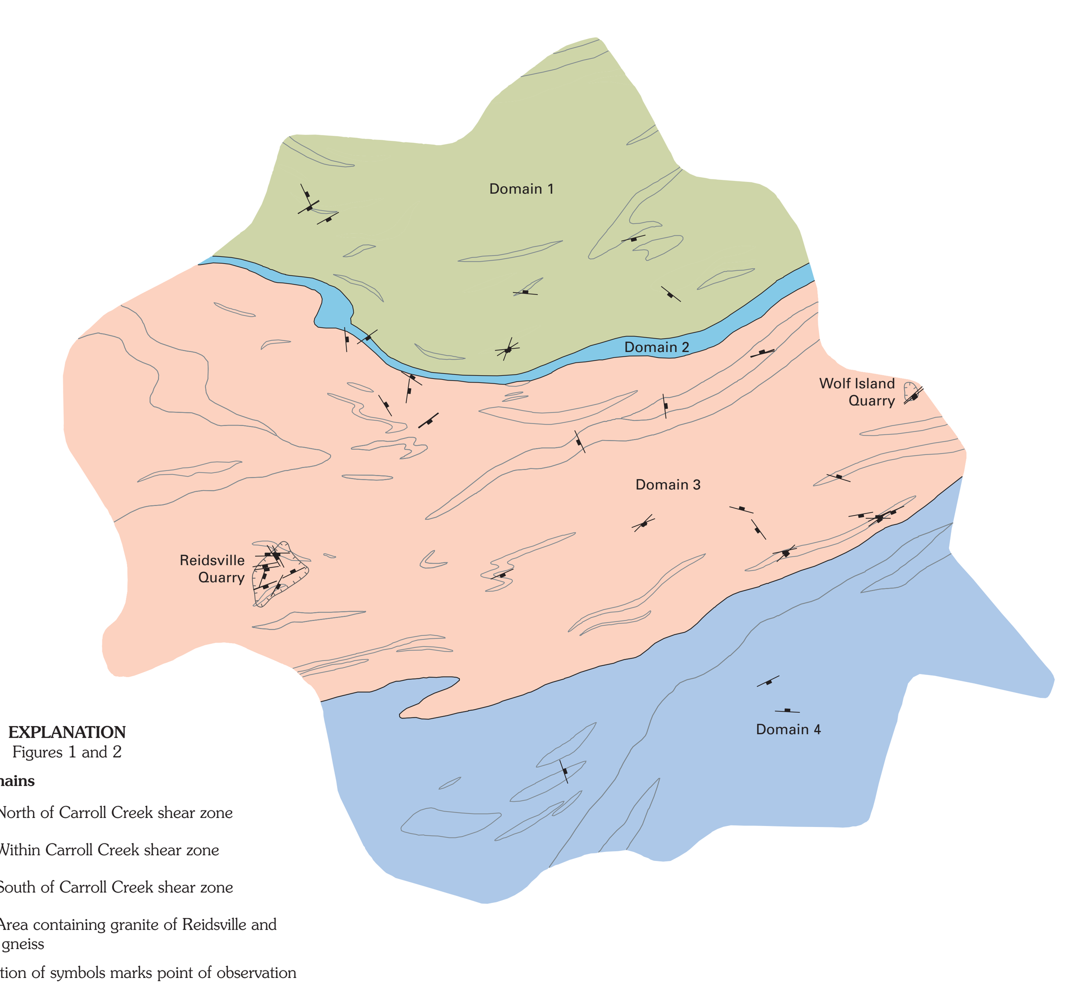
Quarry—Ticks point into workings. Inactive where shown by ⚒

Corehole

Water-monitoring well—Not shown on map; see Arc/Info database on SIM 2871 CD-ROM

N3 **Cluster of drilled wells and (or) corehole described in text**—Northern transect: N1, N2, N3, N4, N5; southern transect: S1, S2, S3, S4





EXPLANATION
Figures 1 and 2

Structural domains

Domain 1—North of Carroll Creek shear zone

Domain 2—Within Carroll Creek shear zone

Domain 3—South of Carroll Creek shear zone

Domain 4—Area containing granite of Reidsville and migmatitic gneiss

Joint—Intersection of symbols marks point of observation

Inclined

Vertical

Quarry

Figure 1.—Measured joints (natural fractures) in the map area that are steeply inclined (dipping >60°) to vertical. Shown in relation to structural domains that are described in the figure explanation. Orientations are locally consistent at individual outcrops but vary from one outcrop to another. For example, steeply inclined joints at the Wolf Island Quarry (at the eastern edge of domain 3) include orthogonal sets striking north-northeast and west-northwest, respectively, whereas those at the Reidsville Quarry (on the west side of domain 3) strike mainly east-northeast to northeast. Some north- to north-northwest-striking joints are intruded by early Jurassic diabase dikes. Map-unit contacts are outlined.

Figure 2.—Measured joints (natural fractures) in the map area that are subhorizontal to moderately inclined (dipping ≤60°). Includes foliation-parallel parting that has strike subparallel to strike of map units and subhorizontal sheeting joints that commonly merge into foliation-parallel parting. Shown in relation to structural domains that are described in the figure explanation. Map-unit contacts are outlined.

GEOLOGIC MAP OF THE UPPER WOLF ISLAND CREEK WATERSHED, REIDSVILLE AREA, ROCKINGHAM COUNTY, NORTH CAROLINA

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2006

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