

U.S. GEOLOGICAL SURVEY SCIENTIFIC INVESTIGATIONS MAP 2871

Geologic Map of the Upper Wolf Island Creek Watershed,
Reidsville Area, Rockingham County, North Carolina

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U.S. DEPARTMENT OF THE INTERIOR
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System Requirements:

This CD-ROM was produced in accordance with the ISO 9660 standard for universal file system compatibility. Contents are intended for use on either UNIX, Macintosh, or Windows NT/2000/XP platforms.

The report stored on this CD-ROM can be viewed using Adobe Acrobat Reader or other software that reads portable document format (pdf) files. Adobe Acrobat Reader may be downloaded at no cost from the Adobe website at <http://www.adobe.com>.

CD Directory Layout:

```
--README.TXT (This file)
|
|--DATA-----|--COVERS--Contains Arc/Info coverages for the geologic and base map themes (clipped to
|                |                neatline)
|                |--Shapefiles—Same as above, except GIS data in shapefile format
|                |--e00 – Same as above, except GIS data in compressed e00 format
|
|                |--ReidsvilleGeol.eps--PostScript version of the geologic map
|--GRAPHICS--|
|                |--ReidsvilleGeol.pdf--Portable Document Format version of the geologic map
|
|--METADATA--|--Metadata files for all of the layers
|--TEXT-----|--Portable Document Format and .txt versions of explanatory text
=====
```

Report Summary (description, abstract, purpose, map-theme construction, and projection information):

Description:

This is a bedrock and surficial geologic map of the upper Wolf Island Creek watershed, Reidsville area, Rockingham County, N.C. The map area of approximately 16 square miles (mi) encompasses the drainage basin of Wolf Island Creek and its tributary, Carroll Creek, upstream of their confluence in the eastern part of the map area near U.S. Highway 158. It lies about 10 mi south of the Virginia State line, about 22 mi

southwest of Danville, Va., and 21 mi north-northeast of Greensboro, N.C. The area is situated in the Southeast Eden and Reidsville 7.5-min topographic quadrangles and is within the Roanoke River basin. It encompasses the Upper Piedmont Research Station, a 680-acre farm owned and operated for agricultural research by North Carolina State University (NCSU) and the North Carolina Department of Agriculture and Consumer Services (NCDACS). It also contains the Betsy-Jeff Penn 4-H Educational Center, the historic Chinqua-Penn Plantation, and the northwestern part of the City of Reidsville. Coreholes and ground-water monitoring wells are located on the agricultural research station and 4-H center properties. The coreholes were drilled at four sites (S1, S2, S3, S4) along a southern transect and five sites (N1, N2, N3, N4, N5) along a northern transect. Permanent ground-water monitoring wells are located in clusters at seven of these locations (N1, N2, N3, N4 and S1, S3, S4).

Abstract:

This geologic map provides a foundation for hydrogeologic investigations in the Reidsville area of Rockingham County, north-central North Carolina. The 16-mi² area within the Southeast Eden and Reidsville 7.5-min quadrangles includes the watershed of Wolf Island Creek and its tributary, Carroll Creek, upstream of their confluence.

Layered metamorphic rocks in this area of the Milton terrane, here informally named the Chinqua-Penn metamorphic suite, include a heterogeneous mica gneiss and schist unit that contains interlayers and lenses of white-mica schist, felsic gneiss, amphibolite, and ultramafic rock; a felsic gneiss that contains interlayers of amphibolite, white-mica schist, and minor ultramafic lenses; and a migmatitic biotite gneiss. Crushed stone is produced from an active quarry in the felsic gneiss. Igneous intrusive rocks include a mafic-ultramafic assemblage that may have originated as mafic intrusive bodies containing ultramafic cumulates, a foliated two-mica granite informally named the granite of Reidsville, and unmetamorphosed Jurassic diabase dikes. The newly recognized Carroll Creek shear zone strikes roughly east-west and separates heterogeneous mica gneiss and schist to the north from structurally overlying felsic gneiss to the south.

Regional amphibolite-facies metamorphism accompanied polyphase ductile deformation in the metamorphic rocks. Two phases of isoclinal to tight folding and related penetrative deformation, described as D₁ and D₂, were followed by phases of high-strain mylonitic deformation in shear zones and late gentle to open folding. Later brittle deformation produced minor faults, steep joints, foliation-parallel parting, and sheeting joints.

The metamorphic and igneous rocks are mantled by saprolite and residual soil derived from weathering of the underlying bedrock, and unconsolidated Quaternary alluvium occupies the flood plains of Wolf Island Creek and its tributaries.

The geologic map delineates lithologic and structural features that may act as barriers or conduits for ground-water flow. It provides a hydrogeologic framework for the upper Wolf Island Creek drainage basin, including coreholes and ground-water monitoring wells along two transects. Collaborative hydrogeologic investigations by the North Carolina Department of Environment and Natural Resources and the U.S. Geological Survey are in progress to increase understanding of the influence of geological features on ground-water quality, availability, and transport in an area representative of large areas in the west-central Piedmont.

Purpose:

This geologic map provides a foundation for hydrogeologic investigations in the Reidsville area of Rockingham County, north-central North Carolina. The research near Reidsville is designed to increase our understanding of the influence of geological features on ground-water quality, availability, and transport in an area representative of large areas in the west-central Piedmont. The geologic map delineates structural features that may act as barriers or conduits for ground-water flow. Ongoing investigations are assessing the roles of these features and will integrate the geologic and hydrologic data into a comprehensive ground-water flow model.

The bedrock and surficial geologic map has a database that describes the point, line, and polygon coverages in a way that can be queried for specific applications. The database can also be used to generate customized thematic maps showing specified attributes of bedrock and (or) surficial units, dikes, or structural data. The geology coverages and a digital elevation model can be integrated with hydrologic, geochemical, and other datasets for analysis and modeling.

Map-Theme Construction:

Map themes for this project were created using various methods. The majority of geologic themes were originally drafted on georeferenced Mylar sheets. These sheets were subsequently scanned and saved as TIF images, vectorized and saved as DXF files, and finally converted to Arc/INFO coverages. Other geologic themes were derived from tabular data. The majority of base-map themes were produced from scanned Mylars of USGS 1:24,000-scale topographic quadrangles.

The geologic structure data was compiled digitally in the field using a PDA with GPS capabilities.

Field station numbers and locations were recorded using ArcPad and saved in ArcView shapefile format (STATIONS.*). Attribute data for each station number were recorded in an MS Excel file (stationsdata.xls). The STATIONS.* shapefile was converted to the STRUCTURE cover and data.xls was converted to the INFO table DATA.

A one-to-many relationship exists between STRUCTURE.PAT and DATA for the INFO item STATION. An INFO table named DATA.REL is included which, when restored, will establish a relate environment between STRUCTURE.PAT and DATA using the INFO item STATION. To access the complete list of records that exist in the INFO table DATA for a specific STATION number in STRUCTURE.PAT use the LINK function in ArcView, the RELATE function in ArcMap, or a cursor if using Arc, Arcedit, or Arcplot.

For information on using cursors refer to the following section of the Arc Help document: Working with tables -> Managing Tabular Data -> Cursor processing.

Projection Information:

Spatial_Reference_Information:

Horizontal_Coordinate_System_Definition:

Planar:

Grid_Coordinate_System:

Grid_Coordinate_System_Name: State Plane Coordinate System 1927

State_Plane_Coordinate_System:

SPCS_Zone_Identifier: 3200

Lambert_Conformal_Conic:

Standard_Parallel: 34.333333

Standard_Parallel: 36.166667

Longitude_of_Central_Meridian: -79.000000

Latitude_of_Projection_Origin: 33.750000

False_Easting: 2000000.000000

False_Northing: 0.000000

Planar_Coordinate_Information:

Planar_Coordinate_Encoding_Method: coordinate pair

Coordinate_Representation:

Abscissa_Resolution: 0.000064

Ordinate_Resolution: 0.000064

Planar_Distance_Units: survey feet

Geodetic_Model:

Horizontal_Datum_Name: North American Datum of 1927

Ellipsoid_Name: Clarke 1866

Semi-major_Axis: 6378206.400000

Keywords: geologic map, Wolf Island Creek, watershed, Reidsville, Rockingham County, North Carolina

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