

U.S. Department of the Interior
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Natural Resource Stewardship and Science Directorate
Geologic Resources Division



Chickamauga & Chattanooga National Military Park

GRI Ancillary Map Information Document

Produced to accompany the Geologic Resources Inventory (GRI) Digital Geologic
Data for Chickamauga & Chattanooga National Military Park

chch_geology.pdf

Version: 6/6/2017

Geologic Resources Inventory Ancillary Map Information Document for Chickamauga & Chattanooga National Military Park

Table of Contents

Geologic Resources Inventory Map Document.....	1
About the NPS Geologic Resources Inventory Program.....	3
GRI Digital Maps and Source Map Citations.....	5
Index Map.....	6
Map Unit List.....	7
Map Unit Descriptions.....	9
Qal - Alluvial Deposits (Quaternary).....	9
PNn - New ton Sandstone (Low er Pennsylvanian).....	9
PNw - Whitw ell Shale (Low er Pennsylvanian).....	9
PNs - Sew anee Conglomerate (Low er Pennsylvanian).....	9
PNsp - Signal Point Shale (Low er Pennsylvanian).....	10
PNwp - Warren Point Sandstone (Low er Pennsylvanian).....	10
PNrm - Raccoon Mountain Formation (Low er Pennsylvanian).....	10
Mp - Pennington Formation (Upper Mississippian).....	11
Mb - Bangor Limestone (Upper Mississippian).....	12
Mbh - Bangor Limestone and Hartselle Formation (Upper Mississippian).....	12
Mh - Hartselle Formation (Upper Mississippian).....	12
Mm - Monteagle Limestone (Upper Mississippian).....	12
Msl - St. Louis Limestone (Upper Mississippian).....	13
Mw - Warsaw Limestone (Upper Mississippian).....	13
Mfp - Fort Payne Chert (Low er Mississippian).....	14
MDc - Chattanooga Shale (Low er Mississippian and Upper Devonian).....	14
Sr - Rockw ood Formation (Middle and Low er Silurian).....	14
Os - Sequatchie Formation (Upper Ordovician).....	15
Och - Chickamauga Supergroup (Upper and Middle Ordovician).....	15
Ona - Nashville Group, undivided (Upper and Middle Ordovician).....	15
Ocy - Catheys Formation (Upper and Middle Ordovician).....	16
Ocyen- Catheys Formation and Cannon Limestone, undivided (Upper and Middle Ordovician).....	16
Ocn - Cannon Limestone (Middle Ordovician).....	16
Ocnhsr - Cannon Limestone, Hermitage Formation and Stones River Group, undivided (Middle Ordovician).....	16
Oh - Hermitage Formation (Middle Ordovician).....	17
Osr - Stones River Group, undivided (Middle Ordovician).....	17
Oca - Carters Limestone (Middle Ordovician).....	17
Olb - Lebanon Limestone (Middle Ordovician).....	18
Or - Ridley Limestone (Middle Ordovician).....	18
Om - Murfreesboro Limestone (Middle Ordovician).....	18
Ops - Pond Spring Formation (Middle Ordovician).....	18
OCK - Knox Group, undivided (Ordovician and Cambrian).....	18
On - New ala Formation (Low er Ordovician).....	19
Oma - Mascot Dolomite (Low er Ordovician).....	19
Ok - Kingsport Formation (Low er Ordovician).....	19
Olv - Longview Dolomite (Low er Ordovician).....	19

Oc - Chepultepec Dolomite (Lower Ordovician).....	20
Ccr - Copper Ridge Dolomite (Upper Cambrian).....	20
Ccu - Conasauga Group, undivided (Upper and Middle Cambrian).....	20
Cmn - Maynardville Limestone (Upper Cambrian).....	20
Cr - Rome Formation (Lower Cambrian).....	21
Geologic Cross Sections.....	22
Cross Section A-A'.....	22
Cross Section B-B'.....	22
Cross Section C-C'.....	22
Cross Section D-D'.....	23
Mineral Resources Summary Reports.....	24
Chattanooga Mineral Resources Summary.....	24
East Chattanooga Mineral Resources Summary.....	24
GRI Ancillary Source Map Information.....	25
Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles.....	25
Stratigraphic Column.....	25
Legend.....	26
Tectonic Map.....	26
Structural Data.....	27
Abstract.....	28
References.....	28
Chattanooga Quadrangle.....	29
Stratigraphic Column.....	30
Legend.....	31
East Chattanooga Quadrangle.....	31
Stratigraphic Column.....	32
Legend.....	33
GRI Digital Data Credits.....	34

Geologic Resources Inventory Map Document



Chickamauga & Chattanooga National Military Park, Georgia and Tennessee

Document to Accompany Digital Geologic-GIS Data

[chch_geology.pdf](#)

Version: 6/6/2017

This document has been developed to accompany the digital geologic-GIS data developed by the Geologic Resources Inventory (GRI) program for Chickamauga & Chattanooga National Military Park, Georgia and Tennessee (CHCH).

Attempts have been made to reproduce all aspects of the original source products, including the geologic units and their descriptions, geologic cross sections, the geologic report, references and all other pertinent images and information contained in the original publication.

This document contains the following information:

- 1) **About the NPS Geologic Resources Inventory Program** – A brief summary of the Geologic Resources Inventory (GRI) Program and its products. Included are web links to the GRI GIS data model, and to the GRI products page where digital geologic-GIS datasets, scoping reports and geology reports are available for download. In addition, web links to the NPS Data Store and GRI program home page, as well as contact information for the GRI coordinator, are also present.
- 2) **GRI Digital Maps and Source Citations** – A listing of all GRI digital geologic-GIS maps produced for this project along with sources used in their completion. In addition, a brief explanation of how each source map was used is provided.
 - A.) **Index Map** - An index map showing the quadrangles and sources maps used in the GRI Digital-GIS data.
- 3) **Map Unit Listing** – A listing of all geologic map units present on maps for this project, generally listed from youngest to oldest.
- 4) **Map Unit Descriptions** – Descriptions for all geologic map units. If a unit is present on multiple source maps the unit is listed with its source geologic unit symbol, unit name and unit age followed by the unit's description for each source map.
- 5) **Geologic Cross Sections** – Geologic cross section graphics with source geologic cross section abbreviation.

- 6) **Mineral Resources Summary Reports** – Reports that contain additional information pertaining to Mine Point Features (MIN) and Mine Area Features (MAF) present in the GRI digital geologic-GIS data.
- 7) **Ancillary Source Map Information** – Additional source map information presented by source map. For each source map this may include a stratigraphic column, index map, map legend and/or map notes.
- 8) **GRI Digital Data Credits** – GRI digital geologic-GIS data and ancillary map information document production credits.

For information about using GRI digital geologic-GIS data contact:

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About the NPS Geologic Resources Inventory Program

Background

Recognizing the interrelationships between the physical (geology, air, and water) and biological (plants and animals) components of the earth is vital to understanding, managing, and protecting natural resources. The Geologic Resources Inventory (GRI) helps make this connection by providing information on the role of geology and geologic resource management in parks.

Geologic resources for management consideration include both the processes that act upon the Earth and the features formed as a result of these processes. Geologic processes include: erosion and sedimentation; seismic, volcanic, and geothermal activity; glaciation, rockfalls, landslides, and shoreline change. Geologic features include mountains, canyons, natural arches and bridges, minerals, rocks, fossils, cave and karst systems, beaches, dunes, glaciers, volcanoes, and faults.

The Geologic Resources Inventory aims to raise awareness of geology and the role it plays in the environment, and to provide natural resource managers and staff, park planners, interpreters, researchers, and other NPS personnel with information that can help them make informed management decisions.

The GRI team, working closely with the Colorado State University (CSU) Department of Geosciences and a variety of other partners, provides more than 270 parks with a geologic scoping meeting, digital geologic-GIS map data, and a park-specific geologic report.

Products

Scoping Meetings: These park-specific meetings bring together local geologic experts and park staff to inventory and review available geologic data and discuss geologic resource management issues. A summary document is prepared for each meeting that identifies a plan to provide digital map data for the park.

Digital Geologic Maps: Digital geologic maps reproduce all aspects of traditional paper maps, including notes, legend, and cross sections. Bedrock, surficial, and special purpose maps such as coastal or geologic hazard maps may be used by the GRI to create digital Geographic Information Systems (GIS) data and meet park needs. These digital GIS data allow geologic information to be easily viewed and analyzed in conjunction with a wide range of other resource management information data.

For detailed information regarding GIS parameters such as data attribute field definitions, attribute field codes, value definitions, and rules that govern relationships found in the data, refer to the NPS Geology-GIS Data Model document available at: <http://science.nature.nps.gov/im/inventory/geology/GeologyGISDataModel.cfm>

Geologic Reports: Park-specific geologic reports identify geologic resource management issues as well as features and processes that are important to park ecosystems. In addition, these reports present a brief geologic history of the park and address specific properties of geologic units present in the park.

For a complete listing of Geologic Resource Inventory products and direct links to the download site visit the GRI publications webpage http://www.nature.nps.gov/geology/inventory/gre_publications.cfm

GRI geologic-GIS data is also available online at the NPS Data Store Search Application: <http://irma.nps.gov/App/Reference/Search>. To find GRI data for a specific park or parks select the appropriate park

(s), enter "GRI" as a Search Text term, and then select the Search Button.

For more information about the Geologic Resources Inventory Program visit the GRI webpage: <http://www.nature.nps.gov/geology/inventory>, or contact:

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The Geologic Resources Inventory (GRI) program is funded by the National Park Service (NPS) Inventory and Monitoring (I&M) Division.

GRI Digital Maps and Source Map Citations

The GRI digital geologic-GIS maps for Chickamauga & Chattanooga National Military Park, Georgia and Tennessee (CHCH). Source maps, and how these maps were used by the GRI, are presented with each GRI digital geologic-GIS map.

Digital Geologic-GIS Map of Chickamauga & Chattanooga National Military Park and Vicinity, Georgia and Tennessee (GRI MapCode CHCH)

Source maps for this compiled park extent and vicinity map include all source maps listed with each component map (see maps below), as well as the following source map.

Coker, A.E., year unknown, Geologic Map of the Wauhatchie Quadrangle, Tennessee: Tennessee Division of Geology, Geologic Quadrangle Map, 105-SW, unpublished mylar, scale 1:24,000. (*GRI Source Map ID 76095*). - Only the southeastern 2.5' by 2.5' extent of the map was used, however, all geologic features within this extent were captured.

Digital Geologic-GIS Map of the Fort Oglethorpe Quadrangle and parts of the Hooker and East Ridge Quadrangles, Georgia and Tennessee (GRI MapCode FOHE)

Scruggs, P. Levader, Wunderlich, Andrew L. and Hatcher, Robert D. Jr., 2013, Detailed Geologic Maps of the Chickamauga and Chattanooga National Military Park and Surrounding Area: Fort Oglethorpe 7.5' Quadrangle and Half of Hooker and East Ridge 7.5' Quadrangles: University of Tennessee, Tectonics and Structural Geology Research Group, scale 1:24,000. ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)) (*GRI Source Map ID 76088*). - The full extent of the source map was used and all geologic features were captured.

Digital Geologic-GIS Map of the Chattanooga Quadrangle, Tennessee (GRI MapCode CHOO)

Finlayson, C.P., Barnes, R.H., Colvin, J.M., Jr., and Luther, E.T., 1966, Geologic Map and Mineral Resources Summary of the Chattanooga Quadrangle (Including the Tennessee portion of the Fort Oglethorpe Quadrangle), Georgia-Tennessee: Tennessee Division of Geology, Geologic Quadrangle Map 105 SE (Blackline Copy Only), scale 1:24,000. ([Geologic Map of Chattanooga Quadrangle](#)) (*GRI Source Map ID 68253*). - All geologic features were captured within the Chattanooga Quadrangle extent however Mine Point Features (MIN) and Mine Area Features (MAF) were also captured within the Tennessee portion of the Fort Oglethorpe Quadrangle.

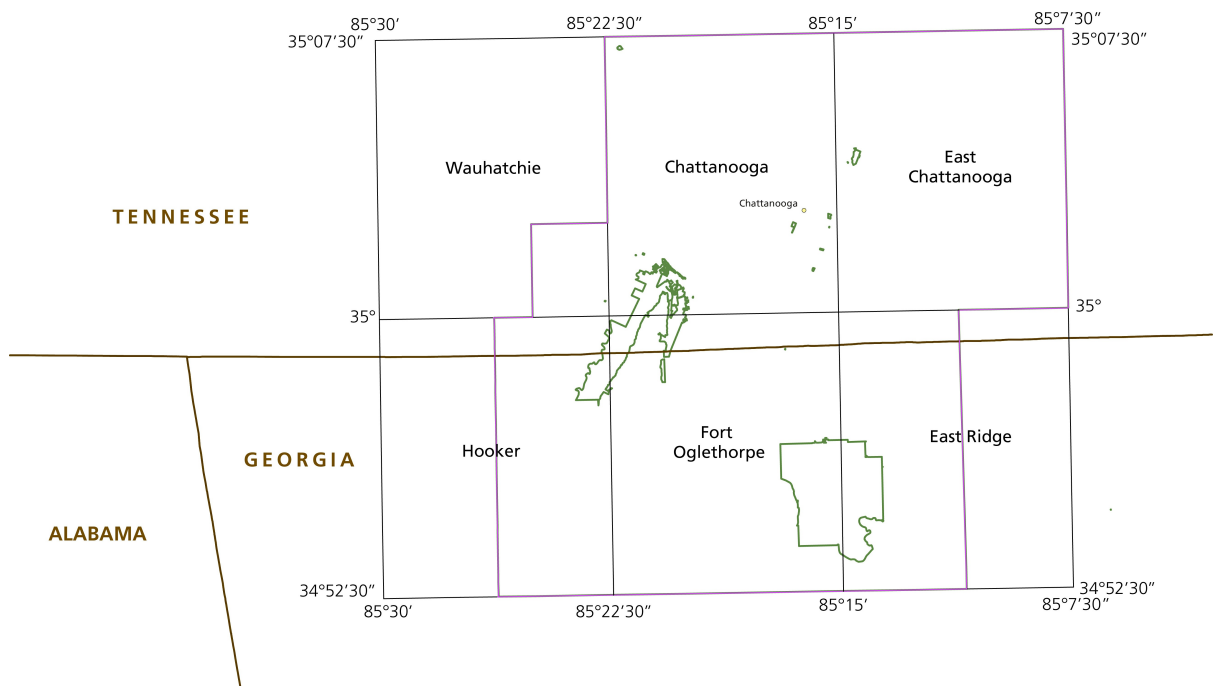
Digital Geologic-GIS Map of the East Chattanooga Quadrangle, Tennessee (GRI MapCode EACH)

Wilson, R.L., 1989, Geologic Map and Mineral Resources Summary of the East Chattanooga Quadrangle: Tennessee Division of Geology, Geologic Quadrangle Map 112 SW, scale 1:24,000. ([Geologic Map of East Chattanooga Quadrangle](#)) (*GRI Source Map ID 68296*). - All geologic features were captured within the East Chattanooga Quadrangle extent.

Additional information pertaining to each source map is also presented in the GRI Source Map Information (CHCHMAP) table included with the GRI geology-GIS data.

Index Map

The following index map displays 7.5' quadrangle extents and the Chickamauga and Chattanooga National Military Park (CHCH) boundary in dark green (as of January, 2017). The purple boundary represents the extent of GRI mapping.



Map Unit List

The geologic units present in the digital geologic-GIS data produced for Chickamauga & Chattanooga National Military Park, Georgia and Tennessee (CHCH) are listed below. Units are listed with their assigned unit symbol and unit name (e.g., Qal - Alluvial Deposits). Units are listed from youngest to oldest. No description for water is provided. Information about each geologic unit is also presented in the GRI Geologic Unit Information (CHCHUNIT) table included with the GRI geology-GIS data. Some source unit symbols, names and/or ages may have been changed in this document and in the GRI digital geologic-GIS data. This was done if a unit was considered to be the same unit as one or more units on other source maps used for this project, and these unit symbols, names and/or ages differed. In this case a single unit symbol and name, and the unit's now recognized age, was adopted. Unit symbols, names and/or ages in a unit descriptions, or on a correlation of map units or other source map figure were not edited. If a unit symbol, name or age was changed by the GRI the unit's source map symbol, name and/or age appears with the unit's source map description.

Cenozoic Era

Quaternary Period

[Qal](#) - Alluvial Deposits

Paleozoic Era

Pennsylvanian Period

[PNn](#) - Newton Sandstone

[PNw](#) - Whitwell Shale

[PNs](#) - Sewanee Conglomerate

[PNsp](#) - Signal Point Shale

[PNwp](#) - Warren Point Sandstone

[PNrm](#) - Raccoon Mountain Formation

Mississippian Period

[Mp](#) - Pennington Formation

[Mb](#) - Bangor Limestone

[Mbh](#) - Bangor Limestone and Hartselle Formation

[Mh](#) - Hartselle Formation

[Mm](#) - Monteagle Limestone

[Msl](#) - St. Louis Limestone

[Mw](#) - Warsaw Limestone

[Mfp](#) - Fort Payne Chert

Mississippian and Devonian Period

[MDc](#) - Chattanooga Shale

Silurian Period

[Sr](#) - Rockwood Formation

Ordovician Period

[Os](#) - Sequatchie Formation

[Och](#) - Chickamauga Supergroup, undifferentiated

[Ona](#) - Nashville Group, undivided

[Ocy](#) - Catheys Formation

[Ocycn](#) - Catheys Formation and Cannon Limestone, undivided
[Ocn](#) - Cannon Limestone
[Ocnhsr](#) - Cannon Limestone, Hermitage Formation and Stones River Group, undivided
[Oh](#) - Hermitage Formation
[Osr](#) - Stones River Group, undivided
[Oca](#) - Carters Limestone
[Olh](#) - Lebanon Limestone
[Or](#) - Ridley Limestone
[Om](#) - Murfreesboro Limestone
[Ops](#) - Pond Spring Formation
[OCk](#) - Knox Group, undivided
[On](#) - Newala Formation
[Oma](#) - Mascot Dolomite
[Ok](#) - Kingsport Formation
[Olv](#) - Longview Dolomite
[Oc](#) - Chepultepec Dolomite

Cambrian Period

[Ccr](#) - Copper Ridge Dolomite
[Ccu](#) - Conasauga Group, undivided
[Cmn](#) - Maynardville Limestone
[Cr*](#) - Rome Formation

**Unit Cr shown only in cross section.*

Map Unit Descriptions

Descriptions of all geologic map units, generally listed from youngest to oldest, are presented below.

Qal - Alluvial Deposits (Quaternary)

Qal - Alluvial Deposits (Quaternary)

Clay, silt, sand, and gravel, reddish- to yellowish-brown, unconsolidated and poorly sorted; contains subangular to subrounded pebbles of chert, quartz, and quartzite. Mapped only in flood plains. Older fluvial deposits above the level of the present flood plain occur locally, too discontinuous to map. (GRI Source Map ID 76088) ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).

Qal - Alluvial Deposits (Quaternary)

Clay, silt, sand, and gravel, reddish- to yellowish-brown, unconsolidated and poorly sorted; contains subangular to subrounded pebbles of chert, quartz, and quartzite. Mapped only in flood plains of Tennessee River and South Chickamauga Creek. Older fluvial deposits above the level of the present flood plain occur locally, too discontinuous to map. (GRI Source Map ID 68296) ([Geologic Map of East Chattanooga Quadrangle](#)).

PNn - Newton Sandstone (Lower Pennsylvanian)

Sandstone, pale-pink, very light-gray, or yellowish-brown, fine- to coarse-grained with quartz pebbles locally, thin- to thick-bedded, crossbedded in part, micaceous, well-cemented. (GRI Source Map ID 76088) ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).

PNw - Whitwell Shale (Lower Pennsylvanian)

PNw - Whitwell Shale (Lower Pennsylvanian)

Shale and silty shale, gray, weathers brown and buff; interlayered with siltstone and fine-grained lenticular, thin-bedded sandstones; lenses up to five feet thick; sandy toward base. (GRI Source Map ID 76088) ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).

Pw - Whitwell Shale (Pennsylvanian)

Shale, silty, light-brown to dark-gray, with minor clay shale, carbonaceous shale, sandy shale, and sandstone. Approximately 40 feet preserved, along Georgia State line on Lookout Mountain. (GRI Source Map ID 68253) ([Geologic Map of Chattanooga Quadrangle](#)).

PNs - Sewanee Conglomerate (Lower Pennsylvanian)

PNs - Sewanee Conglomerate (Lower Pennsylvanian)

Sandstone, fine- to coarse-grained, feldspathic, pink-weathering; generally thin-bedded, but massive in part; planar cross-bedding common and well developed; conglomeratic at base, in part; some interlayered shale and siltstone, particularly near base. (GRI Source Map ID 76088) ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).

Ps - Sewanee Conglomerate (Pennsylvanian)

Conglomerate and sandstone, yellowish-gray to pale yellowish-brown, with numerous quartz pebbles as

much as 1 inch long; sandstone is medium-grained, crossbedded. Thickness 80 to 200 feet. (*GRI Source Map ID 68253*) ([Geologic Map of Chattanooga Quadrangle](#)).

PNsp - Signal Point Shale (Lower Pennsylvanian)

PNsp - Signal Point Shale (Lower Pennsylvanian)

Shale, silty shale and thin-bedded sandstone, interlayered; flaser bedding; dark-gray, weathered buff. (*GRI Source Map ID 76088*) ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).

Psp - Signal Point Shale (Pennsylvanian)

Shale, yellowish-brown to medium dark-gray, primarily silty, with minor clay shale, carbonaceous shale, and sandy shale, locally contains thin coal seams. Thickness 55 to 140 feet. (*GRI Source Map ID 68253*) ([Geologic Map of Chattanooga Quadrangle](#)).

Psp - Signal Point Shale (Lower Pennsylvanian)

Shale, silty or argillaceous, and siltstone, greenish-gray or olive-gray when fresh, weathers to yellowish-brown, very fine- to fine-grained, thin- to thick-bedded; Wilder coal occurs about the middle of the formation in the northern portion of the quadrangle. Thickness 100 to 200 feet. (*GRI Source Map ID 76095*) ([Geologic Map of Wauhatchie Quadrangle](#)).

PNwp - Warren Point Sandstone (Lower Pennsylvanian)

PNwp - Warren Point Sandstone (Lower Pennsylvanian)

Sandstone, fine- to coarse-grained, conglomeratic in part, with conglomerate lenses, massive, feldspathic in part; uneven base, with channeling into underlying siltstones and shale; thin lenticular coals near base. (*GRI Source Map ID 76088*) ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).

Pwp - Warren Point Sandstone (Pennsylvanian)

Sandstone and conglomerate, light brownish-gray to moderate brown; sandstone is fine- to medium-grained, thin- to thick-bedded, crossbedded in part, with lenses of quartz pebbles as much as 1 inch long. Shaly zone, less than 10 feet thick, locally present near middle. Thickness about 300 feet. (*GRI Source Map ID 68253*) ([Geologic Map of Chattanooga Quadrangle](#)).

Pwp - Warren Point Sandstone (Lower Pennsylvanian)

Sandstone, conglomeratic sandstone, and conglomerate, greenish- to brownish-gray and pale- to yellowish-orange; upper portion generally consists of sandstone, fine- to medium-grained, silty, thin- to medium-bedded, and cross-bedded in part; a shale and clay zone, with plant fossils and coal, dark- to greenish-gray, in places up to 10 feet in thickness occurs about the middle, and lower portion is sandstone, medium- to very coarse-grained, or conglomeratic, slightly carbonaceous, medium-bedded to massive, crossbedded in part. Thickness 200 to 300 feet. (*GRI Source Map ID 76095*) ([Geologic Map of Wauhatchie Quadrangle](#)).

PNrm - Raccoon Mountain Formation (Lower Pennsylvanian)

PNrm - Raccoon Mountain Formation (Lower Pennsylvanian)

Shale, silty shale, and siltstone, gray, thin-bedded with siderite nodules; flaser bedding and cross-bedding are common. Contains abundant plant fossil debris; weathers buff to yellow-brown; contains

lenticular sandstones. (GRI Source Map ID 76088) ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).

Pra - Raccoon Mountain Formation (Pennsylvanian)

Shale, silty, olive or light-brown to dark-gray, with minor sandstone and local thin coal seams. Thickness 80 to 160 feet. (GRI Source Map ID 68253) ([Geologic Map of Chattanooga Quadrangle](#)).

Prm - Raccoon Mountain Formation (Lower Pennsylvanian)

Shale, silty or argillaceous, and siltstone, greenish-gray or olive gray when fresh, weathers to yellowish-orange or yellowish-brown, interbedded with sandstone, light-gray when fresh, weathers to grayish-orange, yellowish-orange or yellowish-brown, very fine- to fine-grained, thin-to thick-bedded. Bon Air coal and associated fireclay occur near the top and lower Bon Air coal with associated fireclays occur about 30 to 100 feet below the Bon Air seam in the southern portion of the quadrangle. Thickness 160 to 300 feet. (GRI Source Map ID 76095) ([Geologic Map of Wauhatchie Quadrangle](#)).

Mp - Pennington Formation (Upper Mississippian)

Mp - Pennington Formation (Upper Mississippian)

Shale, argillaceous, olive-gray and typically variegated red and green. Sandstone, greenish-gray to grayish- orange, fine- to medium-grained, thin- to thick-bedded, occur chiefly in upper part; locally, on Lookout Mountain, one of these sandstones is as much as 60 feet thick and contains small, scattered quartz pebbles. Limestone, light olive-gray to ducky yellowish-brown, fine- to medium-grained, thin- to thick- and even-bedded, mostly fossil-fragmental with some oolitic zones' some beds are dolomitic' as much as 50 feet of limestone present near base of formation, underlain by persistent greenish-gray shale as much as 20 feet thick. Total thickness of formation approximately 400 to 500 feet. Contact with overlying Raccoon Mountain Formation is gradational. (GRI Source Map ID 76088) ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).

Mp - Pennington Formation (Mississippian)

Shale, argillaceous, olive-gray and typically variegated red and green. Sandstones, greenish-gray to grayish-orange, fine- to medium-grained, thin- to thick-bedded, occur chiefly in upper part; locally, on Lookout Mountain, one of these sandstones is as much as 60 feet thick and contains small, scattered quartz pebbles. Limestone light olive-gray to dusky yellowish-brown, fine- to medium-grained, thin- to thick- and even-bedded, mostly fossil-fragmental with some oolitic zones; some beds are dolomitic; as much as 50 feet of limestone present near base of formation, underlain by persistent greenish-gray shale as much as 20 feet thick. Total thickness of formation approximately 400 to 500 feet. (The Pennington-Raccoon Mountain contact is gradational.). (GRI Source Map ID 68253) ([Geologic Map of Chattanooga Quadrangle](#)).

Mp - Pennington Formation (Upper Mississippian)

Shale, siltstone, sandstone, limestone and dolomite; shale is argillaceous, in part calcareous, olive-gray, variegated red and green. Sandstones and siltstones are yellowish-gray, orange-gray, or light olive-gray, very fine- to fine-grained, in part irregularly bedded or crossbedded; sandstone near middle of formation is about 20 feet thick with arenaceous limestone at base. Limestone near upper part of formation is medium-dark-gray, very fine- to medium crystalline, thick-bedded with abundant fossil fragments in places. Dolomite and limestone beds in lower part of formation are light-gray to dark-greenish-gray, very finely crystalline and thick-bedded. Thickness 280 to 500 feet. (The Pennington-Raccoon Mountain contact is gradational.). (GRI Source Map ID 76095) ([Geologic Map of Wauhatchie Quadrangle](#)).

Mb - Bangor Limestone (Upper Mississippian)

Limestone, light olive-gray to brownish-black, fine- to medium-grained, thin- to medium and even bedded, fossil-fragmental with some oolitic zones, locally has petroliferous odor when broken, some beds dolomitic, stylolites common, partings and very thin beds of greenish-gray to gray shale may be present. Thickness 180 to 200 feet. (GRI Source Map ID 76095) ([Geologic Map of Wauhatchie Quadrangle](#)).

Mbh - Bangor Limestone and Hartselle Formation (Upper Mississippian)

Mbh - Bangor Limestone and Hartselle Formation (Upper Mississippian)

These units were mapped as a single unit. **Bangor Limestone:** Limestone, light olive-gray to brownish-black, fine- to medium-grained, thin- to medium- and even-bedded, fossil-fragmental with some oolitic zones, locally has petroliferous odor when broken, some beds dolomitic, stylolites common, partings and very thin beds of greenish-gray to gray shale may be present. **Hartselle Formation:** Sandstone, light-gray to brownish-gray, fine-grained, thin- to medium-bedded; interbedded zones of pale-red and light-green fossiliferous shale at the top. (GRI Source Map ID 76088) ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).

Mb - Bangor Limestone and Hartselle Formation (Mississippian)

Bangor Limestone: Limestone, light olive-gray to brownish-black, fine- to medium-grained, thin- to medium- and even-bedded, fossil-fragmental with some oolitic zones, locally has petroliferous odor when broken, some beds dolomitic, stylolites common, partings and very thin beds of greenish-gray to gray shale may be present. Thickness approximately 200 to 400 feet. **Hartselle Formation:** Shale, olive, fissile to thinly laminated, commonly very fossiliferous; sandstone, fine-grained, olive-gray, thin- to medium-bedded, in part crossbedded, in some areas has calcareous matrix; limestones are interbedded with shale and are pale yellowish-brown to olive-gray, fine- to medium-grained, fossil-fragmental, some zones oolitic, stylolites common. Formation thickness 0 to approximately 40 feet. (GRI Source Map ID 68253) ([Geologic Map of Chattanooga Quadrangle](#)).

Mh - Hartselle Formation (Upper Mississippian)

Shale, olive, fissile to thinly laminated, commonly very fossiliferous; sandstone, fine-grained, olive-gray, thin- to medium-bedded, in part crossbedded, in some areas has calcareous matrix; limestone, interbedded with shale and are pale yellowish- brown to olive-gray, fine- to medium-grained, fossil-fragmental, some zones oolitic, stylolites common. Thickness 150 to 200 feet . In places the Hartselle-Galiconda break occurs (Mhg), sandstone, medium- to fine-grained, yellowish- to light-brown. Thickness 0 to 20 feet. (GRI Source Map ID 76095) ([Geologic Map of Wauhatchie Quadrangle](#)).

Mm - Monteagle Limestone (Upper Mississippian)

Mm - Monteagle Limestone (Upper Mississippian)

Limestone, light olive-gray to dusky yellowish-brown, cryptocrystalline and very fine-grained to coarse-grained and crystalline, thin- to very thick-bedded, commonly cross-bedded, stylolitic; many beds oolitic with very high percentage of calcium carbonate, many fossil-fragmental, some dolomitic; locally has petroliferous odor when broken; partings and very thin beds of greenish-gray to gray shale present in places; locally cherty, particularly near base. (GRI Source Map ID 76088) ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).

Mm - Monteagle Limestone (Mississippian)

Limestone, light olive-gray to dusky yellowish-brown, cryptocrystalline and very fine-grained to coarse-grained and crystalline, thin- to very thick-bedded, commonly crossbedded, stylolitic; many beds oolitic with very high percentage of calcium carbonate, many fossil-fragmental, some dolomitic; locally has petroliferous odor when broken; partings and very thin beds of greenish-gray to gray shale present in places; locally cherty, particularly near base. Formation thickness approximately 200 to 300 feet. (GRI Source Map ID 68253) ([Geologic Map of Chattanooga Quadrangle](#)).

Mm- Monteagle Limestone (Upper Mississippian)

Limestone, light olive-gray to dusky yellowish-brown, cryptocrystalline, thin- to very thick-bedded, commonly cross-bedded, stylolitic; many beds oolitic with very high percentage of calcium carbonate, many fossil-fragmental, some dolomitic; locally has petroliferous odor when broken; partings and very thin beds of greenish-gray to gray shale present in places; locally cherty, particularly near base. Formation thickness approximately 200 to 300 feet. (GRI Source Map ID 76095) ([Geologic Map of Wauhatchie Quadrangle](#)).

Msl - St. Louis Limestone (Upper Mississippian)

Msl - St. Louis Limestone (Upper Mississippian)

Limestone, olive-gray to dark-gray, fine- to medium- grained, thin to medium- and even-bedded; much chert present, generally as nodular "cannon-balls" as much as 4 inches in diameter; some beds fossil-fragmental, some dolomitic; locally has petroliferous odor when broken. (GRI Source Map ID 76088) ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).

Msl - St. Louis Limestone (Mississippian)

Limestone, olive-gray to dark-gray, fine- to medium-grained, thin- to medium- and even-bedded; much chert present, generally as nodular "cannon-balls" as much as 4 inches in diameter; some beds fossil-fragmental, some dolomitic; locally has petroliferous odor when broken. Formation thickness approximately 40 to 100 feet. (GRI Source Map ID 68253) ([Geologic Map of Chattanooga Quadrangle](#)).

Msl - St. Louis Limestone (Upper Mississippian)

Limestone, olive-gray to dark-gray, fine- to medium-grained, thin- to medium- and even-bedded; much chert present, generally as nodular "cannon-balls" as much as 4 inches in diameter; some beds fossil-fragmental, some dolomitic; locally has petroliferous odor when broken. Formation thickness approximately 40 to 100 feet. (GRI Source Map ID 76095) ([Geologic Map of Wauhatchie Quadrangle](#)).

Mw - Warsaw Limestone (Upper Mississippian)

Mw - Warsaw Limestone (Upper Mississippian)

Limestone, olive-gray to dark-gray, fine- to coarse-grained, thin- to thick-bedded, crossbedded in part, most beds fossil-fragmental, some dolomitic; locally has petroliferous odor when broken. (GRI Source Map ID 76088) ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).

Mw - Warsaw Limestone (Mississippian)

Limestone, olive-gray to dark-gray, fine- to coarse-grained, thin- to thick-bedded, crossbedded in part, most beds fossil-fragmental, partings and very thin beds of gray shale locally present. Formation thickness approximately 40 to 100 feet. (GRI Source Map ID 68253) ([Geologic Map of Chattanooga Quadrangle](#)).

Mw- Warsaw Limestone (Upper Mississippian)

Limestone, olive-gray to dark-gray, fine- to coarse-grained, thin- to thick-bedded, crossbedded in part,

most beds fossil fragmental, partings and very thin beds of gray shale locally present. Formation thickness approximately 40 to 100 feet. (GRI Source Map ID 76095) ([Geologic Map of Wauhatchie Quadrangle](#)).

Mfp - Fort Payne Chert (Lower Mississippian)

Mfp - Fort Payne Formation (Lower Mississippian)

Limestone and dolomite, highly siliceous, gray, fine- to coarse-grained, weathers to thick chert ledges. Thin pale green shale (Maury Shale) at base. (GRI Source Map ID 76088) ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).

Mfp - Fort Payne Chert (Mississippian)

Limestone and dolomite, highly siliceous, gray, fine- to coarse-grained, weathers to thick chert ledges. Thin pale-green shale (Maury Shale) at base. Thickness 90 to 200 feet. (GRI Source Map ID 68253) ([Geologic Map of Chattanooga Quadrangle](#)).

Mfp - Fort Payne Chert (Lower Mississippian)

Limestone and dolomite, highly siliceous, gray, fine- to coarse-grained, weathers to thick chert ledges. Thin pale-green shale (Maury Shale) at base. Thickness 90 to 200 feet. (GRI Source Map ID 76095) ([Geologic Map of Wauhatchie Quadrangle](#)).

MDc - Chattanooga Shale (Lower Mississippian and Upper Devonian)

MDc - Chattanooga Shale (Lower Mississippian and Upper Devonian)

Shale, bituminous, brownish-black (weathers yellowish-orange to brown), fissile. (GRI Source Map ID 76088) ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).

MDc - Chattanooga Shale (Devonian and Mississippian)

Shale, bituminous, brownish-black (weathers yellowish-orange to brown), fissile. Thickness about 20 feet. (GRI Source Map ID 68253) ([Geologic Map of Chattanooga Quadrangle](#)).

MDc - Chattanooga Shale (Lower Mississippian and Upper Devonian)

Shale, bituminous, brownish-black (weathers yellowish-orange to brown), fissile. Thickness about 20 feet. (GRI Source Map ID 76095) ([Geologic Map of Wauhatchie Quadrangle](#)).

Sr - Rockwood Formation (Middle and Lower Silurian)

Sr - Rockwood Formation (Lower and Middle Silurian)

Siltstone, shale, limestone, and sandstone, greenish-gray to grayish-red, weather yellowish-brown or grayish-orange. At least 10 hematite beds near the middle within a 70-foot zone. Basal ferruginous sandstone units commonly massive, crossbedded, micaceous, and conglomeratic. (GRI Source Map ID 76088) ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).

Sr - Rockwood Formation (Silurian)

Shale, reddish to yellowish-orange, with thin beds of siltstone and sandstone. Thin layers and lenses of hematite in upper part. Thickness about 200 feet. (GRI Source Map ID 68253) ([Geologic Map of Chattanooga Quadrangle](#)).

Sr - Rockwood Formation (Lower and Middle Silurian)

Shale, reddish to yellowish-range, with thin beds of siltstone and sandstone. Thin layers and lenses of hematite in upper part. Thickness about 200 feet. (GRI Source Map ID 76095) ([Geologic Map of Wauhatchie Quadrangle](#)).

Os - Sequatchie Formation (Upper Ordovician)

Os - Sequatchie Formation (Upper Ordovician)

Siltstone, calcareous, fossil-fragmental limestone, mudstone, and shale, interbedded greenish-gray and dark-gray to grayish-red. Upper part contains distinctive 20-foot zone of fossil-fragmental limestone, grayish-red, coarse-grained, thick-bedded, and crossbedded (Fernvale Member). Sequence of thinly laminated beds at base. (GRI Source Map ID 76088) ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).

Os - Sequatchie Formation (Ordovician)

Limestone, typically silty and argillaceous, mottled red and green, thin-to medium-bedded. Thickness about 200 feet. (GRI Source Map ID 68253) ([Geologic Map of Chattanooga Quadrangle](#)).

Os - Sequatchie Formation (Upper Ordovician)

Limestone, typically silty and argillaceous mottled red and green, thin-to medium-bedded. Thickness about 200 feet. (GRI Source Map ID 76095) ([Geologic Map of Wauhatchie Quadrangle](#)).

Och - Chickamauga Supergroup (Upper and Middle Ordovician)

Och - Chickamauga Limestone (Upper and Middle Ordovician)

Limestone, gray, mostly fine- to medium-grained, thin- to medium-bedded, in part shaly and nodular. Locally contains beds of crystalline limestone, and reddish silty limestone. Thickness approximately 1,500 feet.

It is our interpretation that unit Och, present on the East Chattanooga Quadrangle source map ([Wilson, 1989](#)), but with no explanation, is the Chickamauga Limestone. An adjacent quadrangle map, Swingle et. al., 1964 (see citation below) has the same mapped unit, Och, and refers to the unit as the Chickamauga Limestone.

As the unit has no explanation on its source map the unit's description was taken from an adjacent map: Swingle, G.D., Finlayson, C.P., and Luther, E.T., 1964, Geologic Map and Mineral Resources Summary of the Daisy Quadrangle (Blackline Copy Only): Tennessee Division of Geology, Geologic Quadrangle Map 112 NW, scale 1:24,000.

The Chickamauga Limestone is now recognized as the Chickamauga Supergroup. The super group is comprised of the Nashville Group and the Stones River group. Thus, rocks of Och are of either of the Nashville Group and/or the Stones River Group.

Ona - Nashville Group, undivided (Upper and Middle Ordovician)

On - Nashville Group (Middle Ordovician) (Chickamauga Supergroup)

The Nashville Group includes the Catheys Formation, Bigby-Cannon Limestone, and Hermitage Formation. (GRI Source Map ID 68296) ([Geologic Map of East Chattanooga Quadrangle](#)).

Catheys Formation: Limestone medium dark-gray to brownish-gray, medium- to thin-bedded,

weathers to thin "contour-rock" slabs, silty and shaly, fossiliferous; limestone, fossil-fragmental and fine-grained (weathers yellowish-brown), contains zones of greenish-gray calcareous shale. Thickness uncertain due to faulting.

Bigby-Cannon Limestone: Limestone, medium dark-gray, fossil-fragmental and very fine-grained, medium-bedded.

Hermitage Formation: Limestone, olive-gray, silty, nodular, bedding indistinct, fossiliferous; contains abundant colonial corals *Tetradium*. Locally, near base are several thin beds of medium-grained quartz sandstone.

Ocy - Catheys Formation (Upper and Middle Ordovician)

Limestone, medium dark-gray to brownish-gray, medium- to thin-bedded, weathers to thin "contour-rock" slabs, silty and shaly, fossiliferous; limestone, fossil-fragmental and fine-grained (weathers yellowish-brown), contains zones of greenish-gray calcareous shale. (GRI Source Map ID 76088) ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).

Ocycn- Catheys Formation and Cannon Limestone, undivided (Upper and Middle Ordovician)

Ochu - Chickamauga Limestone, upper part (Ordovician)

Upper part (Ochu) is a limestone, light-gray to gray, fine- to medium-grained, thin- to medium-bedded, with very minor chert. Thickness about 500 feet. (GRI Source Map ID 68253) ([Geologic Map of Chattanooga Quadrangle](#)).

Och - Chickamauga Limestone, upper part (Ordovician)

Upper part (Ochu) is limestone, light-gray to gray, fine-to medium-grained, thin-to medium-bedded, with very minor chert. Thickness about 500 feet. (GRI Source Map ID 76095) ([Geologic Map of Wauhatchie Quadrangle](#)).

As per personal communication with map author Wade Scruggs the upper part of the Chickamauga Limestone is now recognized as the Sequatchie Formation ([Os](#)), Catheys Formation ([Ocy](#)) and the Cannon Limestone ([Ocn](#)).

Ocn - Cannon Limestone (Middle Ordovician)

Limestone, medium dark-gray, fossil-fragmental and very fine-grained, medium bedded. (GRI Source Map ID 76088) ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).

Ocnhsr - Cannon Limestone, Hermitage Formation and Stones River Group, undivided (Middle Ordovician)

Ochl - Chickamauga Limestone, lower part (Ordovician)

Lower part (Ochl) consists of about 4 feet of bentonite at top, underlain by limestone, light-gray to gray, fine- to coarse-grained, thin- to thick-bedded, and minor dark blocky chert. Thickness about 1,000 feet. (GRI Source Map ID 68253) ([Geologic Map of Chattanooga Quadrangle](#)).

As per personal communication with map author Wade Scruggs the lower part of the Chickamauga Limestone is now recognized as the Cannon Limestone ([Ocn](#)), Hermitage Formation ([Oh](#)) and Stones River Group ([Osr](#)).

Oh - Hermitage Formation (Middle Ordovician)

Limestone, olive-gray, silty, nodular, bedding indistinct, fossiliferous; contains abundant colonial corals *Tetradium*. Locally, near base are several thin beds of medium-grained quartz sandstone. (GRI Source Map ID 76088) ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).

Osr - Stones River Group, undivided (Middle Ordovician)

Osr - Stones River Group, undivided (Middle Ordovician)

The Stones River Group includes the Carters, Lebanon, Ridley, and Murfreesboro limestones and the Pond Spring Formation. (GRI Source Map ID 76088) ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).

Osr - Stones River Group (Middle Ordovician)

The Stones River Group includes the Carters, Lebanon, Ridley, and Murfreesboro limestones and the Pond Spring Formation. (GRI Source Map ID 68296) ([Geologic Map of East Chattanooga Quadrangle](#)).

Carters Limestone: Limestone, medium dark-gray, very fine-grained and fossil-fragmental, thin- to medium-bedded, with numerous greenish-gray shale partings. Zones of argillaceous or dolomitic "fucoidal" limestone common. Mostly very poorly exposed.

Lebanon Limestone: Limestone, medium dark-gray, very fine-grained and fossil-fragmental, thin- to medium-bedded, with numerous greenish-gray shale partings. Zones of argillaceous or dolomitic "fucoidal" limestone common. Mostly very poorly exposed.

Ridley Limestone: Limestone, dark- to medium-gray, very fine-grained and fossil-fragmental, medium- to thin-bedded, nodular, and fossiliferous. Dolomitic patches several inches long; "fucoids" common. Zones of calcareous shale occur near middle. Mostly very poorly exposed.

Murfreesboro Limestone: Limestone, medium dark- to dark-gray, thin- to medium-bedded very fine- to fine-grained, with zones of greenish-gray calcareous shale. At top is persistent zone of nodular to ropy, dark-gray to black chert that occurs in a medium- to dark-gray, very fine-grained limestone. Mostly very poorly exposed.

Pond Spring Formation: Upper part is fine-grained limestone, claystone and calcareous shale, greenish-gray and grayish-red. Lower part is limestone, light- to medium-gray very fine-grained, medium-bedded. Basal zone consists of about 20 feet of multicolored shale and sandstone that unconformably overlies the Mascot Dolomite.

Oca - Carters Limestone (Middle Ordovician)

Upper member is limestone, medium-gray to greenish-gray and pale reddish-gray, thin-bedded, very fine- to fine-grained. Near top is T-4 metabentonite 30-36 inches thick. Base of unit is marked by T-3 metabentonite. Lower member is limestone, medium- to medium dark-gray, medium-bedded, very fine-

grained, fossil-fragmental, and cherty, interbedded with greenish-gray calcareous siltstone in a 20- to 40-foot zone near middle. (GRI Source Map ID 76088) ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).

Olb - Lebanon Limestone (Middle Ordovician)

Limestone, medium dark-gray, very fine-grained and fossil-fragmental, thin-to medium-bedded, with numerous greenish-gray shale partings. Zones of argillaceous or dolomitic "fucoidal" limestone common. (GRI Source Map ID 76088) ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).

Or - Ridley Limestone (Middle Ordovician)

Limestone, dark-to medium-gray, very fine-grained and fossil-fragmental, medium- to thin-bedded, nodular, and fossiliferous. Dolomitic patches several inches long; "fucoids" common. Zones of calcareous shale occur near middle. (GRI Source Map ID 76088) ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).

Om - Murfreesboro Limestone (Middle Ordovician)

Limestone, medium dark-to dark-gray, thin- to medium-bedded, very fine- to fine-grained, with zones of greenish-gray calcareous shale. At top is persistent zone of nodular to ropy, dark-gray to black chert that occurs in a medium- to dark-gray very fine-grained limestone. (GRI Source Map ID 76088) ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).

Ops - Pond Spring Formation (Middle Ordovician)

Upper part is fine-grained limestone, claystone and calcareous shale, greenish-gray, very fine-grained, medium-bedded. Basal zone consists of about 20 feet of multicolored shale and sandstone that unconformably overlie the Mascot Dolomite. (GRI Source Map ID 76088) ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).

Ock - Knox Group, undivided (Ordovician and Cambrian)

Ock- Knox Group, undivided (Lower Ordovician and Upper Cambrian)

The Knox Group includes the Mascot Dolomite, Kingsport Formation, Longview Dolomite, Chepultepec Dolomite, and Copper Ridge Dolomite. (GRI Source Map ID 76088) ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).

Ock - Knox Group, undivided (Lower Ordovician and Upper Cambrian)

The Knox Group includes the Mascot Dolomite, Kingsport Formation, Chepultepec Dolomite, and Copper Ridge Dolomite. (GRI Source Map ID 68296) ([Geologic Map of East Chattanooga Quadrangle](#)).

Ock - Knox Group, undifferentiated (Cambrian and Ordovician)

Dolomite, very siliceous, light- to dark-gray, fine- to coarse-grained, thin- to very thick-bedded, weathers to cherty rubble; minor gray, fine-grained limestone, chiefly in upper part. Thickness about 2,600 feet. (

GRI Source Map ID 68253) ([Geologic Map of Chattanooga Quadrangle](#)).

On - Newala Formation (Lower Ordovician)

The Newala Formation includes the Mascot Dolomite and Kingsport Formation. (GRI Source Map ID 76088) ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).

Oma - Mascot Dolomite (Lower Ordovician)

Oma - Mascot Dolomite (Lower Ordovician)

Dolomite, light- to medium-gray, fine-grained, thin- to medium-bedded, locally contains zones of silty dolomite, mottled grayish-red; produces minor amounts of chert on weathering. Upper 50 feet contains several beds of medium- to light-gray, very fine-grained limestone. Upper surface shows evidence of major unconformity. (GRI Source Map ID 76088) ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).

Oma - Mascot Dolomite (Lower Ordovician)

Dolomite, light- to medium-gray, fine-grained, thin- to medium-bedded, locally contains zones of silty dolomite, mottled grayish-red; produces minor amounts of chert on weathering. Upper 50 feet contains several beds of medium- to light-gray, very fine-grained limestone. Upper surface shows evidence of major unconformity. (GRI Source Map ID 68296) ([Geologic Map of East Chattanooga Quadrangle](#)).

Ok - Kingsport Formation (Lower Ordovician)

Ok- Kingsport Formation (Lower Ordovician)

Upper part consists primarily of limestone, light-gray, very fine-grained, with minor amounts of dolomite, olive-gray, coarse-grained. Lower part is dolomite, medium- to coarse-grained, interbedded with limestone, light gray, very fine-grained. Lenses and nodules of chert occur locally. (GRI Source Map ID 76088) ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).

Ok - Kingsport Formation (Upper Ordovician)

Upper part consists primarily of limestone, light-gray, very fine-grained with minor amounts of dolomite, olive-gray, coarse-grained. Lower part is dolomite, medium- to coarse-grained. Lower part is dolomite, medium- to coarse-grained, interbedded with limestone, light-gray, very fine-grained. Lenses and nodules of chert occur locally. (GRI Source Map ID 68296) ([Geologic Map of East Chattanooga Quadrangle](#)).

Olv - Longview Dolomite (Lower Ordovician)

Lower part consists primarily of siliceous dolomite, light-gray to medium dark-gray, fine- to coarse-grained, thin- to very thick-bedded. Weathers to large blocks of porcelaneous chert; Upper part consists of interbedded dolomite with blue and tan compact argillaceous limestone. (GRI Source Map ID 76088) ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).

Oc - Chepultepec Dolomite (Lower Ordovician)

Oc - Chepultepec Dolomite (Lower Ordovician)

Dolomite, light-gray to medium dark-gray, fine- to very coarse-grained, thin- to very thick-bedded; contains nodules and beds of light-gray to brownish-gray chert and lenses of white, porcelaneous, dolomitic chert that weathers grayish- to yellowish-orange. Base marked by 10 to 20 inches medium-grained, calcareous sandstone. (GRI Source Map ID 76088) ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).

Oc - Chepultepec Dolomite (Lower Ordovician)

Dolomite, light-gray to medium dark-gray, fine- to very coarse-grained, thin- to very thick bedded; contains nodules and beds of light-gray to brownish-gray chert and lenses of white, porcelaneous, dolomitic chert that weathers grayish- to yellowish-orange. Base marked by 10 to 20 inches medium-grained, calcareous sandstone. (GRI Source Map ID 68296) ([Geologic Map of East Chattanooga Quadrangle](#)).

Ccr - Copper Ridge Dolomite (Upper Cambrian)

Ccr - Copper Ridge Dolomite (Upper Cambrian)

Dolomite, medium- to dark-gray, cherty, fine- to coarse-grained, medium- to thick-bedded, gives asphaltic odor when broken. Dark-gray *Cryptozoan* and oolitic cherts common near base. (GRI Source Map ID 76088) ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).

Ccr - Copper Ridge Dolomite (Upper Cambrian)

Dolomite, medium- to dark-gray, cherty, fine- to coarse-grained. medium- to thick-bedded, gives asphaltic odor when broken. Dark-gray *Cryptozoan* and oolitic cherts common near base. (GRI Source Map ID 68296) ([Geologic Map of East Chattanooga Quadrangle](#)).

Ccu - Conasauga Group, undivided (Upper and Middle Cambrian)

Ccu - Conasauga Formation, undivided (Middle Cambrian)

Shale, light-green to light-brown, with beds of dolomitic limestone and limestone, gray- to medium-gray, coarse-grained, oolitic and conglomeratic. Lower part characterized by thick sequence of maroon and reddish-brown shale and siltstone. (GRI Source Map ID 76088) ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).

Ccu - Conasauga Shale Undivided (Middle Cambrian)

Shale, light-green to light-brown, with beds of dolomitic limestone and limestone, gray- to medium-gray, coarse-grained, oolitic and conglomeratic. Lower part characterized by thick sequence of maroon and reddish-brown shale and siltstone. Thickness uncertain due to faulting. (GRI Source Map ID 68296) ([Geologic Map of East Chattanooga Quadrangle](#)).

Cmn - Maynardville Limestone (Upper Cambrian)

Limestone, medium dark-gray, argillaceous, faint asphaltic odor when broken. Silty beds weather to straticulate appearance ("contour rock"). Mapped only in the northeast and southeast corners of the quadrangle. (GRI Source Map ID 68296) ([Geologic Map of East Chattanooga Quadrangle](#)).

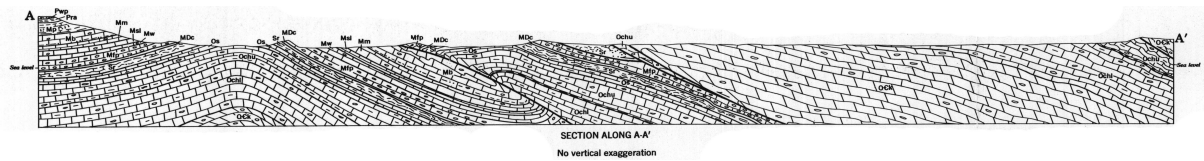
Cr - Rome Formation (Lower Cambrian)

Sandstone, interbedded with siltstone and shale; base concealed by faulting. Shown only in structure section. (GRI Source Map ID 68296) ([Geologic Map of East Chattanooga Quadrangle](#)).

Geologic Cross Sections

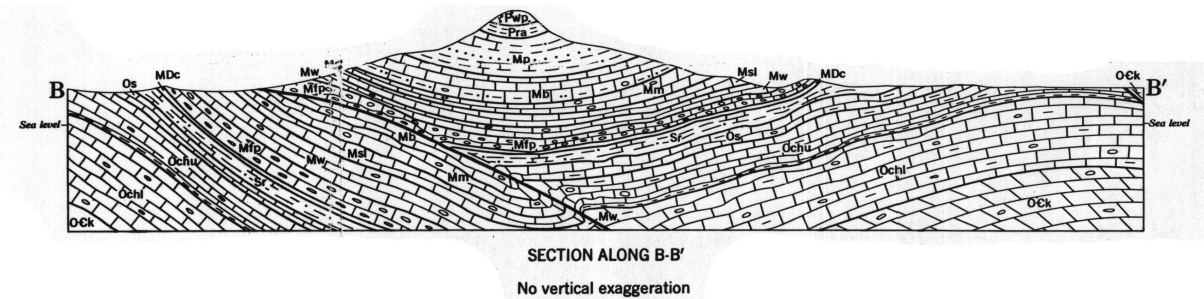
The geologic cross sections present in the GRI digital geologic-GIS data produced for Chickamauga & Chattanooga National Military Park, Georgia and Tennessee (CHCH) are presented below. Note that some cross section abbreviations (e.g., A - A') may have been changed from their source map abbreviation in the GRI data so that each cross section abbreviation in the GRI data is unique. Cross section graphics were scanned at a high resolution and can be viewed in more detail by zooming in (if viewing the digital format of this document).

Cross Section A-A'



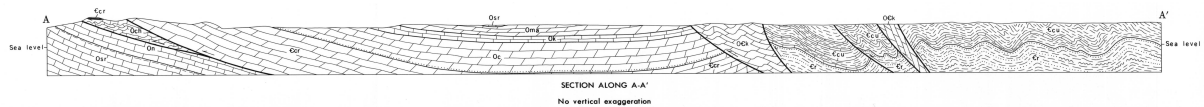
Extracted from: ([Geologic Map of Chattanooga Quadrangle](#)).

Cross Section B-B'



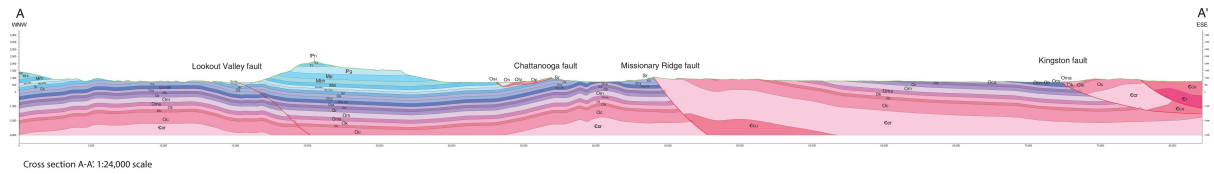
Extracted from: ([Geologic Map of Chattanooga Quadrangle](#)).

Cross Section C-C'



Extracted from: ([Geologic Map of East Chattanooga Quadrangle](#)). Cross section A-A' on source map.

Cross Section D-D'



Extracted from: ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).
Cross section A-A' on source map.

Mineral Resources Summary Reports

Mineral Resources Summary reports for the Chattanooga and East Chattanooga quadrangles are presented below. These reports contain additional information pertaining to Mine Point Features (MIN) and Mine Area Features (MAF) present in the GRI digital geologic-GIS data. This information is public knowledge, however, at the request of the Geologic Resources Division the GIS data for the Mine Point Features (MIN) and Mine Area Features (MAF) is only available to the National Park Service.

Chattanooga Mineral Resources Summary

The following Mineral Resources Summary report contains an introduction, information about different mineral resources sorted by lithology, miscellaneous mineral industries information, and references. To access the document double-click the following link.

[Chattanooga_Mineral_Resources_Summary_105-SE.pdf](#)

East Chattanooga Mineral Resources Summary

The following Mineral Resources Summary report contains an introduction, information about different mineral resources sorted by lithology, miscellaneous mineral industries information, and references. To access the document double-click the following link.

[East_Chattanooga_Mineral_Resources_Summary_112-SW.pdf](#)

GRI Ancillary Source Map Information

Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles

Scruggs, P. Levader, Wunderlich, Andrew L. and Hatcher, Robert D. Jr., 2013, Detailed Geologic Maps of the Chickamauga and Chattanooga National Military Park and Surrounding Area: Fort Oglethorpe 7.5' Quadrangle and Half of Hooker and East Ridge 7.5' Quadrangles: University of Tennessee, Tectonics and Structural Geology Research Group, scale 1:24,000. (GRI Source Map ID 76088).

Stratigraphic Column

SYSTEM AND SERIES	SUPERGROUP GROUP AND FORMATION	LITHOLOGY	EXPLANATION	SYSTEM AND SERIES	SUPERGROUP GROUP AND FORMATION	LITHOLOGY	EXPLANATION	
PENNINSULAN	Altoona Group	100-150	Altoona Group Clay, silt, sand, and gravel, medium to coarse grained, unconsolidated and poorly sorted, contains coarse sand to coarse gravel and some pebbles, and weathered to a fine, silty, clayey sand. Thin, brown, weathered, and silty.	CHICKAMAUGA	Missouri Group	100-150	Missouri Group The Missouri Group includes the Missouri, Kansas, and Kansas City Formations.	
	Whitfield Shale	100-150	Whitfield Shale Medium to coarse grained, silty, clayey, and sandy, unconsolidated and poorly sorted, contains coarse sand to coarse gravel and some pebbles, and weathered to a fine, silty, clayey sand. Thin, brown, weathered, and silty.		Kansas Group	100-150	Kansas Group The Kansas Group includes the Kansas, Kansas City, and Kansas City Shale Formations.	
	Signal Point Shale	100-150	Signal Point Shale Thin to medium grained, silty, clayey, and sandy, unconsolidated and poorly sorted, contains coarse sand to coarse gravel and some pebbles, and weathered to a fine, silty, clayey sand. Thin, brown, weathered, and silty.		Langston Group	100-150	Langston Group The Langston Group includes the Langston, Langston Shale, and Langston Shale Formations.	
	Warner Peak Shale	100-150	Warner Peak Shale Thin to medium grained, silty, clayey, and sandy, unconsolidated and poorly sorted, contains coarse sand to coarse gravel and some pebbles, and weathered to a fine, silty, clayey sand. Thin, brown, weathered, and silty.		Chickasaw Group	100-150	Chickasaw Group The Chickasaw Group includes the Chickasaw, Chickasaw Shale, and Chickasaw Shale Formations.	
	Raccoon Mountain Formation	100-150	Raccoon Mountain Formation Thin to medium grained, silty, clayey, and sandy, unconsolidated and poorly sorted, contains coarse sand to coarse gravel and some pebbles, and weathered to a fine, silty, clayey sand. Thin, brown, weathered, and silty.		Mississippi	Mississippi Group	100-150	Mississippi Group The Mississippi Group includes the Mississippi, Mississippi Shale, and Mississippi Shale Formations.
	Pennington Formation	100-150	Pennington Formation Thin to medium grained, silty, clayey, and sandy, unconsolidated and poorly sorted, contains coarse sand to coarse gravel and some pebbles, and weathered to a fine, silty, clayey sand. Thin, brown, weathered, and silty.			Chickasaw Group	100-150	Chickasaw Group The Chickasaw Group includes the Chickasaw, Chickasaw Shale, and Chickasaw Shale Formations.
	Banger Limestone	100-150	Banger Limestone Thin to medium grained, silty, clayey, and sandy, unconsolidated and poorly sorted, contains coarse sand to coarse gravel and some pebbles, and weathered to a fine, silty, clayey sand. Thin, brown, weathered, and silty.			Chickasaw Group	100-150	Chickasaw Group The Chickasaw Group includes the Chickasaw, Chickasaw Shale, and Chickasaw Shale Formations.
	St. Louis Limestone	100-150	St. Louis Limestone Thin to medium grained, silty, clayey, and sandy, unconsolidated and poorly sorted, contains coarse sand to coarse gravel and some pebbles, and weathered to a fine, silty, clayey sand. Thin, brown, weathered, and silty.			Chickasaw Group	100-150	Chickasaw Group The Chickasaw Group includes the Chickasaw, Chickasaw Shale, and Chickasaw Shale Formations.
	Warner Limestone	100-150	Warner Limestone Thin to medium grained, silty, clayey, and sandy, unconsolidated and poorly sorted, contains coarse sand to coarse gravel and some pebbles, and weathered to a fine, silty, clayey sand. Thin, brown, weathered, and silty.			Chickasaw Group	100-150	Chickasaw Group The Chickasaw Group includes the Chickasaw, Chickasaw Shale, and Chickasaw Shale Formations.
	Chickasaw Shale	100-150	Chickasaw Shale Thin to medium grained, silty, clayey, and sandy, unconsolidated and poorly sorted, contains coarse sand to coarse gravel and some pebbles, and weathered to a fine, silty, clayey sand. Thin, brown, weathered, and silty.			Chickasaw Group	100-150	Chickasaw Group The Chickasaw Group includes the Chickasaw, Chickasaw Shale, and Chickasaw Shale Formations.
MISSISSIPPIAN	Rockwell Formation	100-150	Rockwell Formation Thin to medium grained, silty, clayey, and sandy, unconsolidated and poorly sorted, contains coarse sand to coarse gravel and some pebbles, and weathered to a fine, silty, clayey sand. Thin, brown, weathered, and silty.	CHICKAMAUGA	Copper Ridge Dolomite	100-150	Copper Ridge Dolomite The Copper Ridge Dolomite includes the Copper Ridge, Copper Ridge Shale, and Copper Ridge Shale Formations.	
	Squashville Formation	100-150	Squashville Formation Thin to medium grained, silty, clayey, and sandy, unconsolidated and poorly sorted, contains coarse sand to coarse gravel and some pebbles, and weathered to a fine, silty, clayey sand. Thin, brown, weathered, and silty.		Copper Ridge Dolomite	100-150	Copper Ridge Dolomite The Copper Ridge Dolomite includes the Copper Ridge, Copper Ridge Shale, and Copper Ridge Shale Formations.	
	Cathryn Formation	100-150	Cathryn Formation Thin to medium grained, silty, clayey, and sandy, unconsolidated and poorly sorted, contains coarse sand to coarse gravel and some pebbles, and weathered to a fine, silty, clayey sand. Thin, brown, weathered, and silty.		Copper Ridge Dolomite	100-150	Copper Ridge Dolomite The Copper Ridge Dolomite includes the Copper Ridge, Copper Ridge Shale, and Copper Ridge Shale Formations.	
	Canon Limestone	100-150	Canon Limestone Thin to medium grained, silty, clayey, and sandy, unconsolidated and poorly sorted, contains coarse sand to coarse gravel and some pebbles, and weathered to a fine, silty, clayey sand. Thin, brown, weathered, and silty.		Copper Ridge Dolomite	100-150	Copper Ridge Dolomite The Copper Ridge Dolomite includes the Copper Ridge, Copper Ridge Shale, and Copper Ridge Shale Formations.	
	Herrington Formation	100-150	Herrington Formation Thin to medium grained, silty, clayey, and sandy, unconsolidated and poorly sorted, contains coarse sand to coarse gravel and some pebbles, and weathered to a fine, silty, clayey sand. Thin, brown, weathered, and silty.		Copper Ridge Dolomite	100-150	Copper Ridge Dolomite The Copper Ridge Dolomite includes the Copper Ridge, Copper Ridge Shale, and Copper Ridge Shale Formations.	
	Carter Limestone	100-150	Carter Limestone Thin to medium grained, silty, clayey, and sandy, unconsolidated and poorly sorted, contains coarse sand to coarse gravel and some pebbles, and weathered to a fine, silty, clayey sand. Thin, brown, weathered, and silty.		Copper Ridge Dolomite	100-150	Copper Ridge Dolomite The Copper Ridge Dolomite includes the Copper Ridge, Copper Ridge Shale, and Copper Ridge Shale Formations.	
	Laboon Limestone	100-150	Laboon Limestone Thin to medium grained, silty, clayey, and sandy, unconsolidated and poorly sorted, contains coarse sand to coarse gravel and some pebbles, and weathered to a fine, silty, clayey sand. Thin, brown, weathered, and silty.		Copper Ridge Dolomite	100-150	Copper Ridge Dolomite The Copper Ridge Dolomite includes the Copper Ridge, Copper Ridge Shale, and Copper Ridge Shale Formations.	
	Ridley Limestone	100-150	Ridley Limestone Thin to medium grained, silty, clayey, and sandy, unconsolidated and poorly sorted, contains coarse sand to coarse gravel and some pebbles, and weathered to a fine, silty, clayey sand. Thin, brown, weathered, and silty.		Copper Ridge Dolomite	100-150	Copper Ridge Dolomite The Copper Ridge Dolomite includes the Copper Ridge, Copper Ridge Shale, and Copper Ridge Shale Formations.	
	Marathon Limestone	100-150	Marathon Limestone Thin to medium grained, silty, clayey, and sandy, unconsolidated and poorly sorted, contains coarse sand to coarse gravel and some pebbles, and weathered to a fine, silty, clayey sand. Thin, brown, weathered, and silty.		Copper Ridge Dolomite	100-150	Copper Ridge Dolomite The Copper Ridge Dolomite includes the Copper Ridge, Copper Ridge Shale, and Copper Ridge Shale Formations.	
	Point Spring Formation	100-150	Point Spring Formation Thin to medium grained, silty, clayey, and sandy, unconsolidated and poorly sorted, contains coarse sand to coarse gravel and some pebbles, and weathered to a fine, silty, clayey sand. Thin, brown, weathered, and silty.		Copper Ridge Dolomite	100-150	Copper Ridge Dolomite The Copper Ridge Dolomite includes the Copper Ridge, Copper Ridge Shale, and Copper Ridge Shale Formations.	

Extracted from: [\(Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles\)](#).

Legend

Explanation of map symbols

Geologic structures

- ⊕ Horizontal bedding
- ↗₁₂ Strike and dip of inclined bedding
- ↗ Strike of vertical bedding
- ↗₁₂ Trend and plunge of small, inclined fold hinge
- ↗₁₂ Strike and dip of inclined joint

Structural symbols in red indicate unpublished data collected by Crawford, 1999; Fitzroy et al., 1999; and Wilson, 1999.

Mining and mineral resources

- ⛏ Open pit or quarry
- ⛏ Abandoned quarry
- ✕ Location of coal outcrop (historical)
- ✕ Mine prospect (historical)
- ⌋ Adit or tunnel entrance (historical)
- — — — — Strip mine, dashed where inferred (historical)

Fault contacts

Strike-slip fault, arrows indicate movement sense

(solid where certain, long dashes where approximate, dotted where concealed)
In cross section A and T denote relative movement away and toward viewer

Thrust fault, teeth on hanging wall
(solid where certain, long dashes where approximate, dotted where concealed)

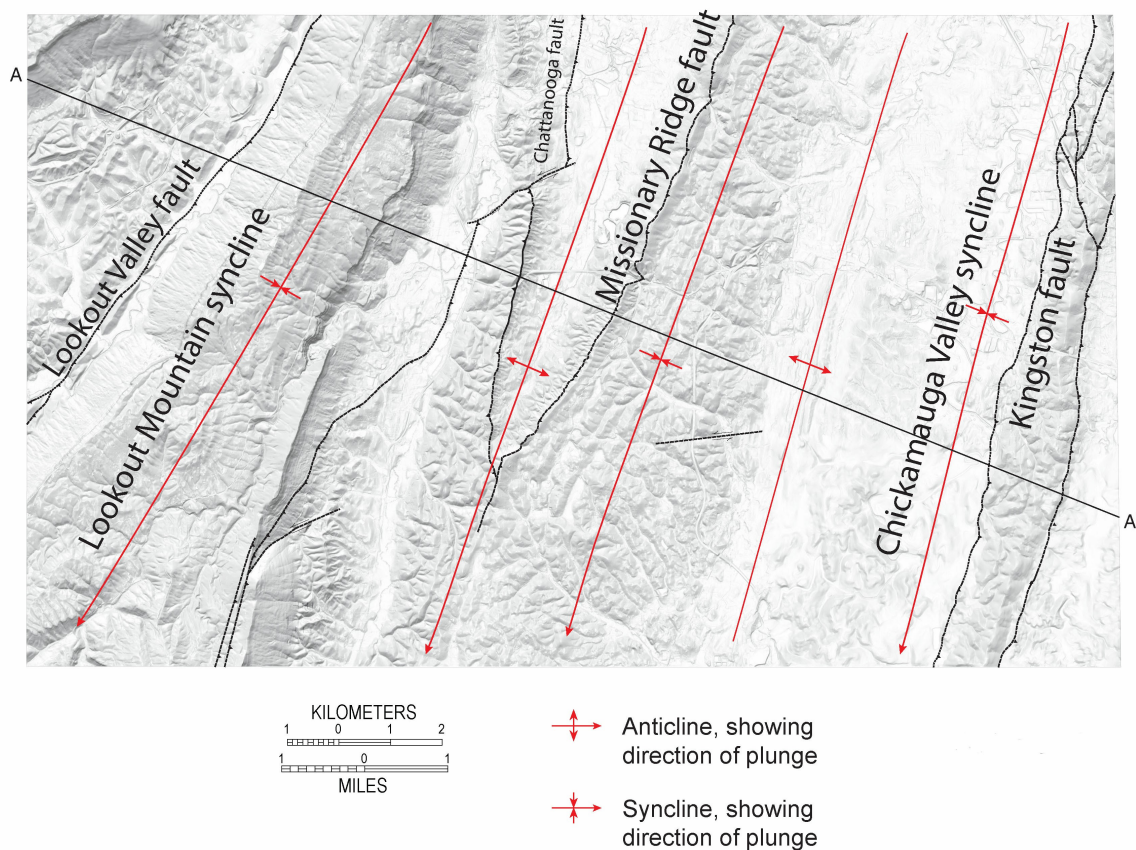
Stratigraphic contacts

(solid where certain, long dashes where approximate, dotted where concealed,
hachured where gradational)

CHCH park boundaries

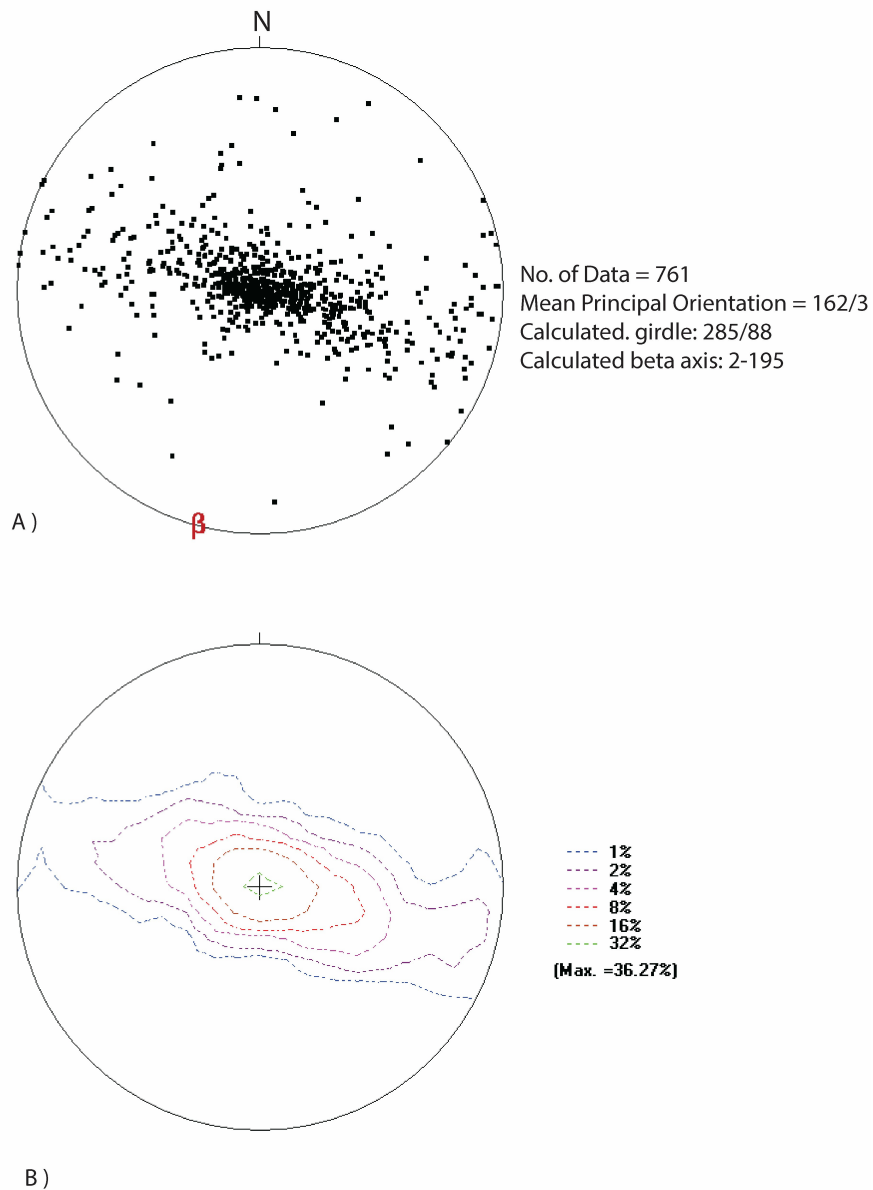
Extracted from: ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).

Tectonic Map



Extracted from: ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).

Structural Data



Lower hemisphere, equal-area projection of (A) poles to bedding in the study area. (B) Contoured data from (A). Plots made using GEORient v. 9.2 by Rod Holcombe.

Extracted from: ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).

Abstract

The southern Appalachian Valley and Ridge consists of a wedge of Permian (Alleghanian) deformed Paleozoic rocks making up a foreland fold-thrust belt. It is bound on the east by the Blue Ridge-Piedmont megathrust indenter and on the west by the Cumberland Plateau in Kentucky, Tennessee, and Georgia. The Valley and Ridge and Cumberland Plateau structure consists of a stack of mostly westward-vergent, thin-skinned thrust sheets that propagated through progressively younger units to the west.

Detailed geologic mapping of the East Ridge, Fort Oglethorpe, and Hooker 7.5' quadrangles in the westernmost Valley and Ridge of NW Georgia and southern Tennessee was completed at 1:24,000 scale. All of the rocks in this area have Cambrian to Pennsylvanian ages and consist of dolomite, limestone, shale, sandstone, and coal. Many of the carbonate rocks of lower Ordovician and Mississippian age contain significant amounts of chert. Where possible, Cambrian, Ordovician, Silurian, and Mississippian rocks were subdivided more than any previous mapping of this area. Due to the highly weathered nature of the Cambro-Ordovician Knox Group, many rocks in this unit were divided based on changes in chert and topographic characteristics.

Three major Alleghanian thrust faults are present: the Lookout Valley, Chattanooga, and Kingston faults. 762 structural measurements were made for structural control and assist in the building of a modern cross section through this area. All of the rock units and thrust faults in this area strike NNE and, with the exception of the Hawkins Ridge fault, dip east to SE. One high angle strike-slip fault was observed in the Fort Oglethorpe quadrangle with horizontal displacement of ~400 m (1,300 ft). Major folds in this area consist of the Lookout Mountain syncline, Chickamauga Valley syncline, and Missionary Ridge anticline.

Extracted from: ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).

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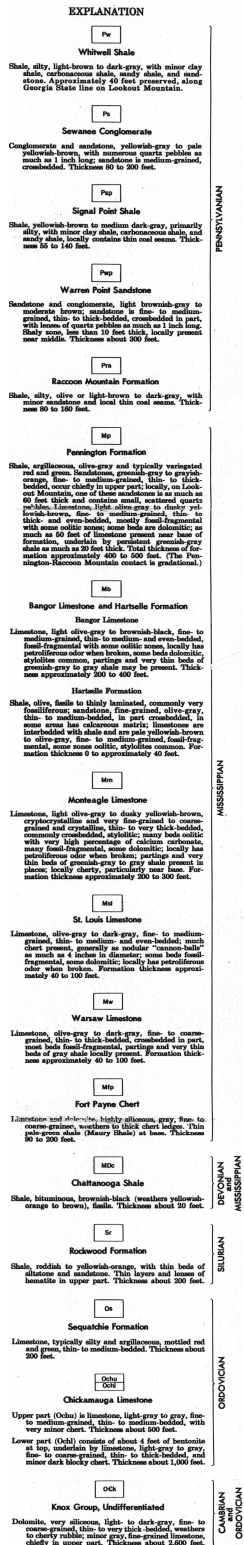
Wilson, R.L., 1989, Geologic Map and Mineral Resources Summary of the East Chattanooga Quadrangle. Scale 1:24,000. Geologic Quadrangle Map 112 SW. Nashville, TN: Tennessee Division of Geology.

Extracted from: ([Geologic Map of Fort Oglethorpe and Half of Hooker and East Ridge Quadrangles](#)).

Chattanooga Quadrangle

Finlayson, C.P., Barnes, R.H., Colvin, J.M., Jr., and Luther, E.T., 1966, Geologic Map and Mineral Resources Summary of the Chattanooga Quadrangle (Including the Tennessee portion of the Fort Oglethorpe Quadrangle), Georgia-Tennessee: Tennessee Division of Geology, Geologic Quadrangle Map 105 SE (Blackline Copy Only), scale 1:24,000. (*GRI Source Map ID 68253*).

Stratigraphic Column



Extracted from: ([Geologic Map of Chattanooga Quadrangle](#)).

Legend

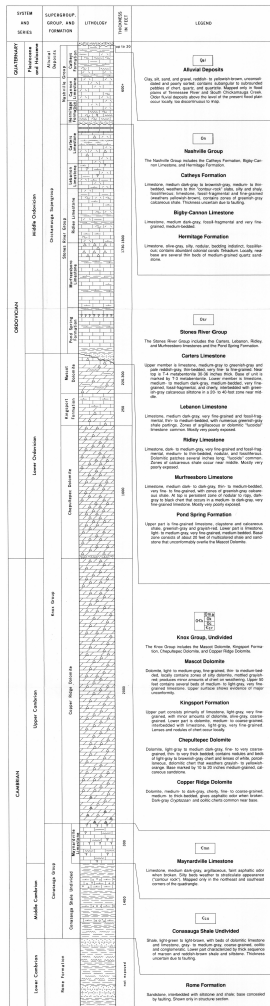
	Contact, dashed where approximate		
	Fault, dashed where approximately located, $\nearrow$ on upper plate of thrust fault		
	Thrust fault, arrow indicates relative movement (shown in cross section only)		
	Klippe		
	Strike and dip of beds		
	Normal		
	Horizontal		
	Beds dipping less than 5°		
	Generalized strike and dip of crumpled or undulated beds		
	Anticline showing trace and direction of plunge of axial plane		
	Active pit	Al	Aluminum (Bauxite)
	Abandoned pit	ch	Chert
	Abandoned quarry or pit	cl	Clay
	Abandoned quarry	Fe	Iron
	Adit	ls	Limestone
	Prospect	sh	Shale
	Questionable or approximate location		
	Brick plant		
	Sand and gravel plant		
	Map numbers refer to descriptions in Mineral Resources Summary		

Extracted from: ([Geologic Map of Chattanooga Quadrangle](#)).

East Chattanooga Quadrangle

Wilson, R.L., 1989, Geologic Map and Mineral Resources Summary of the East Chattanooga Quadrangle: Tennessee Division of Geology, Geologic Quadrangle Map 112 SW, scale 1:24,000. (GRI Source Map ID 68296).

Stratigraphic Column



Extracted from: ([Geologic Map of East Chattanooga Quadrangle](#)).

Legend

	Contact, dashed where approximate, dotted where concealed.	
	Thrust fault, dashed where approximate, dotted where concealed; on upper plate.	
	Transverse fault, arrows indicate relative movement.	
	Thrust fault, arrow indicates relative movement (on cross section only).	
	Klippe	
Strike and dip of beds:		
	Normal	ls Limestone
	Vertical	dol Dolomite
	Generalized strike and dip of crumpled beds	ch Chert
	Horizontal	Al Aluminum
	Dip less than 5°	ba Barite
	Plunging anticline, showing dip of limbs	sh Shale
	Syncline, showing axial plane	gh Geologic hazard
	Active quarry	
	Abandoned quarry	
	Active pit	
	Abandoned pit	
	Prospect	
25	Map numbers refer to descriptions in Mineral Resources Summary.	

Extracted from: ([Geologic Map of East Chattanooga Quadrangle](#)).

GRI Digital Data Credits

This document was developed and completed by Dalton Meyer and James Winter (Colorado State University) for the NPS Geologic Resources Division (GRD) Geologic Resources Inventory (GRI) Program. Quality control of this document by Stephanie O'Meara and James Winter (Colorado State University)

The information in this document was compiled from GRI source maps, and intended to accompany the digital geologic-GIS maps and other digital data for Chickamauga & Chattanooga National Military Park, Georgia and Tennessee (CHCH) developed by James Winter, Chase Winters, Stephanie O'Meara, Georgia Hybels, and Dalton Meyer (Colorado State University) (see the [GRI Digital Maps and Source Map Citations](#) section of this document for all sources used by the GRI in the completion of this document and related GRI digital geologic-GIS map(s)).

GRI finalization by Stephanie O'Meara (Colorado State University).

GRI program coordination and scoping provided by Bruce Heise (NPS GRD, Lakewood, Colorado).