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

Carl Sandburg Home National Historic Site

GRI Ancillary Map Information Document

Produced to accompany the Geologic Resources Inventory (GRI) Digital Geologic Data for Carl Sandburg Home National Historic Site

carl_geology.pdf

Version: 7/28/2022

Geologic Resources Inventory Map Document for Carl Sandburg Home National Historic Site

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Geologic Resources Inventory Map Document

Carl Sandburg Home National Historic Site, North Carolina

Document to Accompany Digital Geologic-GIS Data

carl_geology.pdf

Version: 7/28/2022

This document has been developed to accompany the digital geologic-GIS data developed by the Geologic Resources Inventory (GRI) program for Carl Sandburg Home National Historic Site, North Carolina (CARL).

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 Map and Source Map Citation** – A listing of the GRI digital geologic-GIS map produced for this project along with source map used in it's completion. In addition, a brief explanation of how the source map was used is provided.

3) **Map Unit List** – 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.

5) **Ancillary Source Map Information** – Additional source map information.

6) **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:

Stephanie O'Meara
Geologist/GIS Specialist/Data Manager
Colorado State University Research Associate, Cooperator to the National Park Service
Fort Collins, CO 80523
phone: (970) 491-6655
email: stephanie_o'meara@partner.nps.gov

About the NPS Geologic Resources Inventory Program

Background

The Geologic Resources Inventory (GRI) provides geologic map data and pertinent geologic information to support resource management and science-informed decision making in more than 270 natural resource parks throughout the National Park System. 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 GRI is one of 12 inventories funded by the National Park Service (NPS) Inventory and Monitoring Program. The Geologic Resources Division of the NPS Natural Resource Stewardship and Science Directorate administers the GRI. The NPS Geologic Resources Division partners with the Colorado State University Department of Geosciences to produce GRI products. Many additional partners participate in the GRI process by contributing source maps or reviewing products.

The GRI team undertakes three tasks for each park in the Inventory and Monitoring program: (1) conduct a scoping meeting and provide a summary document, (2) provide digital geologic map data in a geographic information system (GIS) format, and (3) provide a GRI report. These products are designed and written for nongeoscientists.

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: https://www.nps.gov/articles/gri-geodatabase-model.htm

Geologic Reports: GRI reports synthesize discussions from the original scoping meeting, follow up conference call(s), and subsequent research. Chapters of each report discuss the geologic setting of the park, distinctive geologic features and processes within the park, highlight geologic issues facing resource managers, and describe the geologic history leading to the present-day landscape. Each report also includes a poster illustrating these GRI digital geologic-GIS data.

For a complete listing of GRI products visit the GRI publications webpage: https://go.nps.gov/gripubs. GRI digital geologic-GIS data is also available online at the NPS Data Store: https://irma.nps.gov/DataStore/Search/Quick. 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: https://www.nps.gov/subjects/geology/gri.htm. At the bottom of that webpage is a “Contact Us” link if you need additional information. You may also directly contact the program coordinator:

Jason Kenworthy
Inventory Coordinator
National Park Service Geologic Resources Division
P.O. Box 25287
Denver, CO 80225-0287
phone: (303) 987-6923
fax: (303) 987-6792
email: Jason_Kenworthy@nps.gov

The Geologic Resources Inventory (GRI) program is funded by the National Park Service (NPS) Inventory and Monitoring (I&M) Division. Learn more about I&M and the 12 baseline inventories at the I&M webpage: https://www.nps.gov/im/inventories.htm.

GRI Digital Map and Source Map Citation

The GRI digital geologic-GIS map for Carl Sandburg Home National Historic Site, North Carolina (CARL).

Digital Geologic-GIS Map of Carl Sandburg Home National Historic Site and Vicinity, North Carolina (*GRI MapCode CARL*)

The map was produced from the following source map.

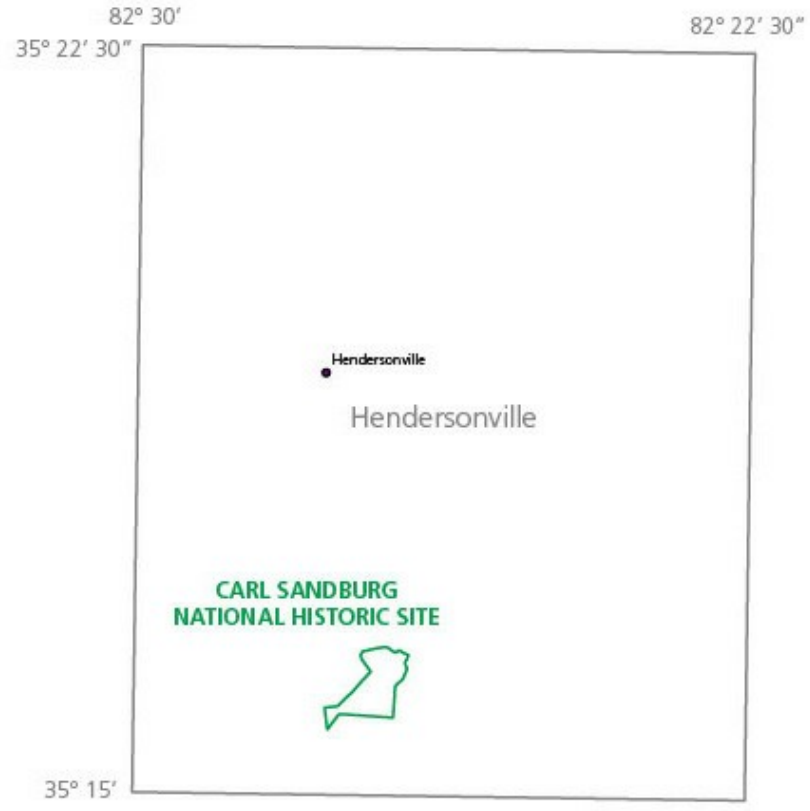
> Lemmon, R.E., 1978, Manuscript Geologic Map of the Hendersonville Quadrangle, North Carolina: North Carolina Geological Survey, unpublished map, scale 1:24,000 (Hendersonville Quadrangle (Manuscript Geologic Map)). (*GRI Source Map ID 887*).

The full extent of the source map was used, and all geologic features within this extent were captured.

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

Index Map

The following index map displays the extent of the GRI digital geologic-GIS map (the extent of the Hendersonville Quadrangle, outlined in gray) produced for Carl Sandburg Home National Historic Site (CARL). The boundary for Carl Sandburg Home National Historic Site (as of July, 2022) is outlined in green.



Index map by Stephanie O'Meara (Colorado State University).

Map Unit List

The geologic units present in the digital geologic-GIS data produced for Carl Sandburg Home National Historic Site, North Carolina (CARL) are listed below. Units are listed with their assigned unit symbol and unit name (e.g., Qal - Alluvium). Units are listed from youngest to oldest. Information about each geologic unit is also presented in the GRI Geologic Unit Information (CARLUNIT) table included with the GRI digital geologic-GIS data.

Cenozoic Era

Quaternary Period
Qal - Alluvium

Paleozoic Era

Ordovician to Silurian Periods
SOgg - Granitic gneiss

Cambrian Period
Chg - Henderson Augen Gneiss

Lower Paleozoic Era - Upper Precambrian
CZts - Tourmaline muscovite schist
CZgms - Garnetiferous muscovite schist, amphibolite and hornblende gneiss
CZmy - Ultramylonite
CZtgn - Migmatite

Map Unit Descriptions

Descriptions of all geologic map units, generally listed from youngest to oldest, are presented below. All unit descriptions taken from source map Hendersonville Quadrangle (Manuscript Geologic Map). Where source map unit symbols differ from the unit symbol assigned in the GRI digital geologic-GIS data, the source map unit symbol is also noted.

Qal - Alluvium (Quaternary)

Unconsolidated stream deposits of gravel, sand, silt, and clay.

SOgg - Granitic gneiss (Ordovician to Silurian)

Unit OSgg on source map.

Biotite granitic gneiss (quartz monzonite composition), light-gray, medium-grained, poorly foliated. Contains plagioclase (oligoclase) 26%, quartz 33%, microcline 30%, biotite 6%, muscovite, sphene, epidote, allanite, zircon and opaque minerals. Contains a few lenses of hornblende gneiss. Interlayered with augen gneiss (Chg) on eastern contact. Differs from augen gneiss in lack of augen and slightly lighter color. Equivalent to part of the Henderson Granite of Keith. Zircon elongation ratios, from reduced major axes, average 2.8 suggesting an igneous origin.

Chg - Henderson Augen Gneiss (Cambrian)

Unit Cag on source map.

Biotite augen gneiss (quartz monzonite composition), medium-gray to medium-bluish-gray, generally massive, homogeneous, and well-foliated. Conspicuous feldspar (chiefly microcline) augen in a medium-grained matrix of quartz 23%, plagioclase (oligoclase) 31%, microcline (average, including augen) 28%, biotite 14%, muscovite 2%, epidote 1%, allanite, sphene, apatite, zircon and opaque minerals. Augen generally less than 2.5 cm, show finely crushed white rims containing myrakitic intergrowths into the microcline. Equivalent to part of the Henderson Granite of Keith. Zircon elongation ratios from reduced major axes, average 2.7, suggesting an igneous origin.

CZts - Tourmaline muscovite schist (Lower Paleozoic - Upper Precambrian)

Unit ts on source map.

Muscovite, biotite, quartz, feldspar ± tourmaline schist medium-gray, and medium-grained. Muscovite is highly lustrous. Tourmaline lies within schistosity. Feldspar weathers to a light brown imparting a spotted appearance. Weathers to a red-brown saprolite with only the highly lustrous muscovite remaining.

CZgms - Garnetiferous muscovite schist, amphibolite and hornblende gneiss (Lower Paleozoic - Upper Precambrian)

Unit gms-am on source map.

Garnetiferous muscovite schist, dark-gray to medium-light-gray, lustrous, medium-grained. Composed of muscovite 28%, biotite 33%, quartz 28%, plagioclase (oligoclase) 7%, microcline 1%, garnet 2%,

and opaque minerals. In the vicinity of Mine Gap chromium bearing fuchsite is present along with garnet up to 1.5 cm in diameter.

Amphibolite, dark-gray to medium-gray, medium-grained, lustrous. Composed of hornblende 45%, plagioclase (andesine) 29%, quartz 10%, epidote 7%, opaque minerals 3%, and zircon. Weathers to a brown to reddish-brown saprolite.

Feldspathic hornblende gneiss, gray to dark-gray (weathers buff-brown), medium-grained; interlayered with feldspathic quartzite, gray, medium-grained, thinly foliated, (weathers yellow-brown) with angular blocks of resistant feldspathic quartzite occurring as float. Units grade laterally and vertically and have experienced strong isoclinal, passive flow folding.

CZmy - Ultramylonite (Lower Paleozoic - Upper Precambrian)

Unit my on source map.

Extremely fine-grained siliceous rock, weathering dark brown to black in outcrop. Generally forms resistant ledges in streams and breaks out in blocky patterns.

CZtgn - Migmatite (Lower Paleozoic - Upper Precambrian)

Unit tgn on source map.

Porphyroblastic feldspar, biotite, muscovite gneiss, (granodiorite composition) light-gray, medium-grained, massive to well-foliated. Contains quartz 32%, plagioclase (oligoclase) 47%, microcline 7%, biotite 12%, muscovite 2% and minor amounts of opaque minerals, epidote, chlorite and zircon. Feldspar blasts vary in size up to 15cm. and commonly occur in stringes and boudinage. The migmatite - Chg contact is gradational and is determined mainly by size and number of feldspar blasts and the lack of crushed rips about the blasts within the migmatite. The migmatite saprolite generally contains stringes and lenses of garnet-muscovite schist, amphibolite and hornblende gneiss. Occasional lens of biotite granitic gneiss (SOgg?) up to mappable dimensions are noted within the migmatite.

Ancillary Source Map Information

The following sections present ancillary source map information associated with source map used for this project.

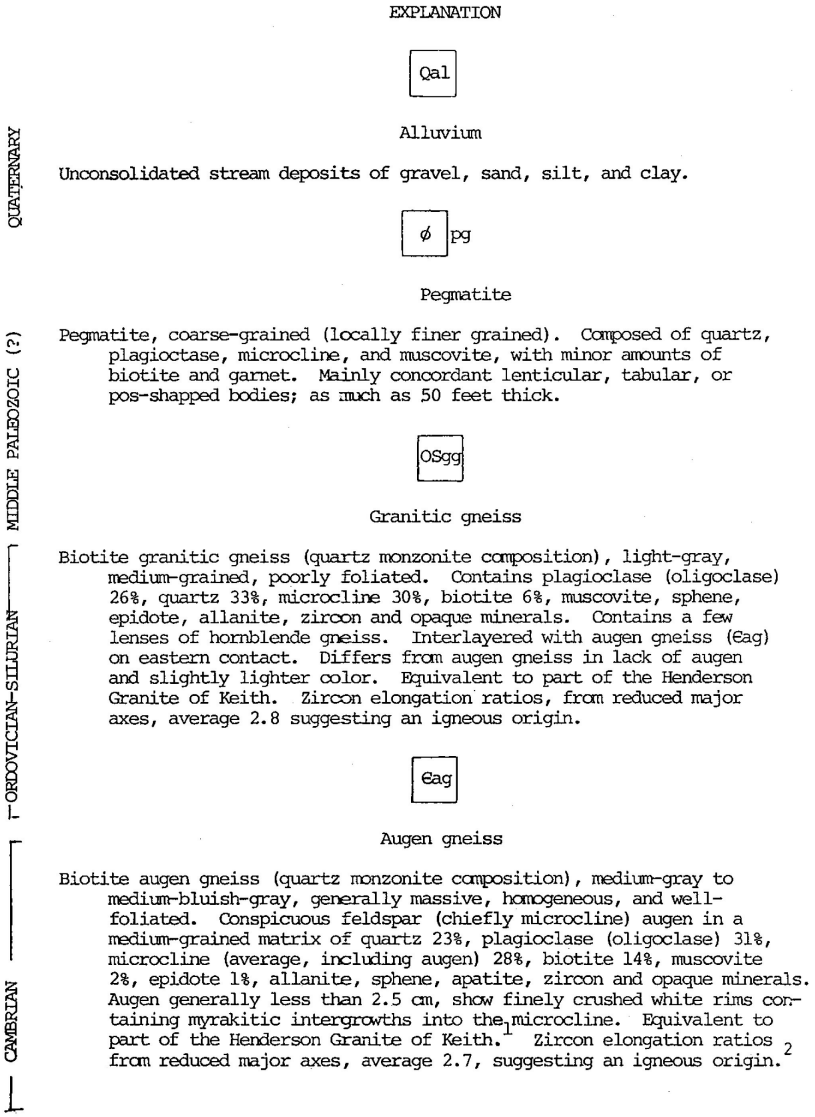
Hendersonville Quadrangle (Manuscript Geologic Map)

The formal citation for this source.

> Lemmon, R.E., 1978, Manuscript Geologic Map of the Hendersonville Quadrangle, North Carolina: North Carolina Geological Survey, unpublished map, scale 1:24,000 (*GRI Source Map ID 887*).

Prominent graphics and text associated with this source map.

Explanation



EXPLANATION

Qal

Alluvium

Unconsolidated stream deposits of gravel, sand, silt, and clay.

ø pg

Pegmatite

Pegmatite, coarse-grained (locally finer grained). Composed of quartz, plagioctase, microcline, and muscovite, with minor amounts of biotite and garnet. Mainly concordant lenticular, tabular, or pos-shapped bodies; as much as 50 feet thick.

OSgg

Granitic gneiss

Biotite granitic gneiss (quartz monzonite composition), light-gray, medium-grained, poorly foliated. Contains plagioclase (oligoclase) 26%, quartz 33%, microcline 30%, biotite 6%, muscovite, sphene, epidote, allanite, zircon and opaque minerals. Contains a few lenses of hornblende gneiss. Interlayered with augen gneiss (Eag) on eastern contact. Differs from augen gneiss in lack of augen and slightly lighter color. Equivalent to part of the Henderson Granite of Keith. Zircon elongation ratios, from reduced major axes, average 2.8 suggesting an igneous origin.

Eag

Augen gneiss

Biotite augen gneiss (quartz monzonite composition), medium-gray to medium-bluish-gray, generally massive, homogeneous, and well-foliated. Conspicuous feldspar (chiefly microcline) augen in a medium-grained matrix of quartz 23%, plagioclase (oligoclase) 31%, microcline (average, including augen) 28%, biotite 14%, muscovite 2%, epidote 1%, allanite, sphene, apatite, zircon and opaque minerals. Augen generally less than 2.5 cm, show finely crushed white rims containing myrakitic intergrowths into the microcline. Equivalent to part of the Henderson Granite of Keith.[1] Zircon elongation ratios from reduced major axes, average 2.7, suggesting an igneous origin.[2]

QUATERNARY

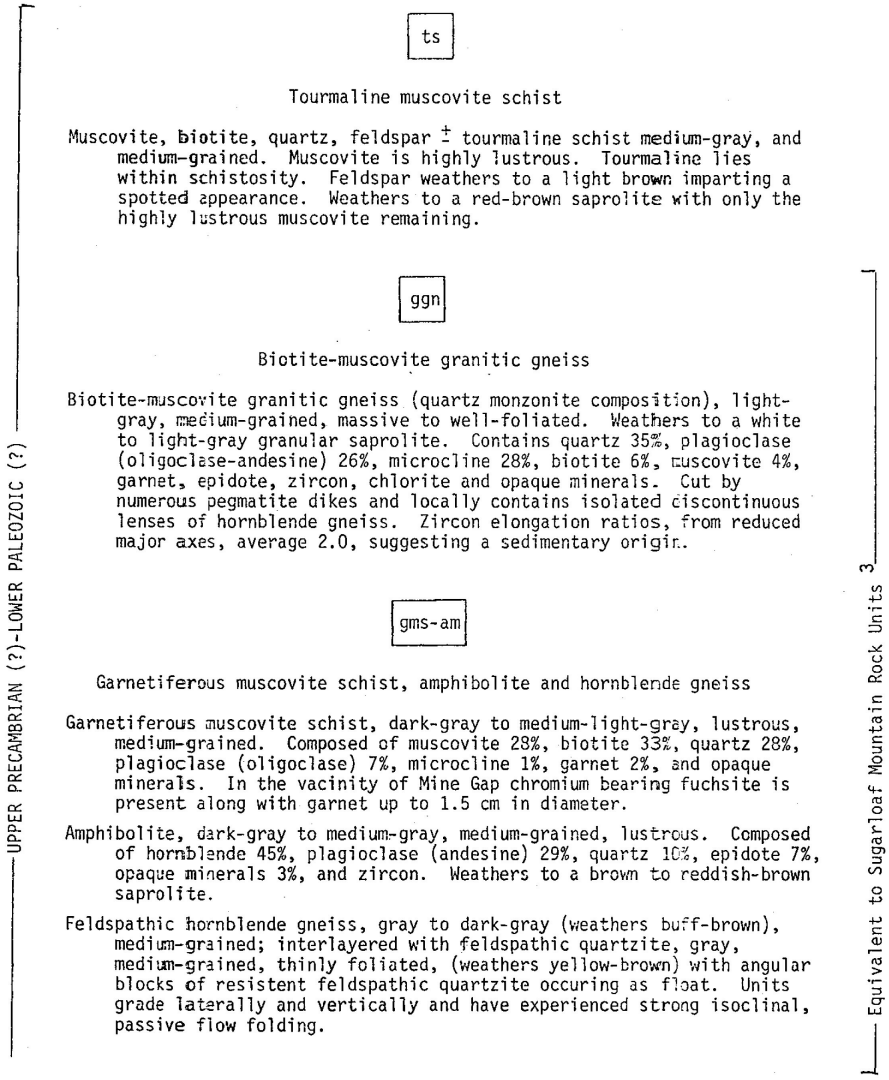
MIDDLE PALEOZOIC (?)

ORDOVICIAN-SILURIAN

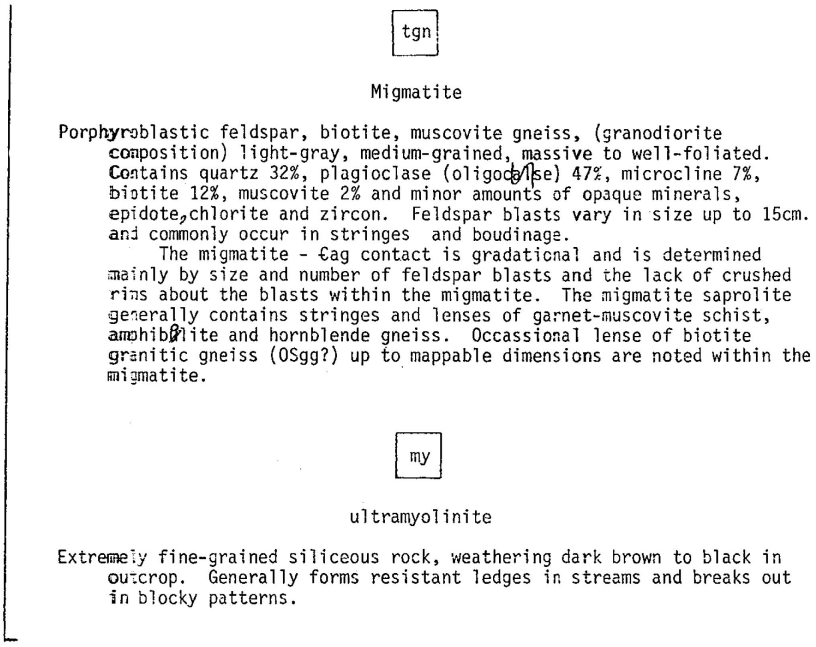
CAMBRIAN

Of note, although present on the above unit correlation/explanation, unit pg was not found on the source map. It is certainly possible the unit appears in the map extent, but as an unmapped unit.

Graphic from source map: Hendersonville Quadrangle (Manuscript Geologic Map).



Graphic from source map: Hendersonville Quadrangle (Manuscript Geologic Map).



Graphic from source map: Hendersonville Quadrangle (Manuscript Geologic Map).

References

References associated with this source map:

Keith, Arthur, 1905, Description of the Mount Mitchell quadrangle (N.C.-Tenn.): U.S. Geol. Survey Geol. Atlas, Folio 124.

Lemmon, R.E., 1981, An igneous origin for the Henderson Augen Gneiss, western North Carolina: Evidence from zircon morphology: Southeastern Geology col. 22, no.2, p.79-90.

Lemmon, R.E., and Dunn, D.E., 1973, Geologic Map and Mineral Resources Summary of the Bat Cave Quadrangle North Carolina: GM 202-NE and MRS 202-NE, p.4.

GRI Digital Data Credits

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

The information in this document was compiled from GRI source maps, and is intended to accompany the digital geologic-GIS map and other digital data for Carl Sandburg Home National Historic Site, North Carolina (CARL) developed by Stephanie O'Meara, Phil Reiker (NPS GRD) and Dave Green (Colorado State University) (see the GRI Digital Map and Source Map Citation section of this document for all sources used by the GRI in the completion of this document and related GRI digital geologic-GIS map).

GRI finalization by Stephanie O'Meara.

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