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UNITED STATES GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
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PAMPHLET

MINERAL RESOURCE POTENTIAL OF THE BLOOD MOUNTAIN ROADLESS AREA, UNION AND LUMPKIN COUNTIES, GEORGIA

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Studies Related to Wilderness

Under the provisions of the Wilderness Act (Public Law 88-577, September 3, 1964) and related acts, the U.S. Geological Survey and the U.S. Bureau of Mines have been conducting mineral surveys of wilderness and primitive areas. Areas officially designated as "wilderness," "wild," or "canoe" when the act was passed were incorporated into the National Wilderness Preservation System, and some of them are presently being studied. The act provided that areas under consideration for wilderness designation should be studied for suitability for incorporation into the Wilderness System. The mineral surveys constitute one aspect of the suitability studies. The act directs that the results of such surveys are to be made available to the public and be submitted to the President and the Congress. This report discusses the results of a mineral survey of the Blood Mountain Roadless Area (08-027) in the Chattahoochee National Forest, Union and Lumpkin Counties, Ga. The area was established as a further planning area during the Second Roadless Area Review and Evaluation (RARE II) by the U.S. Forest Service, January 1979.

MINERAL RESOURCE POTENTIAL SUMMARY STATEMENT

The Blood Mountain Roadless Area has a low potential for stone suitable for crushed rock and for low-quality sheet mica associated with pegmatites. Although the roadless area lies between two nearby zones of gold deposition, they do not appear to extend into it. Our data from a geochemical survey do not indicate concentrations of gold or other metals likely to be associated with hidden mineral deposits. Sedimentary rocks underlying the metamorphic rocks exposed at the surface have an unknown potential for hydrocarbons in the form of natural gas; no reasonable estimate of the potential can be made without deep test drilling.

INTRODUCTION

The Blood Mountain Roadless Area occupies approximately 10,275 acres in the Chattahoochee National Forest in northern Georgia. This Blue Ridge Mountain area, centered about 11 mi south of Blairsville, Ga., covers parts of two counties, Union on the north and Lumpkin on the south (fig. 1). The highest altitude is 4458 ft on Blood Mountain, and the lowest is 1795 ft in Dicks Creek in the southern part of the area. Tributaries of the north-flowing Nottely River, the northwest-flowing Toccoa River, and the south-flowing Chestatee River drain the roadless area. The terrain is heavily forested and has a rugged topography characterized by narrow valleys, sharp ridges, and steep slopes. The hill slopes commonly range from 20° to 30°, but may exceed 45°.

A few secondary roads, as well as some logging roads and U.S. Forest Service roads, provide limited access to the area. From the roadless area these roads lead either to U.S. Highway 19, which parallels the area's eastern boundary, or to Georgia Highways 60 and 180, near the area's western and northwestern borders. In addition, the Appalachian Trail gives limited access into some of roadless area's high ground.

Previous Investigations

Crickmay (1952) and Hurst (1973) described the rocks of the roadless area as part of the general descriptions of the geology of the Blue Ridge crystalline rocks. Hatcher (1971) reported on the geology of nearby Rabun and Habersham Counties, Ga., and he also reported on the tectonic history of northern Georgia (1974, 1976, 1978). The general geology of the area is shown on the Geologic Map of Georgia (Georgia Geological Survey, 1976). Butler (1972) and Dallmeyer (1975) studied various geochronological problems associated with metamorphism of the southern Appalachians. Aeromagnetic and aeroradioactivity surveys of the roadless area were done by Daniels (in press) and Higgins and Zietz (1975). A magnetotelluric survey was performed in the Chattahoochee National Forest by Geotronics Corp. in early 1982.

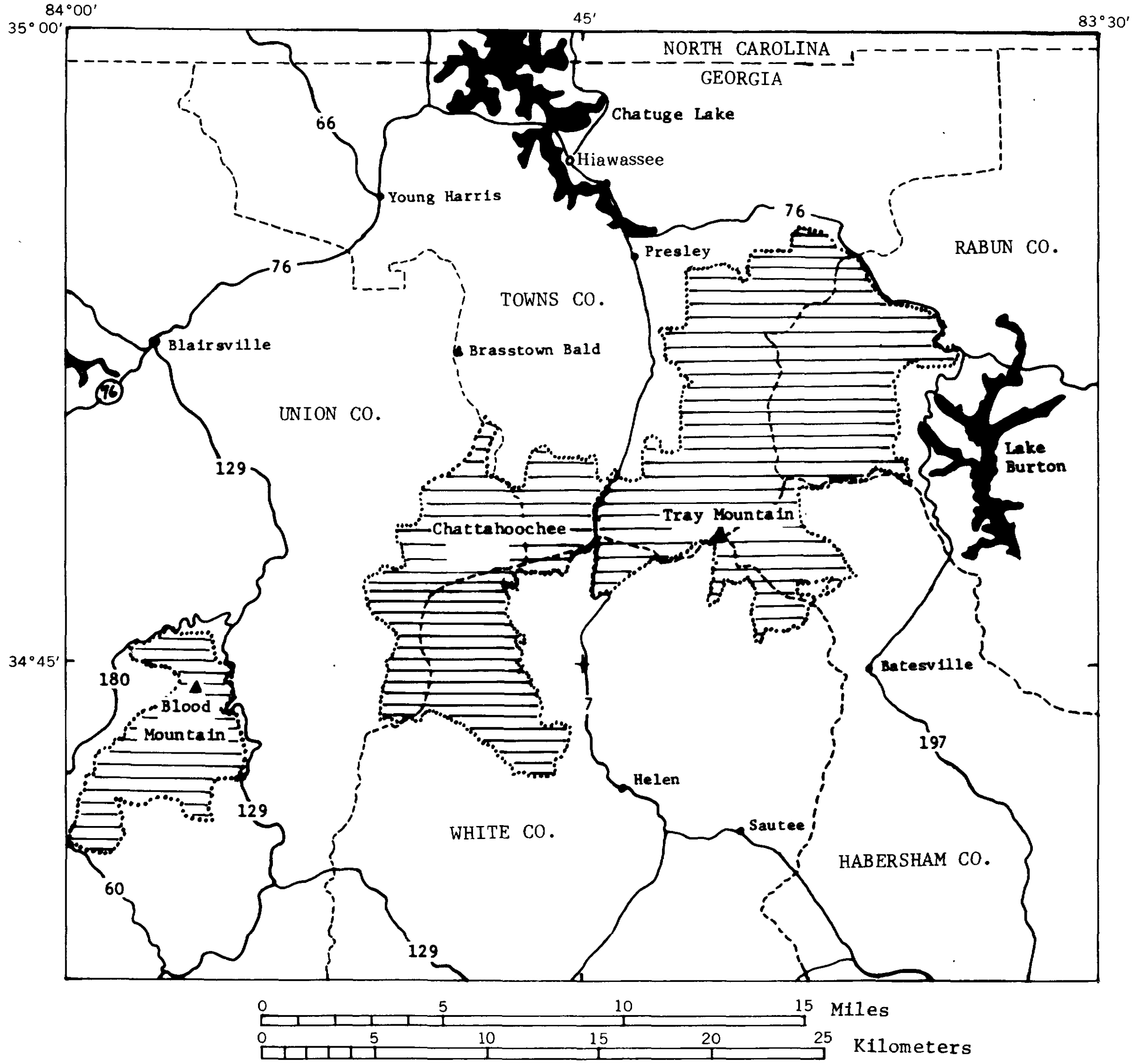


Figure 1.--Index map showing location of the Blood Mountain, Chattahoochee, and Tray Mountain Roadless Areas.

Mineral commodities in and near the roadless area are the subject of reports dating back 100 years. Works by Yeates and others (1896) and Jones (1909) are two of the more comprehensive reports on the gold belts of Georgia. Lesure and Shirley (1968) reported on mica and pegmatite districts of the Appalachian region. Detailed descriptions of mica deposits in Lumpkin and Union Counties are presented by Galpin (1915) and Furcron and Teague (1943). King (1894) and Hopkins (1914) describe the ultramafic deposits near the roadless area, and Misra and Keller (1978) present a regional perspective on ultramafic bodies in the Blue Ridge. Hartley (1973) describes the ultramafic rocks from the nearby Lake Chatuge area. Hurst (1973) discusses heavy minerals in saprolite deposits in northern Georgia, and Hurst and Otwell (1964) locate and describe minerals of White County. Mertie (1979) outlines monazite belts in the Appalachians and suggests an origin for these concentrations. Collective summaries of Georgia minerals are presented by McCallie (1926), Whitlatch and others (1962), and Cook (1978). Oil and gas potential in the Blue Ridge is discussed by Cook and others (1979) and Hatcher (1982).

Present Investigation

M. K. Armstrong and A. E. Sabin, assisted by F. W. Miller and T. M. Crandall, made field studies for the U.S. Bureau of Mines (USBM) in the fall of 1981 and collected 58 rock samples and 34 stream-sediment pan concentrates (Armstrong and Sabin, 1982). Semiquantitative spectrographic analyses for 42 elements were done on all rock samples and on 23 of the pan concentrates, and fire assay, atomic absorption, and fluorometric analyses were done on selected samples, at TSL Laboratories, Ltd., Spokane, Wash. Additional analyses were made of the pan-concentrate samples at the USBM, Reno Research Center, Reno, Nev.

A. E. Nelson (1983) prepared a reconnaissance geologic map for the U.S. Geological Survey (USGS), and collected 15 rock-chip samples for analysis. The geochemical survey was initiated in 1978 by W. L. Griffitts (USGS); under his direction 57 stream-sediment and 40 pan-concentrate samples were collected in the roadless area. The geochemical samples were analyzed at the USGS laboratories, Denver, Colo. (data listed in Siems and others, in press), and the data were analyzed by R. P. Koeppen and Nelson (in press) for indications of hidden mineral deposits in the area.

SURFACE- AND MINERAL-RIGHTS OWNERSHIP

In the Blood Mountain Roadless Area surface and mineral rights are privately owned on 30 acres; mineral rights are privately owned on about 1300 acres of Federally acquired land at the northern end of the area; and for the remainder, all rights are owned by the U.S. Government (fig. 2).

Oil and gas lease applications are pending for approximately the southern two-thirds of the roadless area. Ten-year leases on about 700 acres along the southwestern boundary of the area were issued to Amoco Production Co. in May 1982. At last report no drilling for oil and gas had taken place on the leased tracts. There are no known mines or prospects within the roadless area.

GEOLOGY

The Blue Ridge Mountains of northeastern Georgia and adjoining North Carolina consist of metamorphic rocks of two major lithotectonic units—the Great Smoky thrust sheet and the Hayesville thrust sheet (Nelson, 1983). The Hayesville sheet was emplaced by westward-directed tectonic transport over the Great Smoky sheet, along the Hayesville-Fries thrust fault (Rankin and others, 1972; and Hatcher, 1978), which is a major Appalachian feature (Williams, 1978). Although rocks of the Great Smoky sheet underlie the area at depth, only rocks of the Hayesville sheet are exposed in the roadless area.

In the Blood Mountain Roadless Area, rocks of the Hayesville sheet consist of biotite gneiss, granite gneiss, amphibolite, and metasandstone (fig. 3); discontinuous pods and veins of pegmatite are abundant and widely dispersed throughout the area. The rocks are compositionally layered, and migmatites of biotite gneiss and granite gneiss are common. As a result of interlayering, metamorphic differentiation, and transposition of rock units in the area, contacts between mapped units are gradational.

Rocks in the roadless area are multiply deformed, and fold interference patterns are commonly seen. While rock exposures showing three or more phases of folding have not been observed within the roadless area, nearby rock exposures in the Hayesville sheet show as many as four episodes of folding.

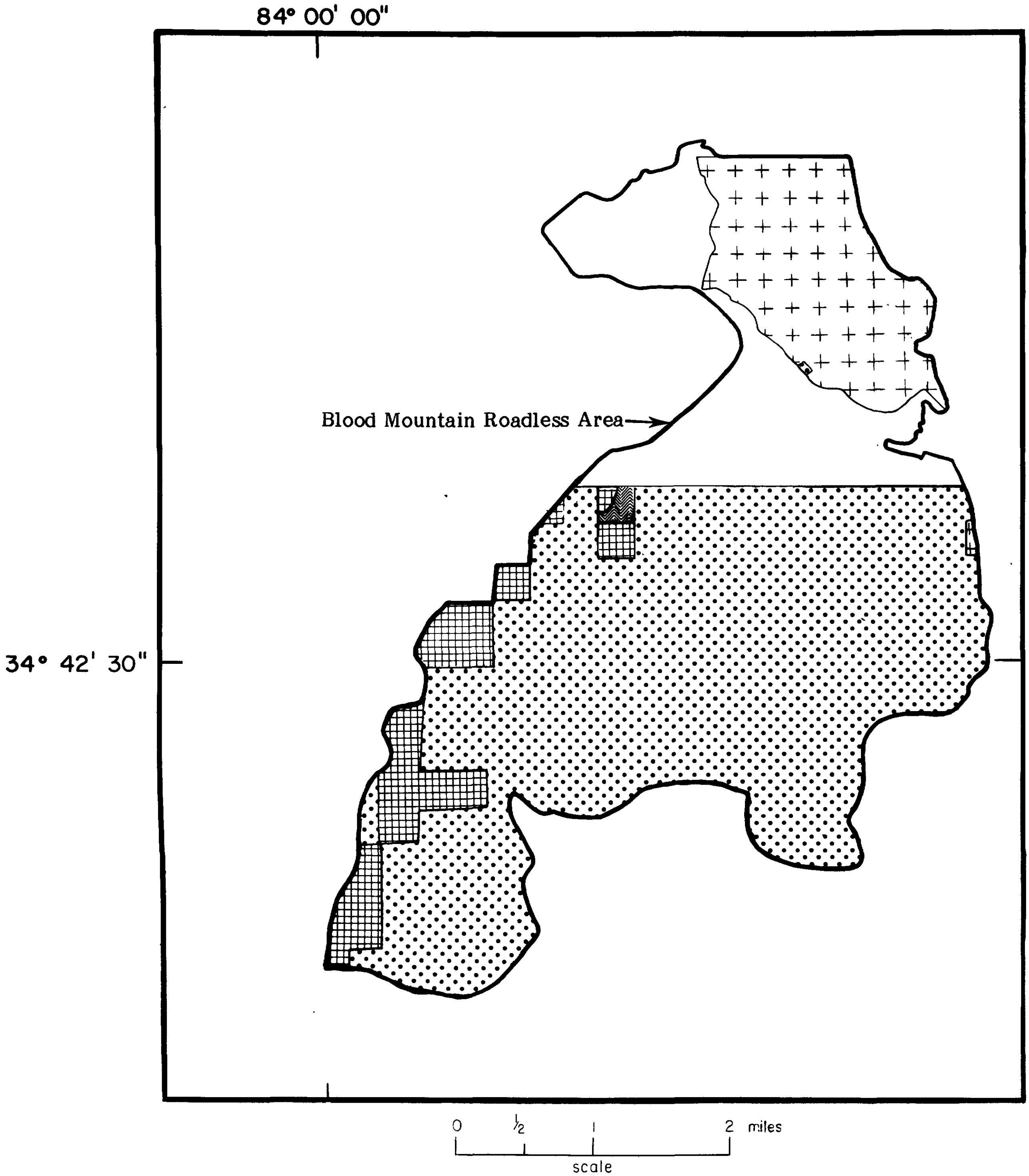
The highest grade regional metamorphism in the southern Appalachian Mountains is estimated to have occurred 450-480 m.y. ago, during the Taconic orogeny (Butler, 1972; Dallmeyer, 1975). All pelitic rocks in the roadless area are at sillimanite grade of regional Barrovian metamorphism. The migmatite, pegmatite, and felsic segregations probably formed during this time, near the thermal peak of metamorphism.

GEOCHEMICAL SURVEY

Samples of rock chips and stream sediments were evaluated in a reconnaissance geochemical survey to determine if any unidentified mineral deposits exist in the Blood Mountain Roadless Area (data listed in Siems and others, in press). The assessment is based on an analysis of the abundance, distribution, and geological association of 31 elements in the geochemical samples. No anomalous elemental enrichments are recognized in the geochemical data, and we conclude that there is little likelihood of hidden metallic mineral deposits in the roadless area (Koeppen and Nelson, in press).

ASSESSMENT OF MINERAL RESOURCE POTENTIAL

The Blood Mountain Roadless Area has low potential for nonmetallic mineral resources consisting of stone suitable for crushed rock, and low-quality sheet mica in pegmatites. Although the roadless area lies between two nearby zones of gold deposition, they do not appear to extend into it. No geochemical or mineralogical evidence was found to indicate the presence of metallic or other mineral deposits. The possibility exists for hydrocarbons at great depth under the area but present data are insufficient to evaluate the potential.



EXPLANATION

- Federally acquired land; no mineral rights outstanding or reserved
- Federally acquired land; mineral rights held privately in perpetuity
- Privately owned surface and mineral rights
- Oil and gas lease issued May 1, 1982
- Oil and gas lease application filed; no action as of June 1982

Figure 2.--Status of surface- and mineral-rights ownership and of oil and gas leasing, Blood Mountain Roadless Area.

Stone

Gneiss and schist that underlie much of the roadless area are suitable for use as crushed stone. However, no quarries are known in the area, possibly because many readily available and accessible sources exist closer to markets and transportation.

Mica

The Blood Mountain Roadless Area lies entirely within the North Georgia pegmatite district (Furcron and Teague, 1943; Lesure and Shirley, 1968). Pegmatites in the district were exploited for sheet mica at the turn of the century and again after World War I. The sheet mica is generally low quality and of poor grade, and its resource potential is considered to be low.

Gold

The Blood Mountain Roadless Area is located between two nearby zones of gold deposition, the Coosa Creek gold belt to the north and the Dahlonega gold belt to the south (fig. 4). Neither of the gold belts is known to extend into the roadless area, and no record is known of gold occurrence within it. Gold was not detected during our reconnaissance geochemical survey of bedrock, fine-grained stream sediments, and heavy-mineral pan concentrates, and we conclude that there is no evidence of a potential for gold in the roadless area.

Oil and Gas

Recent seismic studies (Cook and others, 1979; Harris and others, 1981) indicate the metamorphic rocks of the southern Blue Ridge Mountains are underlain at depth by younger unmetamorphosed, possibly hydrocarbon-bearing sedimentary rocks. Projection of seismic profiles into the Blood Mountain Roadless Area suggests these sediments may be as much as 5 mi below the surface, and consequently, any hydrocarbons in them would probably be stable only in the form of natural gas (Hatcher, 1982). Present information is insufficient to confirm the presence of gas in these rocks or to assess its potential, and until deep drilling is done in the roadless area no reasonable estimate can be made of the potential.

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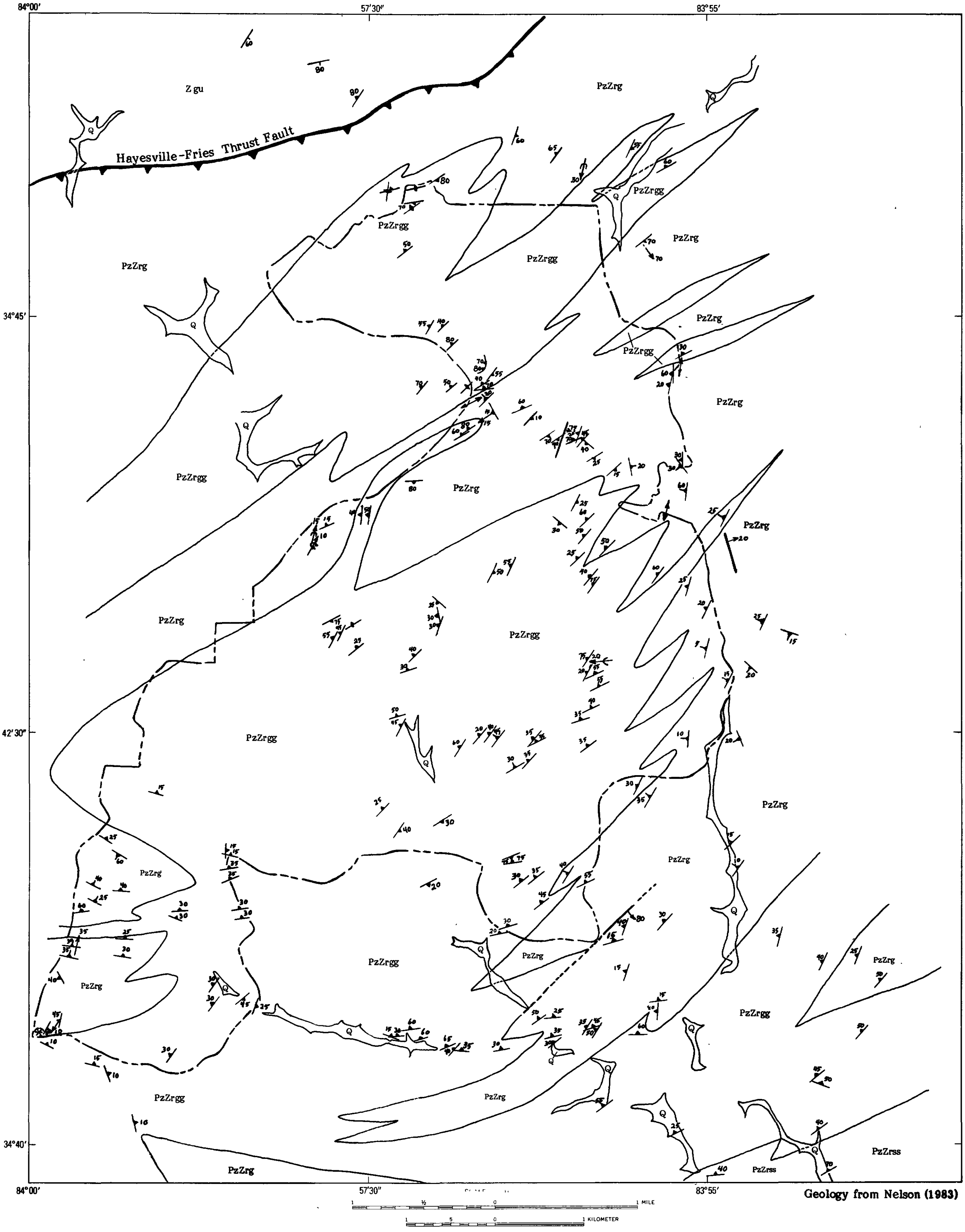


Figure 3.--Geologic map describing mineral resource potential for each geologic unit in the Blood Mountain Roadless Area.

EXPLANATION OF MAP UNITS

Q	QUATERNARY
Unconformity	
PzZrg, PzZrss, PzZrgg	EARLY PALEOZOIC AND(OR) LATE PROTEROZOIC
Break in sequence	
Zgu	LATE PROTEROZOIC

DESCRIPTION OF MAP UNITS

Q Quaternary deposits—Unconsolidated colluvium and alluvium. Coarse bouldery and cobbly gravels, sand, and clay

Unnamed early Paleozoic and(or) Late Proterozoic biotite gneiss, metasandstone, mica schist, amphibolite and hornblende gneiss, granite gneiss, and quartzite assemblage that is informally called the "Richard Russell group" (K. A. Gillon, written commun., 1979)

PzZrg Chiefly biotite gneiss variably interlayered with and gradational into metasandstone and granitic gneiss; alternates with thin-to-thick layers of biotite schist, muscovite-biotite schist, hornblende gneiss, and amphibolite, calc-silicate layers, and granite and dioritic gneiss. Biotite gneiss is irregularly layered to massive. Pegmatites and granite pods and veins are common. Locally suitable for use as crushed rock

PzZrss Mostly metasandstone variably interlayered with and gradational into biotite gneiss, interlayered with biotite schist, muscovite-biotite schist, hornblende gneiss, and amphibolite. Discontinuous pegmatite, quartz veins and pods are common. Locally suitable for use as crushed rock

PzZrgg Principally migmatite of biotite gneiss and granitic gneiss. Biotite and granitic gneisses mixed in all proportions from small granite veins and pods in biotite gneiss to massive granitic gneiss exposures containing only thin wisps of biotite gneiss. Commonly associated with pegmatite pods and veins, and quartzo-feldspathic lenses. Locally suitable for use as crushed rock

Zgu Undivided Late Proterozoic rocks of Great Smoky thrust sheet—Alternating beds of metasandstone, meta-conglomerate, and mica schist; includes some bodies of granite gneiss

Contact—Approximately located; dashed where concealed

Fault—Dashed where approximately located, showing dip

Thrust fault—Approximately located; sawteeth on upper plate. Dashed where concealed

Strike and dip of bedding

Strike and dip of layering and foliation

Strike and dip of foliation

- Inclined
- Vertical

Horizontal lineation

Bearing and plunge of lineation

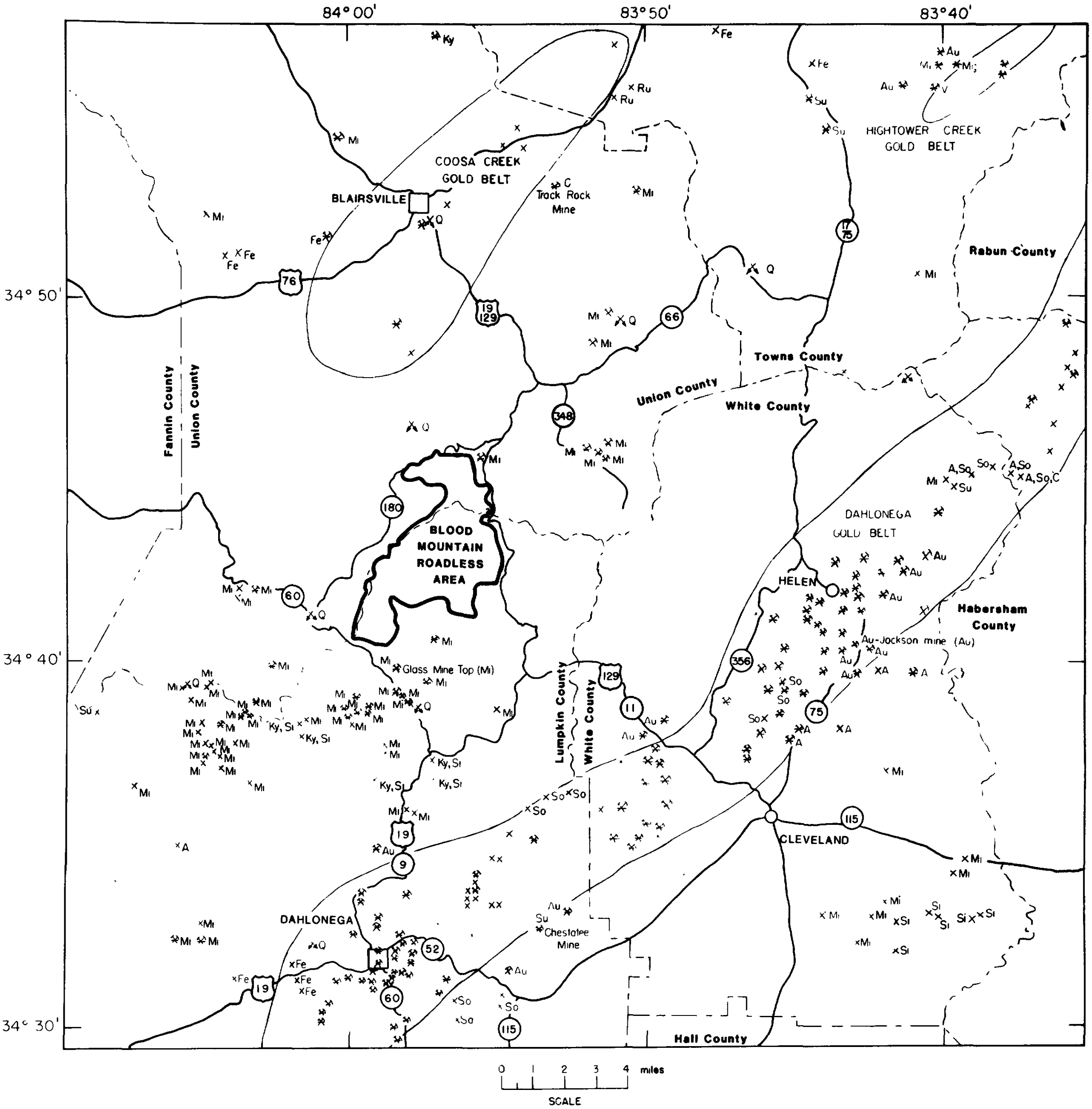
Minor synform showing plunge of axis

Minor antiform showing plunge of axis

Overturned antiform showing plunge of axis

Abandoned quarry

Approximate boundary of roadless area



EXPLANATION

Active mine	A-Asbestos
Abandoned mine	Au-Gold
Prospect	C-Corundum
Quarry	Fe-Iron ore
Roadless area boundary	Ky-Kyanite
County boundary	Mi-Mica
U.S. highway	Q-Road material quarry
State highway	Ru-Rutile
City	Si-Sillimanite
Town	So-Soapstone
Mining district boundary-all unlabelled mines or prospects within a district boundary yielded the mineral of that district	Su-Sulfides
	V-Vermiculite

Figure 4.--Mines and prospects in the region surrounding the Blood Mountain Roadless Area. Modified from Galpin (1915), Georgia Geological Survey (1951), Haseltine (1924), Hurst and Crawford (1964), Hurst and Otwell (1964), Jones (1909), Pardee and Park (1948), Shearer and Hull (1918), Teague (1956), and Yeates and others (1896).

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