DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF-1347-D
PAMPHLET ACCOMPANIES MAP

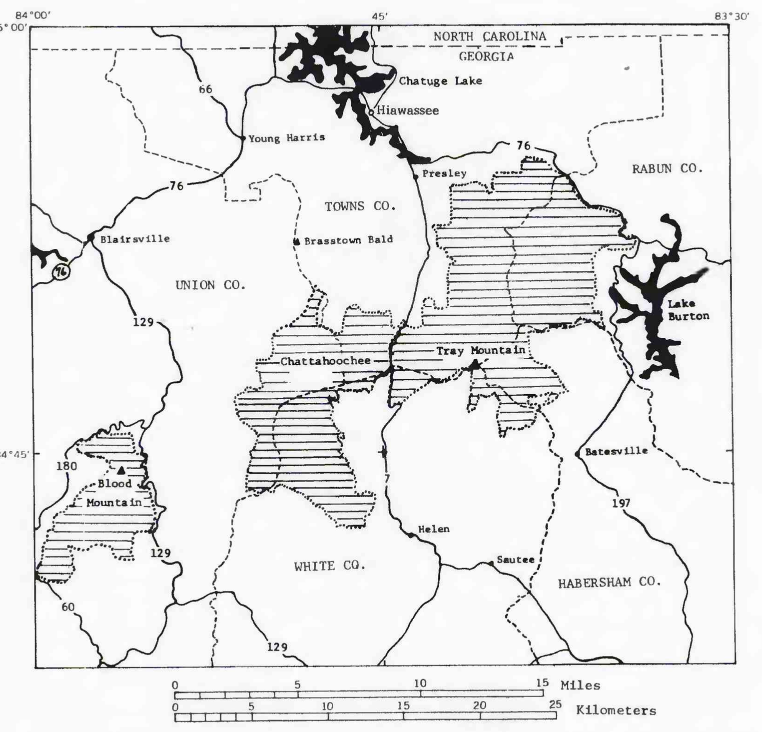

Figure 1.—Index map showing location of the Tray Mountain, Chattahoochee, and Blood Mountain Roadless Areas.

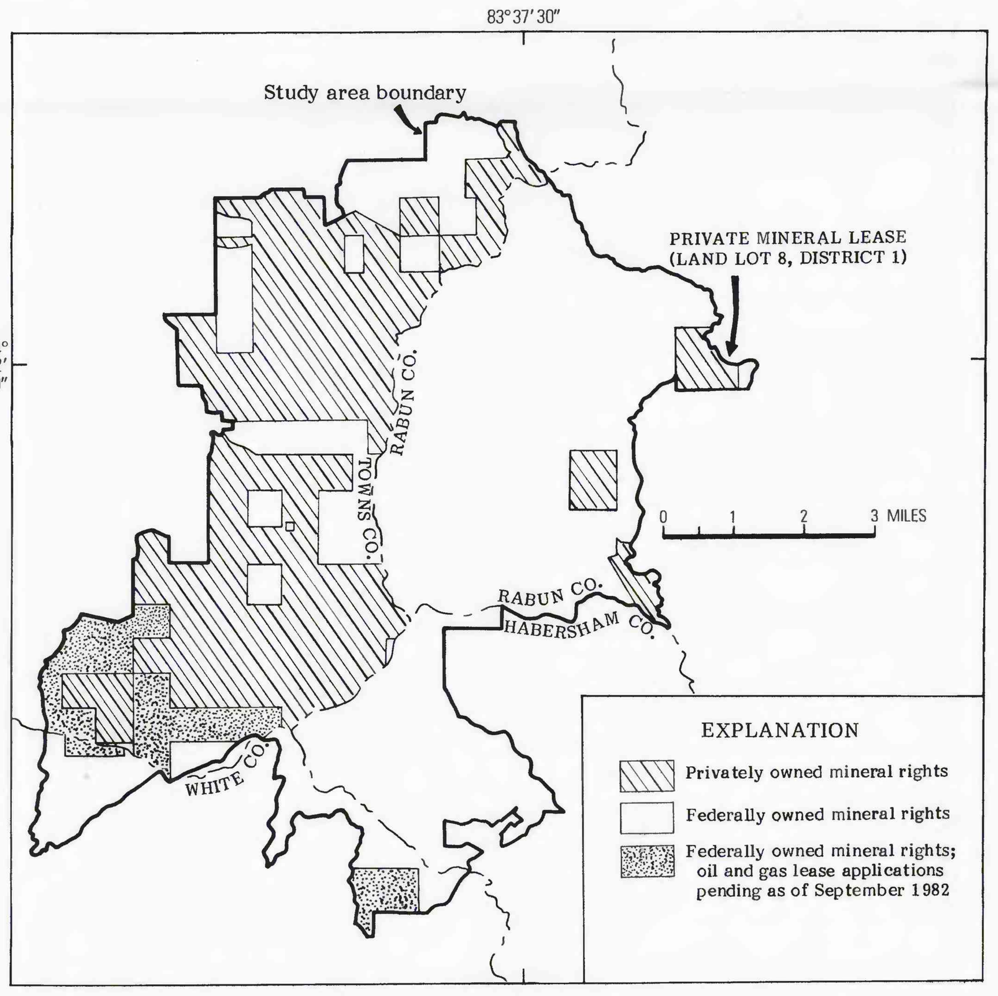

Figure 2.—Status of mineral rights ownership and leasing, Tray Mountain Roadless Area.

Geology modified from Nelson (1982)

Figure 3.—Geologic map showing mineral resource potential in the Tray Mountain Roadless Area, and mines and prospects in the roadless area and vicinity. See table 1 in pamphlet for description of mines and prospects.

EXPLANATION OF MAP UNITS

Q — Unconformity — QUATERNARY

JTRd — Break in sequence — TRIASSIC OR JURASSIC

rrg, rrsq, rrss, rrs, rrg, rrgg, rra — Break in sequence — PRECAMBRIAN(?) (correlable with Richard Russell Formation)

umc — Break in sequence — PRECAMBRIAN(?)

hu, ha — Break in sequence — PRECAMBRIAN

DESCRIPTION OF MAP UNITS

Q — Colluvium and alluvium

JTRd — Diabase dike

Hayesville thrust-sheet rocks

rrg — Biotite gneiss

rrss — Metasandstone

rrsq — Feldspathic metasandstone

rrs — Schist

rra — Amphibolite

rrgg — Granitic gneiss and biotite gneiss

umc — Ultramafic-mafic rocks

Helen belt rocks

hu — Undivided metasandstone, mica schist, metagraywacke, metasiltstone, and quartzite

ha — Amphibolite

Contact—Approximately located; dashed where concealed

Thrust fault—Approximately located; teeth on upper plate; dashed where concealed

Fault—Approximately located; dashed where concealed

Strike and dip of layering and foliation

30 Inclined

Vertical

Strike and dip of foliation

40 Inclined

Vertical

Strike and dip of cleavage

60 Inclined

Vertical

15 Bearing and plunge of lineation

15 Minor antiform—Showing plunge of axis

10 Minor synform—Showing plunge of axis

15 Series of minor folds—Showing plunge of axes

Approximate boundary of roadless area

Abandoned mine

Abandoned quarry or gravel pit

Prospect or mineral occurrence

Abandoned placer mine

STUDIES RELATED TO WILDERNESS

The Wilderness Act (Public Law 88-577, September 3, 1964) and related acts require the U.S. Geological Survey and the U.S. Bureau of Mines to survey certain areas on Federal lands to determine their mineral resource potential. Results must be made available to the public and be submitted to the President and the Congress. This report presents the results of a mineral resource survey of the Tray Mountain Roadless Area (08-030) in the Chattahoochee National Forest, northern Georgia. The area was classified as a further planning area during the Second Roadless Area Review and Evaluation (RARE II) by the U.S. Forest Service, January 1979.

SUMMARY

A mineral survey made in 1981 shows that the northeastern part of the Tray Mountain Roadless Area contains one area having a moderate to high mineral resource potential for olivine, and two nearby areas having low mineral resource potential for olivine. Although mica, gold, and asbestos have been mined nearby, the roadless area has no known potential for these commodities. Rocks underlying the roadless area are suitable for crushed rock or aggregate, but there are other sources for these materials closer to markets. There is a possibility for the occurrence of hydrocarbon resources underlying the area at great depth, but no hydrocarbon potential was identified.

INTRODUCTION

The Tray Mountain Roadless Area occupies approximately 36,000 acres of the Chattahoochee National Forest within Rabun, Habersham, Towns, and White Counties, northern Georgia (fig. 1). The area is in the Blue Ridge Mountains about 14 mi west of Clayton, Ga. A few secondary roads as well as some logging roads and U.S. Forest Service roads provide limited access to the study area. They lead either to U.S. Highway 76, which parallels a part of the northeastern boundary, or to Georgia Highway 17, which is near the western border. In addition, the Appalachian Trail traverses part of the area's high ground.

SURFACE- AND MINERAL-RIGHTS OWNERSHIP

All surface rights in the roadless area are owned by the Federal Government. Mineral rights for 13,438 acres are in private ownership (fig. 2). The remaining mineral rights are Federally owned.

An olivine development interest holds 379 acres along the northeastern boundary of the roadless area under a private mining lease that has renewal options through July 15, 1985 (fig. 2). Two oil- and gas-lease applications totalling 2,357 acres were filed on July 30, 1979, and were awaiting action as of September 1982 by the U.S. Bureau of Land Management.

GEOLOGY

The Tray Mountain Roadless Area is underlain by metamorphic rocks from two lithotectonic units, the Hayesville thrust sheet and the Helen belt (Nelson, 1982). A major northeast-trending fault, the Shope Fork fault (Hatcher, 1974), separates the Hayesville sheet on the northwest from the Helen belt on the southeast. Most of the roadless area is underlain by the rocks of the Hayesville sheet.

Helen belt rocks

Rocks underlying parts of the southeast side of the Tray Mountain Roadless Area form parts of the Helen belt. This belt averages 3 mi in width and divides the Hayesville thrust sheet into a western and an eastern part. Rock assemblages in the Helen belt consist of metagraywacke that is locally sulfidic, metasandstone that is locally conglomeratic, metaquartzite, mica schist, graphite schist, amphibolite, and hornblende gneiss.

Hayesville thrust sheet rocks

Several major metamorphic rock assemblages make up the Hayesville thrust sheet. These include the Tallulah Falls Formation (Hatcher, 1971), which makes up most of the eastern part of the Hayesville thrust sheet, and the Richard Russell Formation of Gillon (1982), which makes up most of the western part. The Richard Russell Formation is probably equivalent to the Tallulah Falls Formation (Hatcher, 1971); both formations are probably Late Precambrian and (or) early Paleozoic in age. In addition, there are some 1,100-m.-y.-old basement rocks in the thrust sheet.

Most of the Tray Mountain Roadless Area is underlain by rocks that correlate with the Richard Russell Formation. This rock assemblage includes biotite gneiss, biotite schist, fine-grained biotite-feldspar gneiss, metasandstone, amphibolite, hornblende gneiss, granitic gneiss, and discontinuous pegmatite veins and pods of various sizes.

Ultramafic-mafic rocks

Complexes containing a wide variety of ultramafic-mafic rocks are associated with the Hayesville thrust sheet as small discontinuous pods, and as large mappable units (Hadley and Nelson, 1971). These rocks are chiefly serpentinite, dunite, pyroxenite, gabbro, and amphibolite (Hartley, 1973). Locally some of these rocks are magnetite rich. In the northeastern part of the roadless area, three areas are underlain by ultramafic-mafic rocks.

Diabase

A small unmetamorphosed diabase dike of probable Triassic or Jurassic age intrudes rocks in both the Helen belt and the Hayesville thrust sheet. It is the youngest rock in the roadless area.

GEOCHEMICAL SURVEY

Our reconnaissance geochemical survey of the Tray Mountain Roadless Area found no evidence of mineral deposits or of significant mineralization. Sources of local concentrations of trace elements are not known. The geochemical assessment is based upon analysis of 87 samples of stream sediment, 78 pan-concentrate samples, and 23 rocks collected during a U.S. Geological Survey (USGS) study of three adjacent roadless areas in northeastern Georgia (data listed in Siems and others, in press). One area along the northeastern boundary of the Tray Mountain Roadless Area has enriched concentrations of copper, zinc, chromium, and nickel in fine-grained sediment samples from drainage basins containing ultramafic rocks. These trace-element abundances, however, are normal and are not related to any significant mineral deposit. Furthermore, pan concentrates from this northern area were notably lacking in any trace-element enrichments.

Pan-concentrate samples from a group of streams in the southwestern corner of the roadless area have modest trace-element enrichments; one sample contains 10 parts per million (ppm) silver, another contains 200 ppm tin, and four others collected between the first two contain 500 to 1,000 ppm zinc. These trace-element concentrations are anomalous, but their source and significance are not known. No geological association is recognized for the anomalous samples, and it appears unlikely that they represent significant mineralization in the near-surface rocks.

Five pan-concentrate samples from the northeastern edge of the roadless area collected and analyzed by the U.S. Bureau of Mines (USBM) contain gold abundances ranging from 1 to 10 ppm. However, little gravel is present in these streams. No gold was detected in any other samples collected for geochemical studies.

ASSESSMENT OF MINERAL RESOURCE POTENTIAL

Olivine and rock suitable for construction materials are the only identified mineral resources in the Tray Mountain Roadless Area. Although mica, gold, and asbestos have been mined nearby, the roadless area has no known potential for these commodities. There is a possibility for the occurrence of hydrocarbon resources in deeply buried rocks under the roadless area, but no potential was identified.

Olivine

A mafic-ultramafic rock body in the Helen belt in the northeastern part of the roadless area (locality 11, fig. 3; also see table 1 in pamphlet) contains olivine and associated serpentine, nickel, cobalt, and chromite. This body, which extends beyond the roadless area boundary, is classed as having a moderate to high mineral resource potential in the study area. It contains an estimated 5.0 million short tons of demonstrated and marginal olivine reserves in the roadless area. The nickel content in the dunite is below minable concentrations.

Two other mafic-ultramafic bodies in the Hayesville thrust sheet within the roadless area are classed as having a low mineral resource potential, because olivine has been mined from nearby mafic-ultramafic bodies.

East and northeast of the roadless area, in the Hayesville thrust sheet, some mafic-ultramafic bodies have been mined for asbestos, olivine, and chromite. Mafic-ultramafic bodies commonly are present in the Hayesville sheet; they vary widely in size, ranging from a few feet in width and several tens of feet long to some that cover several square miles.

Gold

Although the Tray Mountain Roadless Area has no known potential for gold, it is adjacent to two zones of gold deposition, the Hightower Creek gold belt to the north, and the Dahlonega gold belt (Jones, 1909) to the southeast. The Hightower Creek belt (Furcron and others, 1938), which encompasses the mines along Hightower and Hill Creeks (localities 3-6, fig. 3 in pamphlet), is underlain by rocks of the Hayesville thrust sheet.

The Dahlonega gold belt (Jones, 1909, map) forms part of the Helen belt and is southeast of the roadless area. Mines and prospects reported to be near but outside the southeastern boundary of the roadless area (localities 14-26, 36 and 37, fig. 3) are in the Helen belt.

A small group of prospect pits is on a hillside just outside the roadless area boundary (locality 25, fig. 3), where small quartz veins occur in biotite schist. Hurst and Crawford (1964, p. 84, 86) reported finding gold in a placer (locality 26) downstream from these pits, and in a previously worked placer about 2,000 ft upstream (locality 24). These placer deposits occur within the Helen belt.

Other metallic resources

No other metallic mineral resources are known in the Tray Mountain Roadless Area. Along the northeastern boundary, concentrations of copper, zinc, chromium, and nickel occur in stream-sediment and rock samples, but these metallic concentrations are not associated with any mineral deposit. Instead, they represent normal background levels for the ultramafic rocks present in that part of the roadless area.

Mica

Small pegmatites are widespread in the roadless area and occur as discontinuous veins and irregular small pods; large pegmatites have not been observed. Prospecting for mica has occurred in pegmatites near the roadless area, and two mica prospects have been reported to be within the roadless area by Hurst and Otwell (1964, p. 64) and the Georgia Geological Survey (1951). These prospects were not found during the current investigations but are approximately located as sites 48 and 49 in figure 3. Other mica prospects are in McClure and Raper Creek drainages (localities 35 and 44, fig. 3). Prospecting probably has not been undertaken since about 1950, and no production has been reported.

Construction materials

Much of the rock underlying the roadless area is suitable for use as crushed rock or aggregate, and several small quarries for local supplies of these materials are present in and near the roadless area. However, since good sources for aggregate and crushed stone exist closer to markets, there is no immediate use for rock in the roadless area for construction materials.

Oil and gas

Seismic studies (Cook and others, 1979; and Harris and others, 1981) indicate that the metamorphic rocks forming the Blue Ridge Mountains in North Carolina and Georgia have been emplaced over a thick section (3,000-15,000 ft) of younger sedimentary rocks. Sedimentary rocks that contain hydrocarbons in the Tennessee Valley may form a part of the sedimentary rocks that underlie the regional thrust sheets in the roadless area. The depths at which these rocks occur is estimated to be as much as 5 mi below the surface. The possibility of hydrocarbons in rocks at such depths is low, and if they are present, they would probably be in the form of natural gas. However, deep drilling is necessary to prove the presence of gas in these rocks before reasonable estimates of the gas potential can be made.

REFERENCES CITED

Cook, F. A., Albaugh, D. S., Brown, L. D., Kaufman, Sidney, Oliver, J. E., and Hatcher, R. D., Jr., 1979, Thin-skinned tectonics in the crystalline southern Appalachians; COCORP seismic-reflection profiling of the Blue Ridge and Piedmont: Geology, v. 7, no. 12, p. 563-567.

Furcron, A. S., Munyan, A. C., Peyton, Garland, and Smith, R. W., 1938, Mineral resources of Georgia: Georgia Geological Survey, 104 p.

Georgia Geological Survey, 1951, Mineral resources of Union, Towns, Lumpkin, and White Counties, Georgia: Georgia Department of Mines, Mining, and Geology Map RM-4, scale 1:63,360.

Gillon, K. A., 1982, Stratigraphic, structural, and metamorphic geology of portions of the Cowrock and Helen, Georgia 7 1/2-minute quadrangles: Unpublished M.S. thesis, University of Georgia, Athens, Ga., 236 p.

Hadley, J. B., and Nelson, A. E., 1971, Geologic map of the Knoxville quadrangle, North Carolina, Tennessee, and South Carolina: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-654, scale 1:250,000.

Harris, L. D., Harris, A. G., de Witt, Wallace, Jr., and Bayer, K. C., 1981, Evaluation of southern eastern overthrust belt beneath the Blue Ridge-Piedmont thrust: American Association of Petroleum Geologists Bulletin v. 65, no. 12, p. 2497-2505.

Hartley, M. E., III, 1973, Ultramafic and related rocks in the vicinity of Lake Chatuge: Georgia Geological Survey Bulletin 85, 61 p.

Hatcher, R. D., Jr., 1971, The geology of Rabun and Habersham Counties, Georgia: Georgia Geological Survey Bulletin 83, 48 p.

____1974, An introduction to the Blue Ridge tectonic history of northeast Georgia: Georgia Geological Survey Guidebook 13-A, 60 p.

Hurst, V. J., and Crawford, T. J., 1964, Exploration of mineral deposits in Habersham County, Georgia: Washington, D.C., U.S. Department of Commerce, Area Redevelopment Administration, 180 p.

Hurst, V. J., and Otwell, W. L., 1964, Exploration of mineral deposits in White County, Georgia: Washington, D.C., U.S. Department of Commerce, Area Redevelopment Administration, 166 p.

Jones, S. P., 1909, Second report on the gold deposits of Georgia: Georgia Geological Survey Bulletin 19, 283 p.

Nelson, A. E., 1982, Geologic map of the Tray Mountain Roadless Area, northern Georgia: U.S. Geological Survey Miscellaneous Field Studies Map MF-1347-A, scale 1:30,000.

Siems, D. F., Forn, C. L., Koeppen, R. P., and Nelson, A. E., in press, Geochemical data and descriptions of samples from Tray Mountain, Blood Mountain, and Chattahoochee Roadless Areas, northeast Georgia: U.S Geological Survey Open-file Report, 50 p.

MINERAL RESOURCE POTENTIAL MAP OF THE TRAY MOUNTAIN ROADLESS AREA, NORTHERN GEORGIA

By
Arthur E. Nelson and Robert P. Koeppen, U.S. Geological Survey
and
Mark L. Chatman, U.S. Bureau of Mines

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