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PAMPHLET

MINERAL RESOURCE POTENTIAL OF THE TRAY MOUNTAIN ROADLESS AREA, NORTHERN 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 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.

MINERAL RESOURCE POTENTIAL SUMMARY STATEMENT

A mineral survey made in 1981 shows that the northeastern part of the Tray Mountain Roadless Area contains one area having moderate to high mineral resource potential for olivine, and two nearby areas having a 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. Altitudes range from a high of 4,433 ft on Tray Mountain, to a low of 1,801 ft in McClure Creek in the southern part of the area. The roadless area is heavily forested and has rugged topography characterized by narrow valleys, sharp ridges, and steep slopes. Commonly the hill slopes range from 20° to 30°, but in places they exceed 45°. Tributaries of the north-flowing Hiwassee, the southeast-flowing Tallulah, and the southwest-flowing Chattahoochee Rivers drain the Tray Mountain Roadless Area.

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.

Previous investigations

Descriptions of mines and prospects in the study area and vicinity are in King (1894), Yeates and others (1896), and Jones (1909), Hopkins (1914), and Hunter (1941). Mineral resource surveys that cover parts of the study area include Steidtmann (1913), Teas (1921), Hurst and Crawford (1964), and Hurst and Otwell (1964). County mineral resource maps (Teague and Furcron, 1948; Georgia Geological Survey, 1951) and three statewide mineral resource summaries (McCallie, 1926; Whitlatch, 1962; Cook, 1978) contain references to mineralized sites in the study area and adjacent lands. Several reports contain economic assessments of northern Georgia's gold resources: Becker (1895), Crickmay (1933), Anderson (1934), Wilson (1934), Furcron (1960), and Bryan (1961).

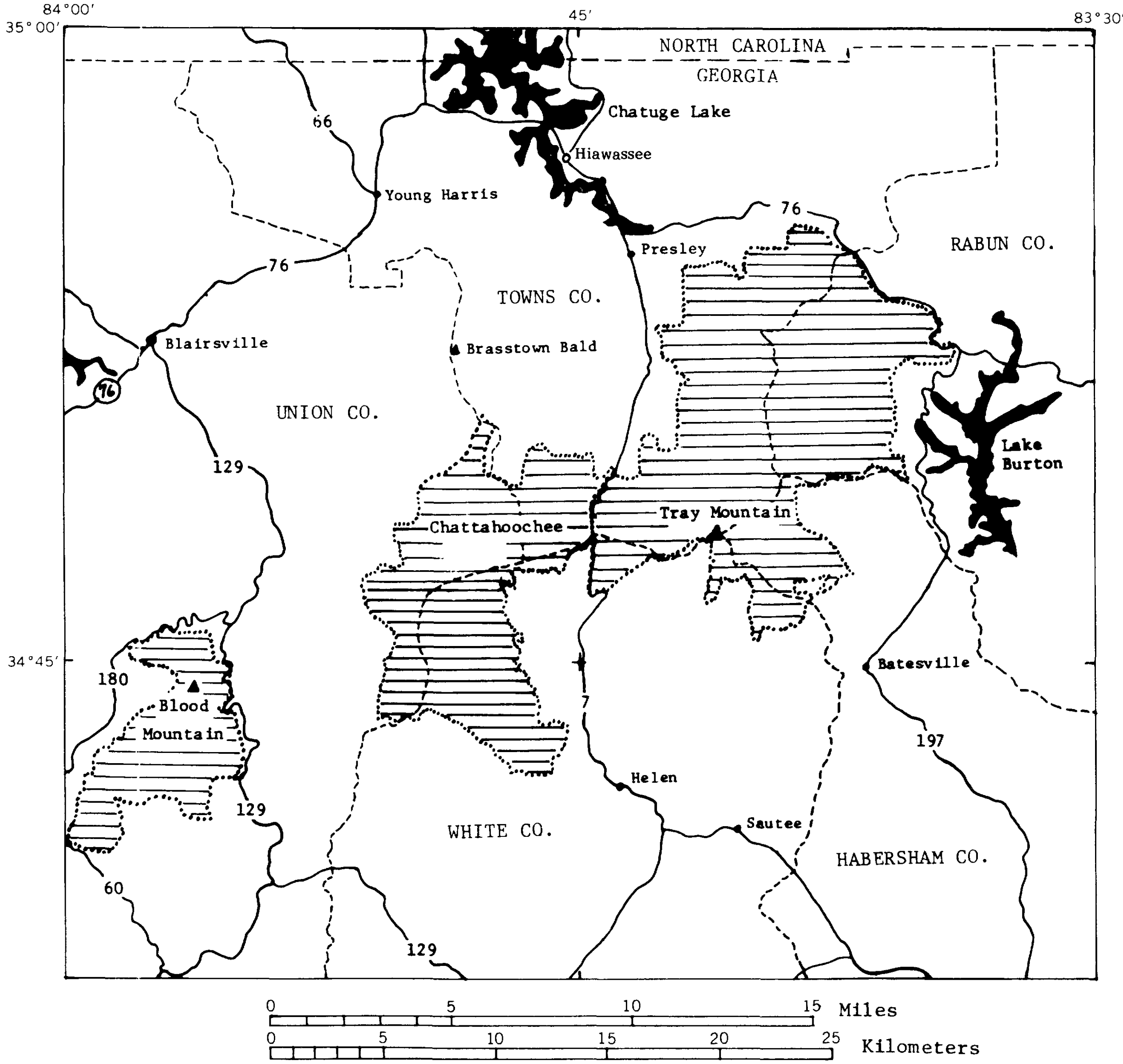

Figure 1.—Index map showing location of the Tray Mountain, Chattahoochee, and Blood Mountain Roadless Areas.

Crickmay (1952) and Hurst (1973) described the rocks of the area as part of their general descriptions of the geology of the Blue Ridge crystalline rocks. Hartley (1973) reported on the ultramafic rocks northwest and north of the Tray Mountain Roadless Area. Hatcher (1971) described the geology of Rabun and Habersham Counties, and also reported on the tectonic history of northern Georgia (1974). The general geology of the area is shown on the Geologic Map of Georgia (Georgia Geological Survey, 1976).

Present investigation

The mineral investigation of the Tray Mountain Roadless Area included mapping and sampling of mine sites and reconnaissance sampling of bedrock, mineral occurrences, and stream gravels. Fieldwork was done in October 1981 by M. L. Chatman, T. J. Wawro, and J. D. Garry, all of the U.S. Bureau of Mines (USBM).

Sampling included the collection of 49 bedrock and mineral samples, 52 alluvial concentrates of steam gravels, and 24 outcrop samples from the Lake Burton olivine deposit. Nineteen splits were collected from two rock cores of the Lake Burton deposit, which were loaned to the USBM by private individuals.

Samples were analyzed by TSL Laboratories, Ltd., Spokane, Wash., and by the USBM, Reno Research Center, Reno, Nev. Special petrographic work was done at Reno and at the USBM, Avondale Research Center, Avondale, Md.

During the 1979 and 1980 field seasons, A. E. Nelson, assisted by J. S. Schindler, mapped and sampled the Tray Mountain Roadless Area in reconnaissance; a report on the geology of the roadless area was published by Nelson (1982). During 1981, stream-sediment samples were collected by University of Georgia students under the direction of Robert Carpenter. Complete analysis of these samples is available in Koeppen and Nelson (in press).

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 by the U.S. Bureau of Land Management as of September 1982.

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, which include interlayered biotite gneiss and schist, fine-grained biotite-feldspar gneiss, metasandstone, amphibolite, hornblende gneiss, granitic gneiss, and numerous variably sized veins and pods of pegmatite. Only a small part of the study area is underlain by the rocks of the Helen belt; they include an interlayered succession of locally sulfidic metagraywacke, metasandstone and metaquartzite, mica schist, graphite schist, amphibolite, and hornblende gneiss. Several mafic-ultramafic bodies have been emplaced along faults into rock of both the Hayesville sheet and the Helen belt. These bodies contain serpentinite, dunite, pyroxenite, gabbro, and amphibolite; locally some of these rocks are magnetite rich. The youngest rock in the roadless area is an unmetamorphosed diabase dike of probable Triassic or Jurassic age that intrudes both Helen belt and Hayesville sheet rocks.

GEOCHEMICAL SURVEY

Our reconnaissance geochemical survey of the Tray Mountain Roadless Area found no clear 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 32 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 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 1000 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 hydrocarbon potential was identified.

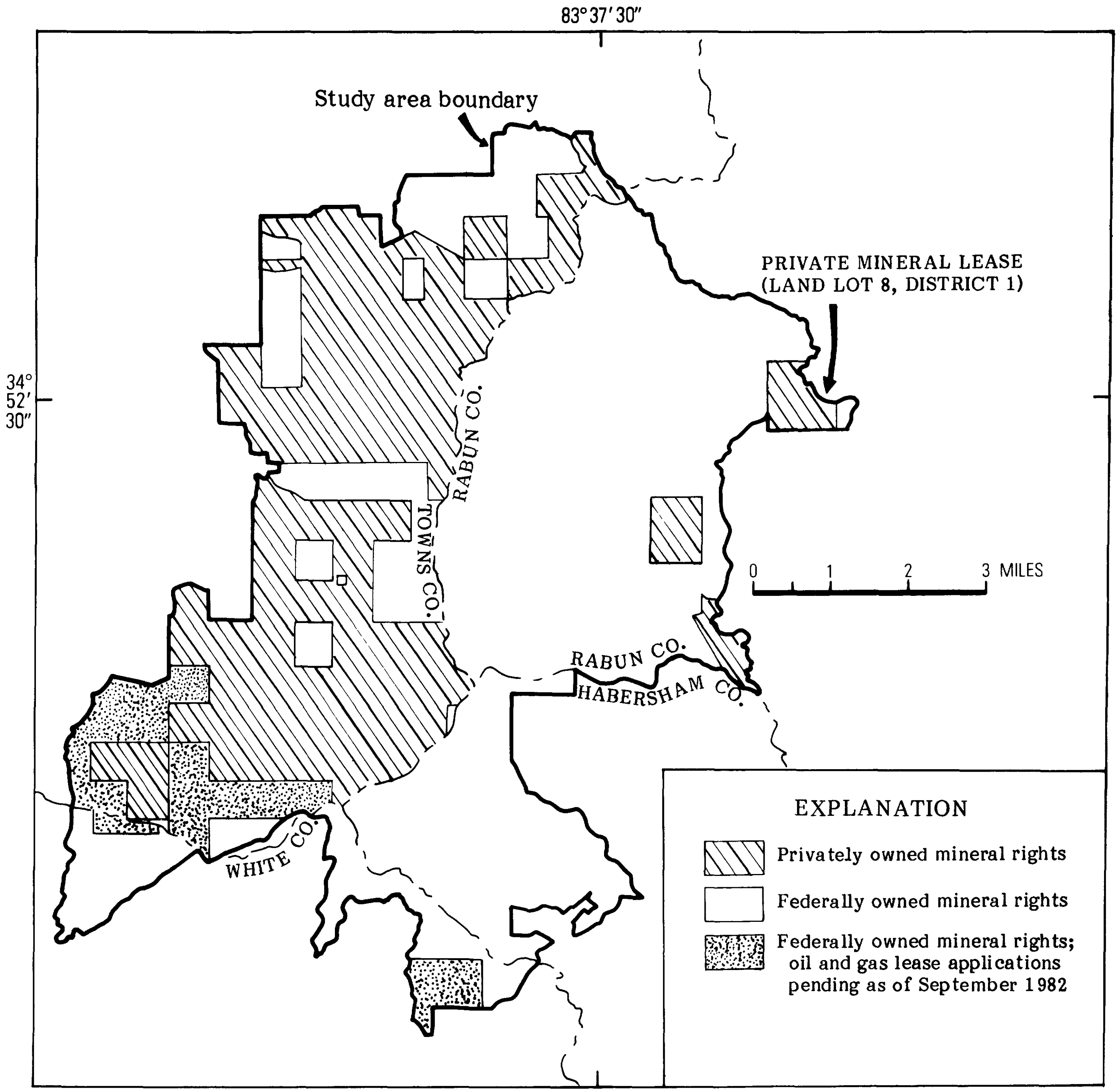

Figure 2.--Status of mineral rights ownership and leasing, Tray Mountain Roadless Area.

Olivine

A mafic-ultramafic rock body in the Helen belt in the northeastern part of the roadless area (locality 11, fig. 3) 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 olivine reserves in the roadless area. These reserves are in the demonstrated and marginal categories under the system outlined by the U.S. Bureau of Mines and the U.S. Geological Survey (1980). The nickel content in the dunite is below minable concentrations.

Two other mafic-ultramafic bodies are in the Hayesville thrust sheet within the roadless area, but olivine has not been identified in either of them. Nevertheless they are classed as having a low mineral resource potential, because olivine has been mined from nearby mafic-ultramafic bodies. If olivine is present, it will have to be proved by exploratory work.

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 High Creeks (localities 3-6, fig. 3), is underlain by rocks of the Hayesville thrust sheet. No significant production was reported from these mines, and the last reported prospecting there was done in 1909, although it is likely that some sites were examined again in the 1930's, when interest in gold mining increased.

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. Included among them is the Smith mine (locality 15), probably the most extensively worked placer deposit near the roadless area. Although the site is primarily a placer mine, the initial work began around 1845 to develop a rich gold-bearing quartz vein found in saprolite. Quartz veins, which were up to 4 ft thick, were mined by both hydraulic and underground methods (Becker, 1895, p. 300). Nitze (1896, p. 719) reported some activity at the mine during 1896. No production figures are known. Burling (1941) unsuccessfully attempted to find the source of some of the Smith mine gold in quartz veins exposed along Gold Mine Branch (Dickenson Branch), a tributary to Dicks Creek. An alluvial concentrate sample collected in Dickenson Branch for the current study contains 3 ppm gold. Another alluvial concentrate, collected at the Smith property, contains 10.3 ppm gold.

A small group of prospect pits is on a hillside just outside the study area boundary (locality 25, fig. 3), where small quartz veins occur in biotite schist. These pits probably represent an attempt to locate the source of the gold in the stream gravels below. 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.

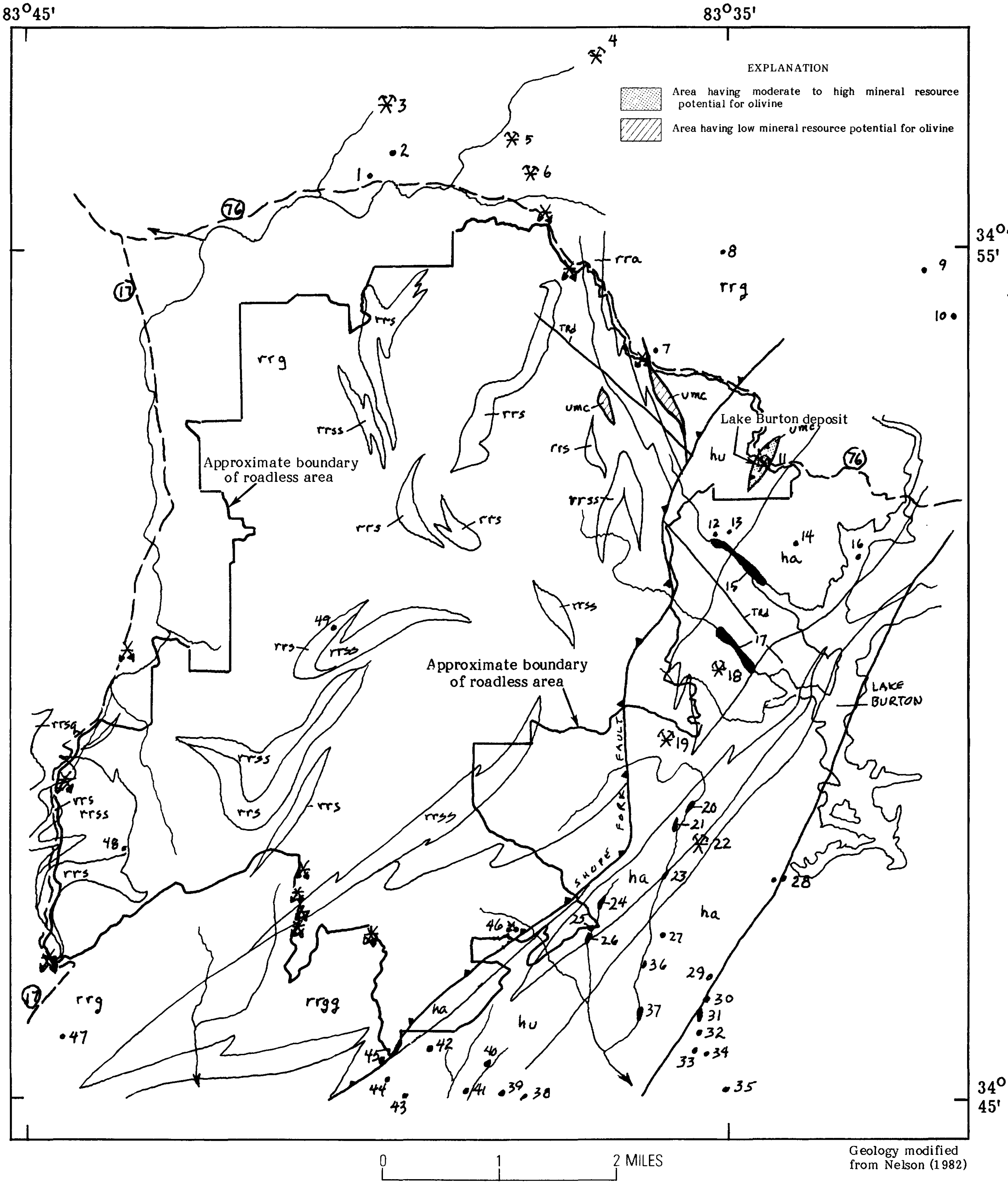

Figure 3.--Geologic map showing mineral resource potential in the Tray Mountain Roadless Area, and mines and prospects in the roadless area and vicinity. See table 1 for description of mines and prospects.

DESCRIPTION OF MAP UNITS

Q	Colluvium and alluvium
J$\bar{R}$d	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
	Thrust fault—Approximately located; teeth on upper plate
	Fault—Approximately located
76	Highway
	Stream
	Abandoned mine
	Abandoned quarry or gravel pit
	Prospect or mineral occurrence
	Abandoned placer mine

Table 1.--*Mines, prospects, and mineral sites in the Tray Mountain Roadless Area and vicinity. Numbers are keyed to localities shown in figure 3*

1. Jethro Burrell prospect (vermiculite) (Prindle, 1935, p. 44), approximate location.

2. Barnett Denton prospect (chromite) (Hansard and others, 1934).

3. Wills Creek mine (gold; placer), Towns Co., lot 102, dist. 18 (Yeates and others, 1896, p. 108-109), approximate location.

4. Smith mine (gold; placer), Towns Co., lot 94, dist. 18, described as "one and half miles northeast of the Newton property" (Yeates and others, 1896, p. 112), approximate location.

5. Newton mine (gold; placer), Towns Co., lot 131, dist. 18 (Yeates and others, 1896, p. 108-109).

6. Chastain Branch mine (gold; placer), Towns Co., lot 136, dist. 18 (Yeates and others, 1896, p. 111-112).

7. Kaolin in a pegmatite (Teague and Furcron, 1948), approximate location.

8. Tom Coward prospect (pyrite), approximate location.

9. Prospect adit (gold?) in saprolite.

10. Prospect adit (gold?) in saprolite.

11. H. V. M. Miller mine (asbestos) (Hopkins, 1914, p. 146), and Lake Burton deposit (olivine) (Hunter, 1941, p. 112).

12. J. T. McNeary prospect (talc), Rabun Co., lot 110, dist. 5 (Yoho, 1941a).

13. Bynum and Wheeler prospect (talc), Rabun Co., lot 103, dist. 5 (Yoho, 1941b).

14. Powell prospect (gold), Rabun Co., lot 102, dist. 5 (Pardee and Park, 1948, p. 127), approximate location.

15. Smith mine (gold; placer, and veins in saprolite), Rabun Co., lot 103, dist. 5 (Jones, 1909, p. 232; Becker, 1895, p. 300).

16. Blalock property (gold; placer), Rabun Co., "along Tallulah River", "near Burton P.O." (Jones, 1909, p. 233; Yeates and others, 1896, p. 98), approximate location.

17. Stonesypher mine (gold; placer, and vein), Rabun Co., lot 105, dist. 5 (Jones, 1909, p. 231; Yeates and others, 1896, p. 95); Rocky Bottom Smith placer was nearby on Moccasin Creek (Jones, 1909, p. 231).

18. Reaves property (gold; lode mining), Rabun Co., lot 105, dist. 5 (Jones, 1909, p. 231), approximate location.

19. Hood mine (gold; placer, and vein), Habersham Co., lot 22, dist. 13 (Jones, 1909, p. 230; Yeates and others, 1896, p. 106; Hurst and Crawford, 1964, p. 63); also listed as Holland or Habersham placer (Pardee and Park, 1948, p. 126), approximate location.

20. Placer mine (gold), Habersham Co., lot 20, dist. 13 (Yeates and others, 1896, p. 106), approximate location; portions of the M.F. Wilson gold placer workings were probably in the vicinity—Habersham Co., lots 19-21, dist. 13 (Pardee and Park, 1948, p. 126).

21. Mrs. Lindy Wilson property (gold; placer), Habersham Co., lot 20, dist. 11 (Jones, 1909, p. 230), approximate location.

22. Robert Brooks property (gold; underground workings?), Habersham Co., lot 20, dist. 11 (Hurst and Crawford, 1964, p. 176).

23. Thomas Wilson placer (gold), Habersham Co., lot 28, dist. 11 (Jones, 1909, p. 229), approximate location.

24. Placer mine (gold), Habersham Co., lot 89, dist. 8, worked about 1900; several colors per pan and occasional nugget reported (Hurst and Crawford, 1964, p. 84, 86).

25. Prospect pits (gold?) in a mica schist with quartz veins.

26. Gold-bearing gravels reported in stream (Hurst and Crawford, 1964, p. 84, 86).

27. Mineral locality (pyrite) (Hurst and Crawford, 1964, p. 91).

28. Mineral locality (soapstone) (Ali Tadkod, Georgia Geological Survey, Atlanta, oral commun., 1981).

29. Mineral locality (soapstone) (Hurst and Crawford, 1964, p. 88, 90).

30. Prospect pits (corundum?, asbestos?) containing garnets and fibrous serpentine (Hurst and Crawford, 1964, p. 88, 90).

31. Weikle Brothers prospect (gold), Habersham Co., lot 30, 31, dist. 11 (Pardee and Park, 1948, p. 126), approximate location.

32. Mineral locality (dunite) (Ali Tadkod, Georgia Geological Survey, Atlanta, oral commun., 1981).

33. Prospect pit (asbestos) (Hurst and Crawford, 1964, p. 92).

34. V. L. Lovell, Jr. (Ellis Lovell) prospect pit (copper?), dug prior to 1890 (Hurst and Crawford, 1964, p. 173).

35. Prospect adit (mica); mica books in a pegmatite (Hurst and Crawford, 1964, p. 92).

36. Tailor Wood prospect (gold), Habersham Co., lot 64, dist. 11 (Pardee and Park, 1948, p. 126), approximate location.

37. Soque River placer (gold), Habersham Co., lot 63, dist. 11 (Pardee and Park, 1948, p. 126), approximate location.

38. John Martin prospect (asbestos, with talc, soapstone, minor corundum) (Teague, 1956, p. 6), approximate location.

39. Mack Mountain prospect (asbestos, soapstone, olivine) (Hopkins, 1914, p. 161-162); also called the Wykle prospect (Teague, 1956, p. 5); B. J. Gildersleeve (written commun., 1950) identified anthophyllite; approximate location.

40. Prospect trench (soapstone, talc) (Hurst and Otwell, 1964, p. 71, 73).

41. Prospect pit (asbestos, soapstone) (Hurst and Otwell, 1964, p. 71, 73).

42. Unnamed prospect (feldspar) (Georgia Geological Survey, 1951), approximate location.

43. Unnamed prospect (sulfides) (Georgia Geological Survey, 1951), approximate location.

44. Unnamed prospect (mica) (Georgia Geological Survey, 1951), approximate location.

45. Alluvial sample (platinum) (Hurst and Otwell, 1964, p. 14, 19, 20).

46. Wikle (Chimney Mountain) road-metal quarry (quartzite) (Hurst and Crawford, 1964, p. 179).

47. Alluvial sample (platinum) (Hurst and Otwell, 1964, p. 14, 19, 20).

48. Rocky Mountain prospect (mica) "on Rocky Mountain between Unicoi and Indian Grave Gaps" (Hurst and Otwell, 1964, p. 64), approximate location.

49. Tripp Gap prospect (mica) (Georgia Geological Survey, 1951), approximate location.

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