

MAPS SHOWING MINES, PROSPECTS, AND MINERAL SITES IN THE TRAY MOUNTAIN ROADLESS AREA AND VICINITY, NORTHERN GEORGIA Mark L. Chatman, U.S. Bureau of Mines 1985

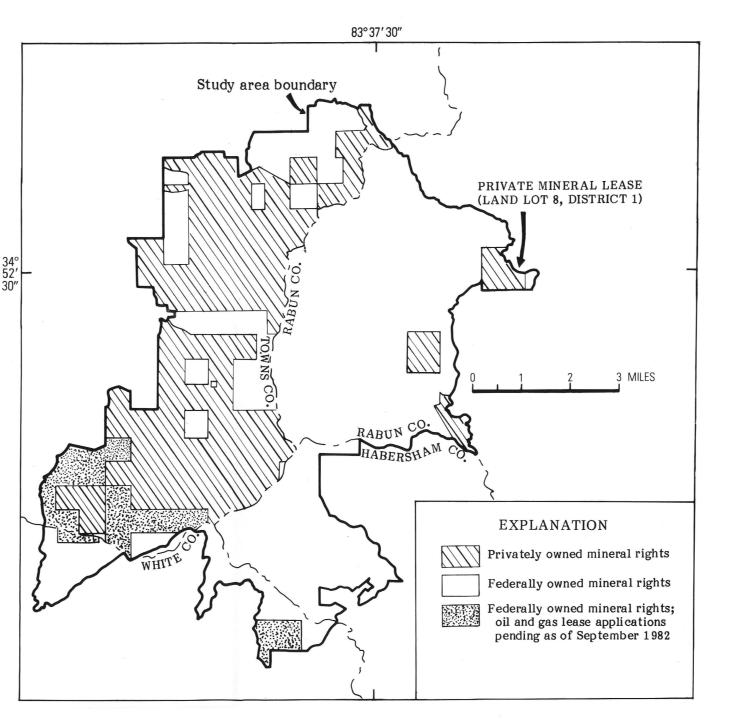
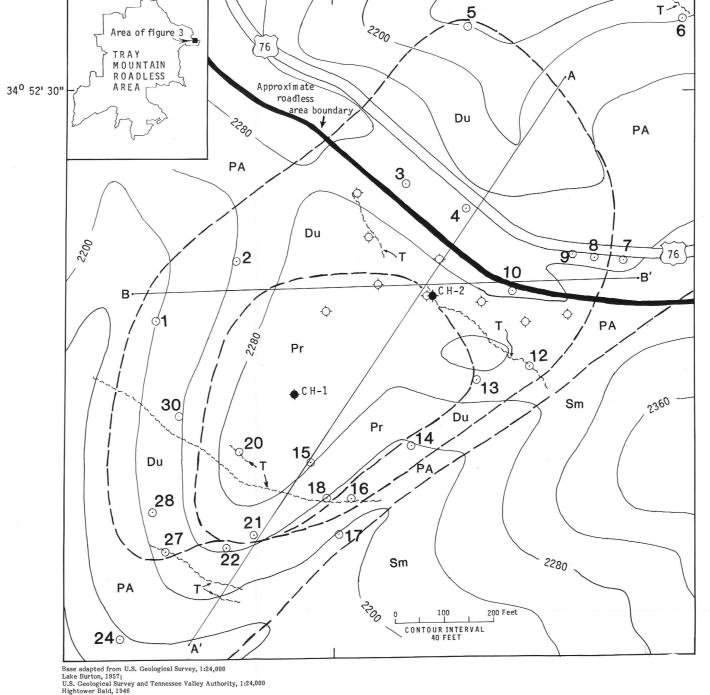


Figure 2.--Status of mineral-rights ownership and leasing, Tray Mountain Roadless



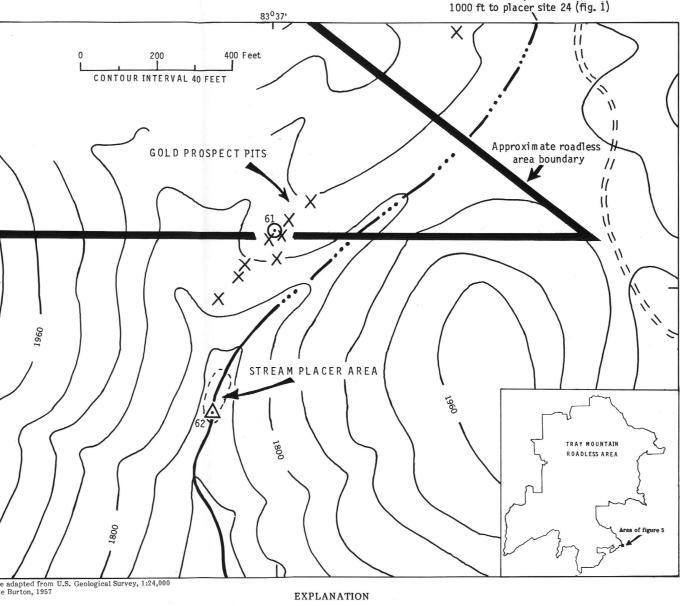
EXPLANATION Outcrop-sample locality (see figure 4 for Dunite (Du), overlain by peridotite (Pr) localities 11, 19, 23, 26, 29) Du and intersected by talc and anthophyllite veins (T) - - Contact, approximately located (inferred in cross sections) PA PA, pyroxenite-amphibolite Outcrop of tale and anthophyllite vein Sm Sm, mica schist Exploratory drill-hole locality ?---?? Projected fracture zone (shown in cross Corehole locality

to unknown depth to unknown depth Figure 3.--Geologic map and cross sections of the Lake Burton olivine deposit.

Elev. 2243 ft (partly caved) Elev. 2185 ft (caved) 8 0 100 200 Feet — [Analyses by U.S. Bureau of Mines, Reno Research Center, Reno, Nev. Analysis methods for chemical constituents: Cr by atomic absorption; Co by semiquantitative emission spectroscopy; all others by inductively coupled plasma. Analysis methods for modes: samples 8, 9, 12, 16, 17, 18, 21, and 28 by X-ray from U.S. Geological Survey, 1:24,000 Geological Survey and Tennessee Valley Authority, 1:24,000 diffraction; samples 4, 5, 6, and 24 by optical and X-ray microprobe; all others by combined optical, X-ray microprobe, and X-ray diffraction. Symbols used: --not detected; <, less than; tr, trace. Sample localities shown in figure 3.]

Open cut with adit Open-cut trench ₀₂₉ Talc or asbestos sample Dump material Elev. Portal elevation $t \rightarrow$ Quarry for road construction material

Figure 4.--H. V. M. Miller mine, developed on the Lake Burton olivine deposit.



62 Alluvial-concentrate X Prospect pit sample == Unimproved road 61 Vein quartz and schist sample

Figure 5.--Lode-gold prospect and nearby placer site, southeast corner of Tray Mountain Roadless Area. Samples 61 and 62 were analyzed by fire assay; no gold was detected in either sample.

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 the mineral values, if any, that may be present. Results must be made available to the public and be submitted to the President and the Congress. This report presents the results of a mines and prospects survey of the Tray Mountain Roadless Area (08-030) in the Chattahoochee National Forest, Rabun, Habersham, Towns, and White Counties, 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. INTRODUCTION

The Tray Mountain Roadless Area, a 36,300-acre tract in the Chattahoochee National Forest, northeastern Georgia, lies within the Blue Ridge physiographic province. The roadless area is composed of Precambrian(?)-age metamorphic rocks from two tectonic units, the Hayesville thrust sheet and the "Helen belt" (Nelson, 1982) (fig. 1). The Hayesville thrust sheet consists mostly of biotite gneiss and schist, finegrained biotite-feldspar gneiss, metasandstone, quartzite, and amphibolite; ultramafic bodies, some granitic gneiss, and small pegmatites are also present. The Helen belt contains mostly metagraywacke, metasandstone, quartzite, graphite schist, amphibolite, some ultramafic bodies, and granitic gneiss. Two "gold belts" and an area of mineralization associated with ultramafic rocks are on lands adjacent to the roadless area. Mining within the roadless area has not been extensive, and there is no current mineral activity in the surrounding region.

Past and present investigations Gold mining near the roadless area was described by Yeates and others (1896) and Jones (1909). In the northeast corner of the roadless area is a site of mineralized ultramafic rock, herein referred to as the Lake Burton olivine deposit. The site was examined by King (1894), Hopkins (1914), and Hunter (1941), and was drilled by a private concern in 1979 and 1980. Mine and prospect sites in the roadless area and vicinity were examined in 1981 by U.S. Bureau of Mines personnel in conjunction with a reconnaissance of potential mineral reserves; 48 bulk samples were collected from the Lake Burton olivine deposit, and alluvial concentrates were panned at sites of known and of potential gold placers (Chatman,

MINERAL-RIGHTS OWNERSHIP Mineral rights for 13,438 acres of the roadless area are owned by the private sector (fig. 2). Oil and gas lease applications for tracts with Rederally owned mineral rights involve 2,357 acres in the southwest part of the Tray Mountain area. These applications were filed on July 30, 1979, and were awaiting action by the U.S. Bureau of Land Management as of September 1982. A private mining lease for olivine, with renewal options through July 15, 1985, controls the mineral rights on 379 acres in the northeast corner of the roadless area.

MINES AND PROSPECTS

Lake Burton olivine deposit

Astride the northeastern boundary of the Tray Mountain Roadless Area is the Lake Burton olivine deposit, which constitutes the eastern edge of Nelson's (1982) ultramafic-mafic complex. The Lake Burton olivine deposit is composed primarily of pyroxenite-amphibolite, and an area of dunite¹ that contains 55 to 90 percent mineral olivine and an average of 40 percent magnesium oxide (fig. 3). The dunite part of the Lake Burton olivine deposit is equivalent to industrial-grade olivine rock. Other identified rock types in the deposit are deficient in olivine mineral and do not represent resource material. Olivine is a term applied to both an industrial material and a mineral. The mineral olivine is a solid-solution series of forsterite Mg_2SiO_4) and fayalite (Fe₂SiO₄). The industrial raw material olivine is a rock defined chiefly by its magnesium oxide (MgO) content, and includes rock with a minimum of 38 percent MgO. Rock containing mineral olivine that has less than 38 percent MgO is not considered to be resource The Lake Burton olivine deposit was examined as a source of industrial olivine by Hunter (1941, p. 112), and by a private olivine development concern that conducted limited exploratory drilling in 1979 and 1980. Olivine rock quarried at the site was used as road construction material (Smith, 1934).

Description-- The dunite part of the Lake Burton olivine deposit measures about 700 ft wide and 1,300 ft long (fig. 3), and is industrial-grade olivine. Limited drilling has indicated that reserves extend from the surface to a depth of about 200 ft (cross sections, fig. 3). The dunite contains serpentinized mineral olivine, and inclusions of pyroxeniteamphibolite rock which may be xenoliths. A peridotite, which is up to 40 ft thick, overlies part of the olivine reserves (fig. 3). The peridotite is deficient in MgO (less than 38 percent) and therefore is not considered to be part of the reserves. Veins composed largely of talc and anthophyllite intersect the deposit at high angles; these are of negligible volume relative to the overall size of the deposit. The veins also contain minor amounts of amphibole, and accessory magnetite and chromium minerals. Drill-core samples reveal several of these veins at depth, two of which have been tentatively correlated with the material in trenches of the H.V.M. Miller mine (fig. 4). The deposit appears to be underlain by pyroxeniteamphibolite, which contains injections(?) of dunite and peridotite at the

Sample analysis--The Lake Burton olivine deposit, which contains an

average of 80.5 percent mineral olivine, was analyzed for the five characteristics that are measured to determine general suitability for industrial application. The analysis below shows that all values are within the acceptable range for industrial application. Percentage Effect on olivine suitability Magnesium oxide (MgO) 40.00 40 percent MgO is marginal Values below 2 percent are Can be highly detrimental in refractory applications; exact cutoffs dependent on product testing Iron is slightly detrimental; a

wide range is acceptable

depending upon the specific

Greater than 40 percent silica

is indicative of inferior

application

Reserves² and industrial applications—The value of olivine is dependent on the magnesium content supplied by forsterite; forsterite exceeding 85 percent and magnesium oxide exceeding 40 percent are general standards for classifying an olivine as an industrial raw material Industrial Minerals, 1977, p. 39; Larrabee and Sweeney, 1968, p. 326; Ceague, 1975, p. 923). The MgO content can be rapidly and accurately determined, and is closely indicative of the forsterite value; forsterite determinations of the same accuracy are difficult to obtain. For this reason, MgO content has become the basic industry standard for olivine quality. The Lake Burton olivine deposit reserve base has been

differentiated from other rock on the basis of MgO content. Thirty-eight

percent MgO was chosen as the lower limit because it is the lowest grade

with current industrial application. Some lenses and inclusions within the

dunite contain slightly less than 38 percent MgO, and are included in the

reserve base because they could not be effectively removed by selective

Silica (SiO₂) content

mining; they could, however, be blended with higher grade material to form a final product of acceptable quality. Peridotite amounting to about 0.4 million short tons overlies the reserve base and should be removed during The following tonnages are present in the Lake Burton olivine deposit reserve base:

(millions of short tons) Reserve base Reserve base inside the roadless Projected recovery losses of the reserve base inside the roadless area Demonstrated marginal reserves² in the roadless area

Calculation of tonnages is based on the application of three factors to the deposit: (1) specific gravity, 3.4; (2) tonnage factor, 0.106 short tons/ft3; and (3) recovery factor (based on estimated losses of about 10 percent in the crushing process)-90 percent. Formulas used in the tonnage calculations are:

> specific gravity x density of water = whole-rock density; (2) whole-rock density ÷ 2000 lbs per short ton = tonnage

(3) volume x tonnage factor = tons of olivine. For the purposes of this paper, usage of the term "dunite" follows the definition of the International Union of Geological Sciences (IUGS) (Bates and Jackson, 1980, p. 190), which says that dunite is a rock type in which the percentage of mafic minerals is greater than or equal to 90 percent (M290), and in which the ratio of mineral olivine to the sum of mineral

olivine plus pyroxenes plus hornblende exceeds 90 (ol/ol+cpx+opx+hbd >90). By this definition, dunite is the rock type representing the highest grade material in an olivine resource because it contains the most mineral olivine. In contrast, a classification scheme that has some usage in the rock products industry defines olivine as a rock type representing the highest grade olivine resources, and dunite as low-grade material which is deficient in olivine and which has little or no industrial application. Reserve categories applied to the deposit are defined by the U.S. Bureau of Mines and U.S. Geological Survey (1980, p. 1-3).

³Specific gravity estimated from modal analyses (tables 1, 2). Volume estimated from isopach construction and planimeter measurement

Table 1.-- Chemical constituents and modal analyses of outcrop samples, Lake Burton olivine deposit

WHITE CO.

0 5 10 15 Miles 0 5 10 15 20 25 Kilometers

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

Selected chemical constituents (percent)

The raw product grade and average chemical constituents of the Lake Burton olivine deposit are comparable to those of commercial olivines (table 3). Olivine of the Lake Burton deposit appears to have potential applications in steelmaking as a blast-furnace flux, soaking-pit aggregate, and tondish sand. It may be useable as a foundry sand, based on the fine grain-size (average 0.25 mm), but casting tests are necessary for full Subeconomic resources—Cobalt and nickel appear to be confined to the dunite. Cobalt is present in amounts exceeding 0.01 percent; nickel averages 0.14 percent. Most cobalt mined today is extracted as a

byproduct of base-metals production; deposits containing 0.01 percent cobalt have been mined under such conditions (Vhay and others, 1973, p. 150). The associated nickel of the Lake Burton olivine deposit does not occur in amounts or mineralogical form that encourage conventional development. Nickel that is conventionally produced is in sulfide form, and 0.8 percent nickel is a suggested cutoff grade when mining the sulfide (Ross and Travis, 1981, p. 1294). Lake Burton rocks contain silicate nickel which does not exceed 0.24 percent (sample 27, table 1). Experimental acid-leaching of nickel (silicate) from a similar Rabun County olivine having an average nickel content of 1.7 percent (Turner and Landrum, 1963) showed encouraging results. Similar research on the possible co-extraction of cobalt and nickel from the Lake Burton olivine deposit may be warranted, especially in the case of in-situ leaching. Positive results may lend future economic significance to the deposit as a resource of these commodities. Anomalous chromium values were detected in two samples of the talc veins in the Lake Burton olivine deposit. Sample 23 (fig. 4) (4.9 percent chromium), contains talc, dunite, and magnetite-chromite

veinlets. The chromium is assumed to be chiefly contributed by the chromite in this sample. Sample 19 (fig. 4) (1.0 percent chromium) was collected from the center of a talc vein and contains talcose and asbestiform material. No chromite was evident, so the chromium in this sample probably is in silicate form. The talc veins are fracture-related,

> Asbestos and related minerals H. V. M. Miller mine

and drilling of these zones may disclose additional chromium deposition at

Anthophyllite asbestos was produced from the H. V. M. Miller mine, land lot 8, district 1, from open trenches and a few adits (loc. 11, fig. 1; fig. 4). The mine, which is in the ultramafic body known as the Lake Burton olivine deposit, was opened about 1890 (Hopkins, 1914, p. 146). Both cross- and slip-fiber asbestos were identified at the site during the current reconnaissance, as well as soapstone (steatite), foliated talc, and chlorite. King (1894, p. 86) suggested that corundum might be present, but the mineral has not yet been observed at this locality. Prospecting by Yoho and Burling (1941) extended trenches A and B (fig. 4) westward and discovered other anthophyllite veins in peridotite a few hundred feet north of the study area. Minor amounts of anthophyllite remain in the trenches of the H. V M. Miller mine, and the fracture zones along which deposition occurred contain additional anthophyllite at depth. Asbestos fragments were

Additional prospects

observed in a vein in corehole 2 between 42 and 60 ft. At the nearest surface exposure, this vein dips about 750 to the north, indicating that the vein is approximately 5 ft in true thickness where encountered in the core-

Prospecting of mineralization associated with ultramafic rocks has been reported south and east of the roadless area in the Helen belt and along its border with the Hayesville thrust sheet (fig. 1). These prospects are along a regional belt of amphibolite and ultramafic rock occurrences (Larrabee, 1966), and include asbestos, talc, soapstone, olivine, and pyrite localities (locs. 27-30, 32, 33, 38-41, and 43, fig. 1). It is doubtful that any prospecting took place after the 1960's, and there are no reports of mineral

The study area is adjacent to two, apparently separate, zones of gold deposition, the Hightower Creek gold belt to the north, and the Dahlonega gold belt to the southeast (Jones, 1909, map). Gold deposition was of a much higher tenor in the latter of these two zones. Lode-gold prospect

Prospecting for gold within the Tray Mountain Roadless Area was limited to a small group of prospect pits straddling the roadless area boundary on a hillside (loc. 25, fig. 1; fig. 5), where quartz veins and stringers in a biotite schist have been exposed, probably in 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 downstream from these pits (loc. 26, fig. 1), and in a previously worked placer about 2,000 ft upstream (loc. 24, fig. 1). These placers are in Helen belt rocks,

the probable gold source. Additional prospects Helen belt rocks--The Dahlonega gold belt (Jones, 1909, map) lies within the Helen belt along the southeastern boundary of the roadless area. Crickmay (1952, p. 5,6) mapped a continuous "metamorphic belt" that encompasses gold-bearing rocks near Dahlonega, Ga., mines as well as rocks near the southeastern border of the roadless area, which were included in the Helen belt of Nelson (1982). Nelson also infers this continuity by equating the Dahlonega shear zone of Crickmay (1952, p. 48) with the fault and shear zone that borders the southeast side of the Helen

Mines and prospects reported near but outside the southeastern boundary of the roadless area (locs. 14-26, 36, and 37, fig. 1) are within Helen belt rocks, and included among them is the Smith mine (loc. 15, fig. 1), 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 and Wilkens (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 3.0 parts per million (ppm) gold. Another alluvial concentrate, collected in the area of Smith mine placer gravels, contains 10.3 ppm gold. Hayesville thrust sheet rocks--The Hightower Creek gold belt, best delineated in Furcron and others (1938, p. 45), is a trend immediately north of the study area. This belt encompasses the mines along Hightower and Will Creeks (locs. 3-6, fig. 1), and is underlain by rocks of the Hayesville thrust sheet. No significant production was reported from these mines.

The last reported prospecting here was done in 1909, although it is likely

that some sites were examined again in the 1930's, when interest in gold

Small pegmatites have been prospected for mica in the vicinity of the roadless area. Two mica prospects reported inside the area (locs. 48 and 49. fig. 1) by Hurst and Otwell (1964, p. 64) and the Georgia Geological Survey (1951) were not located during the current investigation. Other mica prospects are in the McClure and Raper Creek drainages (locs. 35 and 44, fig. 1). Prospecting probably did not take place after the 1950's; no production has been reported.

been quarried at 14 sites near the study area for use as road construction material (fig. 1). Most quarries are within 100 ft of the roadless area boundary, and are of limited extent.

Construction material

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Modes (percent)

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EXPLANATION OF LOCALITIES SHOWN IN FIGURE 1

1. Jethro Burrell prospect (vermiculite) (Prindle, 1935, p. 44), Barnett Denton prospect (chromite) (Hansard and others, 1934). Wills Creek mine (gold; placer), Towns Co., lot 102, dist. 18 (Yeates and others, 1896, p. 108-109), approximate location. Smith mine (gold; placer), Towns Co., lot 94, dist. 18, described as "one and a half miles northeast of the Newton property" (Yeates and

others, 1896, p. 112), approximate location. Newton mine (gold; placer), Towns Co., lot 131, dist. 18 (Yeates and others, 1896, p. 108-109). Chastain Branch mine (gold; placer), Towns Co., lot 136, dist. 18

(Yeates and others, 1896, p. 111-112). 7. Kaolin mineralization in a pegmatite (Teague and Furcron, 1948), approximate location.

8. Tom Coward prospect (pyrite), approximate location. Prospect adit (gold?) in saprolite.

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,

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

Powell prospect (gold), Rabun Co., lot 102, dist. 5 (Pardee and Park, 1948, p. 127), approximate location. Smith mine (gold; placer, and veins in saprolite), Rabun Co., lot 103. dist. 5 (Jones, 1909, p. 232; Becker, 1895, p. 300), approximate area of placer gravels is shaded.

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

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

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.

Hayesville thrust sheet and Helen belt rocks, including olivine, have 26. Gold-bearing gravels reported in stream (Hurst and Crawford, 1964, p. 27. Mineral locality (pyrite) (Hurst and Crawford, 1964, p. 91).

28. Mineral locality (soapstone) (Ali Tadkod, Georgia Geologic 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; placer), Habersham Co., lot 30, 31,

dist. 11 (Pardee and Park, 1948, p. 126), approximate location. 32. Mineral locality (dunite) (Ali Tadkod, Georgia Geologic Survey, Atlanta, oral commun., 1981).

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). Prospect adit (mica); mica books in a pegmatite (Hurst and Crawford, 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. John Martin prospect (asbestos, with talc, soapstone, minor corundum) Teague, 1956, p. 6), approximate location.

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).

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

approximate location. Alluvial sample (platinum) (Hurst and Otwell, 1964, p. 14, 19, 20). Wikle (Chimney Mountain) road-metal quarry (quartzite) (Hurst and Alluvial sample (platinum) (Hurst and Otwell, 1964, p. 14, 19, 20).

Rocky Mountain prospect (mica) "on Rocky Mountain between Unicoi and Indian Grave Gaps" (Hurst and Otwell, 1964, p. 64), approximate Tripp Gap prospect (mica) (Georgia Geological Survey, 1951), approximate location.

Table 2.—Chemical constituents and modal analyses of drill-core samples, coreholes 1 and 2, Lake Burton olivine deposit [Analyses by U.S. Bureau of Mines, Reno Research Center, Reno, Nev. Analysis methods for chemical constituents: Cr by atomic absorption; Co by miguantitative emission spectroscopy; all others by inductively coupled plasma. Analysis methods for modes: optical and X-ray microprobe. Symbols used: —, t detected; <, less than; tr, trace. Corehole localities and explanation of rock units are shown in figure 3. Note: 0.30 percent K₂O was detected in sample 1/5 by ductively coupled plasma method. Core was sampled at intervals where major compositional changes were visually evident.] Selected chemical constituents (percent)

> Table 3.—Comparison of some commercial olivine rocks with the Lake Burton olivine deposit: selected chemical constituents [Symbol used: —, not reported. ${\rm Na_2O}$ was not detected in samples marked by footnote 1, and was not reported in all others.]

North Carolinal 10.6 35.5 37.1 7.7 .50 Used as flux gravel North Carolinal 2.10 39.5 40.4 7.9 .47 Used as flux gravel North Carolina¹ .57 42.6 38.3 10.4 .038 Used as foundry sand North Carolinal 1.27 40.4 37.4 10.2 .054 Collected from quarry North Carolina² -- 48.77 40.93 7.60 -- From Day Book deposit 1 47 40 11 --.7 49.4 41.2 7.1 --2.5 47.0 42.0 2.0 -- Beneficiated sample -- 43-44 24-35 7.6-7.7 -- Beneficiated sample Sample collected by U.S. Bureau of Mines personnel to supplement Tray Mountain study; analyses by U.S. Bureau of Mines Reno Research Center, Reno, Nev.

Kulp and Brobst (1954).

Wilson and Skinner (1940).

Bjoerum (1975).

Industrial Minerals (1970a).

Industrial Minerals (1970b).

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