MINERAL RESOURCE POTENTIAL OF THE OVERFLOW ROADLESS AREA, RABUN COUNTY, GEORGIA, AND MACON COUNTY, NORTH CAROLINA

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MINERAL RESOURCE POTENTIAL
SUMMARY STATEMENT

The Overflow Roadless Area is on the western edge of the Hall County gold belt, a 2-mi-wide band of isolated gold-bearing quartz veins and associated placers that have been prospected and worked since the 1800's, but no records exist of gold occurrences or mining activity within the roadless area. Geochemical data from rocks, pan-concentrated heavy minerals, and fine-grained stream sediments do not reveal any anomalous concentrations of trace elements that might be related to hidden mineral deposits. Minor isolated deposits of amethyst gemstone and mica pegmatite occur within the area. Rock suitable for use as crushed stone and aggregate is abundant both in and adjacent to the roadless area. Paleozoic sedimentary rocks that probably underlie the metamorphic rocks exposed at the surface at depths of about 5 mi have an unknown potential for hydrocarbons in the form of natural gas. No reasonable estimate of this potential can be made with available information.

INTRODUCTION

The Overflow Roadless Area comprises 4600 acres in the Chattahoochee National Forest in Rabun County, Ga., and 3200 acres in the adjoining Nantahala National Forest, Macon County, N.C., in the eastern Blue Ridge Mountains (fig. 1). The highest altitude is about 4170 ft on Chinquapin Mountain at the northern edge of the area; the lowest is about 1600 ft in the West Fork of the Chattooga River, at the southern end of the area. The terrain is heavily forested and is characterized by rugged topography with sharp to rounded ridge crests capping steep valley slopes. In the southern part of the roadless area the topography is dominated by the cliff-bound walls of the deeply incised West Fork of the Chattooga River and its tributary, Overflow Creek, which drains the area and from which the area takes its name. The roadless area is centered about 4 mi southwest of Highlands, N.C., and about 12 mi northeast of Clayton, Ga. (fig.1). Access to the area is via North Carolina Route 106, which forms the northern boundary, and by Georgia and North Carolina Route 28, which is several miles to the east. U.S. Forest Service roads 86B, 86D, and 79 provide access to parts of the roadless area interior.

Previous studies

Parts of the roadless area have been included in broadly focused regional overviews by numerous workers since the turn of the century. Yeates and
Figure 1.—Index map showing the Overflow Roadless Area (shaded), the Blood Mountain, Chattahoochee, and Tray Mountain Roadless Areas, and the nearby Ellicott Rock Wilderness and additions.
others (1896) and Jones (1909) described the gold deposits and mining properties of Georgia, including mines and prospects just outside the roadless area. Furcron and Teague (1943) described the mica-bearing pegmatites in Georgia, and Leasure and Shirley (1966) reported on the pegmatites in the southern Appalachian Mountains. King (1894), Pratt and Lewis (1905), Hopkins (1914), and Hartley (1973) discussed ultramafic deposits in the general region. Ferguson (1978) and the U.S. Department of Energy (1979) presented regional studies and evaluations of uranium potential for the southern United States under the National Uranium Resource Evaluation Program (NURE). Keith (1907) mapped the nearby Pisgah quadrangle, N.C., and Crickmay (1952) and Hurst (1973) described the rocks in North Carolina as part of the general descriptions of the geology of the Blue Ridge crystalline rocks. Teague and Furcron (1948) mapped the geology of Rabun and Habershaw Counties, Ga. McKnight (1967) made a geologic study of the Highlands-Cashiers area, North Carolina, and Hadley and Nelson (1971) mapped the geology of the Knoxville 2-degree quadrangle, in which part of the Overflow Roadless Area lies. Hatcher (1972, 1974, 1976, and 1978) mapped and reported on various aspects of the geology in the region. The general geology of part of the roadless area is shown on the Geologic Map of Georgia (Georgia Geological Survey, 1976).

Present studies
G. C. Gazdik and M. P. Davis made field studies for the U.S. Bureau of Mines (USBM) in April 1980, collecting samples of rock, locating mineral prospects, and making reconnaissance scintillometer surveys (Davis, 1982). Fourteen rock and six pan-concentrate samples were collected in the roadless area. Analyses were performed at the USBM, Reno Research Center, Reno, Nev.

Koeppen and Nelson, assisted by C. M. Sears and K. R. Bond, mapped and sampled the roadless area for the U.S. Geological Survey (USGS) during December 1981 and January 1982. They prepared a reconnaissance geologic map and collected pan concentrates, fine-grained stream-sediment samples, and rock-chip samples for a geochemical evaluation (Nelson and Koeppen, in press; Koeppen and Nelson, in press). The samples were analyzed for 31 elements by means of semiquantitative spectrography, for gold and zinc by atomic absorption methods, and for uranium by fluorometric methods at the USGS laboratories, Denver, Colo. (data in Detra and others, 1983).

SURFACE- AND MINERAL-RIGHTS OWNERSHIP

The Federal Government owns all surface and mineral rights in the Overflow Roadless Area. There are currently no outstanding prospecting or mining permits nor have there been any recent applications.

GEOLOGY

The Overflow Roadless Area is underlain by highly deformed and metamorphosed rocks of the Tallulah Falls Formation of Late Proterozoic and (or) early Paleozoic age (Galpin, 1915; Hatcher, 1971, 1974). This formation forms a part of the Hayesville thrust sheet, which together with the underlying Great Smoky thrust sheet composes a large part of the allochthonous southern Blue Ridge Mountains. In Georgia and adjoining North Carolina the Hayesville sheet was emplaced by westward-directed transport over the Great Smoky sheet along the Hayesville-Fries thrust fault (Hatcher, 1971). The Overflow Roadless Area is in the eastern part of the Hayesville sheet; rocks of the Great Smoky thrust sheet are not exposed in the roadless area.

The principal rocks exposed in the roadless area are biotite-muscovite gneiss and schist, fine-grained biotite-feldspar gneiss, amphibolite, feldspathic and argillaceous metasandstone, and minor quartzite (fig. 2) (Nelson and Koeppen, in press). Bedding is seldom preserved in these metasedimentary rocks and the most prevalent structure is a discontinuous compositional layering. Numerous variably sized bodies of granite, granodiorite gneiss, and migmatite are present, and discontinuous veins and pods of pegmatite and quartz are widespread.

Even though ultramafic rocks have not been observed within the roadless area, they are present nearby, and hence may exist as small undetected pods within it. A variety of ultramafic and mafic rocks are widely dispersed throughout the Hayesville thrust sheet as small discontinuous outcrop-size pods as well as some large bodies covering many acres (Hadley and Nelson, 1971). These rocks are chiefly serpentinite, dunite, pyroxenite, gabbro, and amphibolite (Hartley, 1973). Locally, some of these rocks are rich in magnetite.

Rocks exposed in the Overflow Roadless Area have been complexly folded, some exposures showing deformation by three generations of folding. Numerous thrust faults are common in the southern Appalachian Mountains (Rodgers, 1953; King, 1964; Hadley and Nelson, 1971; and Hatcher, 1971 and 1972), but faults displacing map units in the Hayesville thrust sheet within the roadless area have not been observed. Minor shear zones and faults, however, having relatively small displacements too small to be shown at the map scale, have been seen in individual exposures.

Generally, the metamorphic rocks in the Hayesville thrust sheet range from the kyanite to sillimanite grade of Barrovian regional metamorphism. In the roadless area, however, aluminous rocks that are compositionally favorable for developing index minerals are not widespread, so metamorphic index minerals are rarely seen and isograds are hard to differentiate. Nevertheless, sillimanite is present locally in the roadless area and rock assemblages of nearby areas in the Hayesville sheet contain sillimanite or kyanite. In the southern Appalachian Mountains the regional thermal metamorphic peak was approximately 450-480 m.y. ago, during the Taconic orogeny (Butler, 1972). Formation of pegmatites, felsic segregations, anatectic melt material, and migmatites in rocks of the roadless area probably occurred at this time, near the peak of regional metamorphism.

GEOCHEMICAL SURVEY

No known metallic mineral deposits exist in the Overflow Roadless Area. The Hall County gold belt,
Figure 2.—Geologic map describing mineral resource potential for each geologic unit in the Overflow Roadless Area.
EXPLANATION

**QUATERNARY**

**Granite and granodiorite gneiss, undivided**—Contains small layers and lenses of biotite gneiss, mica schist, and metasandstone; pods and veins of quartz and pegmatite common. Materials suitable for use as crushed stone.

**Colluvium and alluvium (Quaternary)**—Unconsolidated deposits consisting of coarse bouldery and cobbly gravels, sand, and clay.

**Tallulah Falls Formation (Early Paleozoic and/or Late Proterozoic)**—Unnamed biotite gneiss, biotite schist, muscovite-biotite schist, muscovite schist, amphibolite, and metasandstone.

**Contact, approximately located**

- Strike and dip of layering and foliation
- Strike and dip of foliation
- Strike and dip of cleavage
- Bearing and plunge of lineation; may be combined with foliation
- Anticline, showing plunge direction
- Minor overturned synform
- Horizontal foliation
- Vertical foliation

**Approximate boundary of roadless area**

- Rock sample locality having 0.05 ppm gold
- Fine-grained stream-sediment sample locality having 0.1 to 0.25 ppm gold
where placers have been prospected and worked since the 1800s, is just east of the roadless area; and although our reconnaissance geochemical sampling found scattered traces of gold and silver in rock and fine-grained stream-sediment samples (fig. 2), there were no concentrations that might be related to significant mineralization in the area (Koeppen and Nelson, in press).

The geochemical evaluation is based on an analysis of the trace-element content of 78 samples of rock, 58 samples of fine-grained stream sediment, and 39 heavy-mineral pan concentrates from streams. The geochemical data for the roadless area samples have been listed by Detra and others (1983). Traces of gold (0.05 to 0.25 parts per million [ppm]) and silver (0.0 to 0.5 ppm) were detected in two fine-grained stream-sediment samples and in six rock samples, but gold and silver were not detected in any of the pan concentrates. Considering the lack of gold in all the other samples from the roadless area, even the relatively few rock samples containing gold can be regarded as anomalous. Their scattered distribution and low concentration suggest they represent only small localized pockets or thin veins of fine-grained gold, possibly concentrated by fluid movement during regional metamorphism. No other anomalous geochemical concentrations were recognized in the roadless area.

ASSESSMENT OF MINERAL RESOURCE POTENTIAL

The Overflow Roadless Area has a low potential for crushed stone, and contains minor amounts of low-quality mica and amethyst gemstone. Traces of gold (0.25 ppm or less) in a small number of rock-chip or fine-grained stream-sediment samples (fig. 2) are probably related to small, weakly mineralized pockets and indicate only a low resource potential. No geochemical or mineralogical evidence was found during the geochemical survey to suggest hidden deposits of other metallic minerals in the area.

Crushed stone

Gneiss and schist in the roadless area are suitable for use as crushed rock, aggregate, or other construction materials (figs. 2, 3). These rocks are abundant and mostly available outside the area from more readily accessible sites and existing quarries.

Mica

Greenish-brown, bent, and ruled mica occurs in the pegmatite at numerous scattered localities near the roadless area (fig. 3). The area includes a part of the Rabun pegmatite district, a region of poorly exposed and weathered pegmatites (Lesure and Shirley, 1968). A small number of the sites noted as prospects on the USGS 1:24,000-scale topographic maps of the area correspond to the largest pegmatite occurrences, which all are small and of low quality; the resource potential for mica is considered to be low in the roadless area.

Gold

The Overflow Roadless Area lies immediately west of the Hall County gold belt, a 2-mi-wide band of isolated auriferous quartz veins and associated stream placers (fig. 3). Most mining activity in the belt occurred between 1840 and 1890 (Yeates and others, 1896), and although production records for the belt are extremely sketchy, it appears that the amount of gold removed from the six prospects near the roadless area was relatively small. The total recorded production for Rabun County for the period 1881-1904, according to U.S. Mint Records, is only 1,730 oz of gold.

All samples collected by the USGS in the roadless area were analyzed spectrophotographically for gold; the fine-grained stream sediments and the rock chips were also analyzed by atomic-absorption method (AA), but inadequate sample material was collected for AA analyses of gold in the fraction of the pan concentrates that was analyzed. Six rock-chip samples (four of gneiss, and two of pegmatite) contain 0.05 ppm gold, the lower detection limit for the AA technique used. The several samples of quartz vein that we analyzed are barren. Samples of fine-grained sediment from two streams contain 0.1 and 0.25 ppm gold, respectively. The gold-bearing samples are from scattered locations in the area and apparently do not define any restricted pattern of distribution. In consideration of the lack of gold in all other samples, the few samples with detectable gold can be regarded as anomalous. Because the gold-bearing samples are both widely scattered and of low concentration, it would appear that each probably represents only localized, low-grade mineralization. Considering the sparse distribution of the concentrations, the amount of data is minimal for a statistical generalization. The potential for gold resources within the roadless area, nevertheless, is estimated to be low.

Thorium and uranium

The Overflow Roadless Area is partly within the mountain monazite belt of Little (1979, p. 68), a long and generally narrow band of monazite-bearing crystalline rocks locally consisting of granite, granite gneiss, pegmatites, and biotite gneiss. Several early reports were made on monazite in placers east of the roadless area (probably Hedden Placer—Yeates and others, 1896; Sterrett, 1907), but no production of monazite is known or recorded. Our spectral scintillometer survey identified one small area (50 ft²) having higher-than-background emission in the conference of Holcomb, Overflow, and Brown Creeks. Sediment and bedrock samples from this site and from nearby streams did not yield anomalous concentrations of thorium and rare-earth elements (semiquantitative spectrographic analyses), or uranium (AA), and only a moderate amount of monazite and zircon was present in the samples. Low thorium and uranium contents of most samples, and the general lack of substantial gravel as host for the monazite, are not indicative of a potential for uranium and thorium in the roadless area.

Oil and gas

Recent seismic studies (Cook and others, 1979; Harris and others, 1981) indicate that the metamorphic rocks forming the Blue Ridge Mountains of North Carolina and adjoining Georgia were emplaced by westward-directed thrust faulting over a thick sequence (3,000-15,000 ft) of potentially hydrocarbon-bearing sediments. On the basis of the seismic profiles, the sediments probably occur at depths of as
Figure 3. Mines, prospects, and mineral localities in the Overflow Roadless Area and vicinity. Numbers are keyed to descriptions in table 1 (see accompanying map).
REFERENCES CITED


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