DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF-1562
PAMPHLET

GEOLOGY AND MINERAL RESOURCE POTENTIAL OF THE LITTLE BLAKELY ROADLESS AREA, GARLAND COUNTY, ARKANSAS

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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 Little Blakely Roadless Area, Ouachita National Forest, Garland County, Ark. The Little Blakely Roadless Area (08004) 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

The Little Blakely Roadless Area lies within the Arkansas quartz-crystal belt, where crystals have been mined from the Womble and Mazarn Shales and the Blakely and Crystal Mountain Sandstones (Stroud and others, 1969). These high-quality crystals have been used in the optical, oscillator, jewelry, and mineral-specimen industries. There are no patented or unpatented mining claims on public lands, and no recent mining has been done within the roadless area. Quartz crystals were produced from the privately owned W. J. Beard mine in the NW1/4SW1/4 sec. 12 and NE1/4SE1/4 sec. 11, T. 1 S., R. 21 W., within the roadless area. In 1981 quartz was being mined by open-pit methods in the Blakely Sandstone on Miller Mountain, about 0.5 mi north of the roadless area. The potential for quartz crystals within the Blakely Sandstone, which crops out in the Little Blakely Roadless Area, is high.

Although phosphate and vanadium occur in two areas 4 mi and 6 mi outside the roadless area, it appears unlikely that they are present in the roadless area in sufficient concentration and areal extent to constitute a resource.

A Fischer assay of a sample of Womble Shale from the roadless area indicated a trace of oil. The roadless area has a low potential for oil and gas.

INTRODUCTION

During 1981 the U.S. Geological Survey and the U.S. Bureau of Mines conducted field investigations to evaluate the mineral resource potential of the Little Blakely Roadless Area. The roadless area covers about 5,140 acres in the Ouachita National Forest, Garland County, central Arkansas (fig. 1), about 10 mi northwest of Hot Springs, Ark. About 2,415 acres of the total are either under the jurisdiction of the U.S. Army Corps of Engineers or are privately owned.

The Little Blakely Roadless Area is made up principally of two northeast-trending ridges bordered on the north, west, and south by Lake Ouachita. The east border abuts privately owned land. The region is densely timbered by pine and sparse hardwoods. Access to most of the roadless area is by boat; unimproved logging roads provide access to the eastern parts of it. Elevation of the roadless area ranges from 578 ft on Lake Ouachita to 1,035 ft on Mill Creek Mountain.

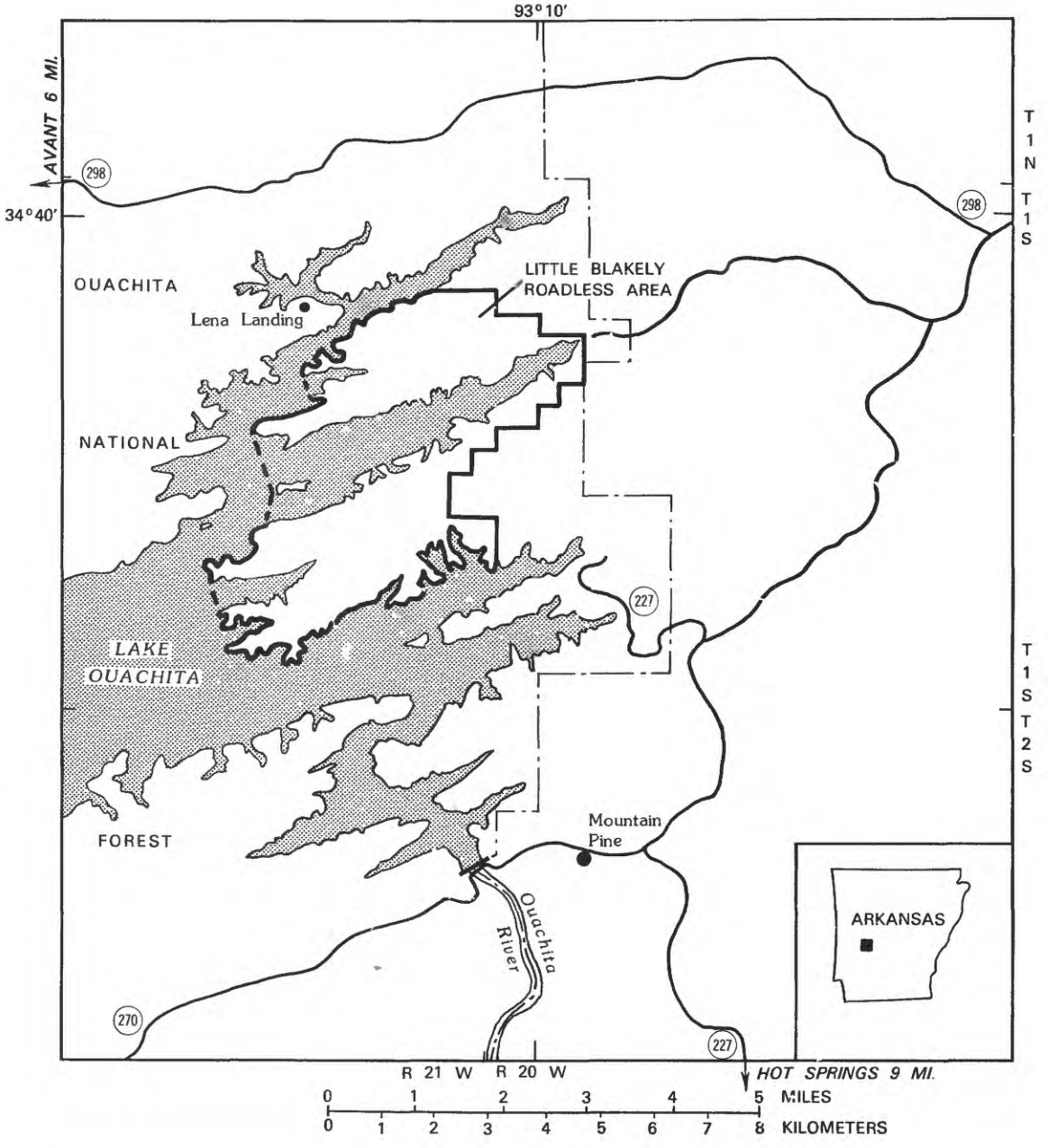

Figure 1.--Index map of the Little Blakely Roadless Area (08004), Garland County, Ark.

We appreciate the cooperation of personnel of the U.S Forest Service, U.S. Bureau of Land Management, and U.S. Army Corps of Engineers. We especially thank Charles Stone, Arkansas Geological Commission, and Boyd R. Haley, U.S. Geological Survey, for providing geologic information and assistance in sample collection in the area.

GEOLOGY

Formations that crop out in the Little Blakely Roadless Area are the Lower Ordovician Mazarn Shale and Blakely Sandstone, Lower and Middle Ordovician Womble Shale, and Middle Ordovician Bigfork Chert (Arkansas Geological Survey, 1942; Haley and others, 1979). The roadless area is within the folded and thrust-faulted Ouachita Mountains of west-central Arkansas. Recumbent and overturned folds and high- and low-angle thrust faults are common. According to Haley and others (1979), there were two or three periods of folding in this region. Some folds are overturned toward the north and some toward the south (Haley and others, 1979).

GEOCHEMISTRY

Spectrographic analyses of six rock samples and the minus-50-mesh fraction of seven stream-sediment samples from the Little Blakely Roadless Area do not show anomalously high metal content at the surface. The vanadium content of a stream-sediment sample from locality 1 was 500 parts per million. Although slightly higher than the background value of 200 parts per million, it does not indicate a significant concentration of vanadium. The analyses indicate that there are no major areas of surface metallic mineralization within the roadless area.

GEOPHYSICS

No detailed magnetic or gravimetric surveys have been made of the Little Blakely Roadless Area. A Bouguer gravity map of Arkansas (Hendricks and others, 1981) shows no anomalies within the roadless area, though gravity and magnetic highs are associated with the Magnet Cove alkalic igneous complex about 20 mi southeast of the roadless area (Erickson and Blade, 1963; Hendricks and others, 1981).

MINING DISTRICTS AND MINERALIZED AREAS

The Little Blakely Roadless Area is within the Arkansas quartz-crystal belt. Several dozen mines within this belt have yielded high-quality crystals satisfactory for optical, oscillator, jewelry, and mineral-specimen use. Most of the quartz-crystal deposits within this belt are in vertical to near-vertical fractures that are approximately parallel to the crests of folds. Even though quartz-crystal deposits occur throughout the Paleozoic shales, sandstones, and cherts within the quartz-crystal belt, most of the high-grade quartz from this region has been obtained from deposits in the Blakely and Crystal Mountain Sandstones (Engel, 1951). The Blakely Sandstone is present throughout most of the roadless area and is exposed in fold apexes on most of the ridgetops. A sample taken across a 1-foot quartz vein in the Blakely Sandstone was negative when assayed for gold and silver (Wood, 1982).

No patented or unpatented mining claims are within public lands of the roadless area. Two unpatented mining claims are about 0.5 mi north of the roadless area near the Miller Mountain quartz-crystal diggings in the SW1/4SW1/4 sec. 1, T. 1 S., R. 21 W. (Engel, 1951; Wood, 1982).

Located on private property, the W. T. Beard quartz-crystal mine is within the northern part of the roadless area in the NW1/4SW1/4 sec. 12 and the NE1/4SE1/4 sec. 11, T. 1 S., R. 21 W. Workings at the mine consist of a series of open pits on several crystal-bearing veins and vein systems in the Blakely Sandstone. The veins are on or near the crest of an anticline, are approximately parallel to the anticlinal axis, and are as much as 500 ft long and 4 ft wide. This area was extensively mined between 1890 and 1940 for display specimens. Production recorded in 1943 consisted of 500 lbs of quartz crystals (Engel, 1951).

The Miller Mountain mining area is on private property about 0.5 mi north of the roadless area. More than 800 ft of underground workings and a series of open pits and trenches are near the crest of Miller Mountain anticline. These workings are on a series of steeply dipping quartz-crystal veins in the deeply weathered, argillaceous lower Blakely Sandstone. The veins or vein zones are approximately parallel to the anticlinal axis and are as much as 30 ft wide and as long as 600 ft. Recorded production from this area during 1943 was about 18,000 lbs of quartz crystals, including 994 lbs of oscillator-grade crystals. Quartz-crystal production before 1943 was estimated to exceed 20,000 lbs (Engel, 1951).

Phosphate occurs in the Mazarn and Womble Shales and in the Bigfork Chert in Garland County, outside the Little Blakely Roadless Area. Although these formations crop out in the roadless area, it appears unlikely that the phosphate is present in sufficient concentration and areal extent in the roadless area to constitute a resource (J. B. Cathcart, oral commun., Jan. 1983). Near Lena Landing, about 1 mi northwest of the roadless area, the Mazarn Shale contains a 3- to 4-foot thick phosphatic conglomerate that contains 20.1 percent P_2O_5 (C. G. Stone, Arkansas Geological Commission, written commun., 1982). The upper member of the Womble Shale in the eastern Ouachita Mountains is characterized by interbedded layers of phosphatic conglomerate containing as much as 5 percent P_2O_5 (Stone and Sterling, 1962). Wavellite, a complex hydrated aluminum phosphate mineral containing 35.2 percent P_2O_5, is found in the Bigfork Chert near Avant and Mountain Pine, Ark. (Stroud and others, 1969).

Vanadium-bearing wavellite occurs in the Bigfork Chert on Dug Hill north of Avant, Ark., about 6 mi west of the roadless area, and near Mountain Pine, Ark., about 4 mi southeast of the roadless area. A 45-foot channel sample taken by the Arkansas Geological Commission from the road cut on Dug Hill contained 0.40 percent V_2O_5; another sample taken by the Arkansas Geological Commission from the Mountain Pine locality contained 0.08 percent V_2O_5 (C. G. Stone, Arkansas Geological Commission, written commun., 1982). According to Foster and Schaller (1966), the vanadium in the wavellite at Dug Hill, Ark.,

ranges from 0.14 to 0.18 percent and causes the distinctive green, blue, blue-green, yellow, and gray colors in the wavellite. These occurrences of wavellite are of interest to mineral collectors, but they have not been mined for phosphate or vanadium.

A sample of Womble Shale assayed by the Fischer method contained a trace of oil. Although some gas has been produced from the 25-1 Weyerhaeuser well in the Ouachita Mountains core area in southeastern Oklahoma, the core areas, including the region of the Little Blakely Roadless Area (Haley and others, 1976), have low potential for commercial amounts of gas or oil (Goldstein, 1975). Recrystallization of rocks in the core area in Oklahoma destroyed the original interstitial porosity, and the small amount of gas produced from the Weyerhaeuser well came from a fracture, probably along a fault zone. Possibly the Ouachita Mountains area in Arkansas has not been tested adequately to ascertain the presence or absence of gas or oil (Caplan, 1963), but, based on available information, the potential for gas or oil in the Little Blakely Roadless Area is low.

ASSESSMENT OF MINERAL RESOURCE POTENTIAL

The northern part of the Little Blakely Roadless Area has a small quartz-crystal resource: the W. T. Beard quartz-crystal mine. A high potential for occurrence of quartz-vein deposits exists in the Blakely Sandstone within the roadless area (fig. 2). Although most natural quartz for optical and oscillator use has been replaced by synthetic quartz, high-purity natural quartz is used for feedstock and as seed plates to grow cultured quartz (Zlobik, 1980). Demand for quartz for jewelry and specimen-quality crystals persists. The roadless area has a low potential for oil and gas.

Although phosphate rock is present in formations in Garland County, outside the roadless area, no phosphate has been mined in the county. It seems that the areal extent and the phosphate content of formations are insufficient to be a potential source of phosphate. Vanadium-bearing wavellite present in Garland County has been collected for mineral specimens, but no vanadium or phosphate has been produced from these occurrences. Based on available information, there appears to be low potential for vanadium and phosphate resources from wavellite within the roadless area.

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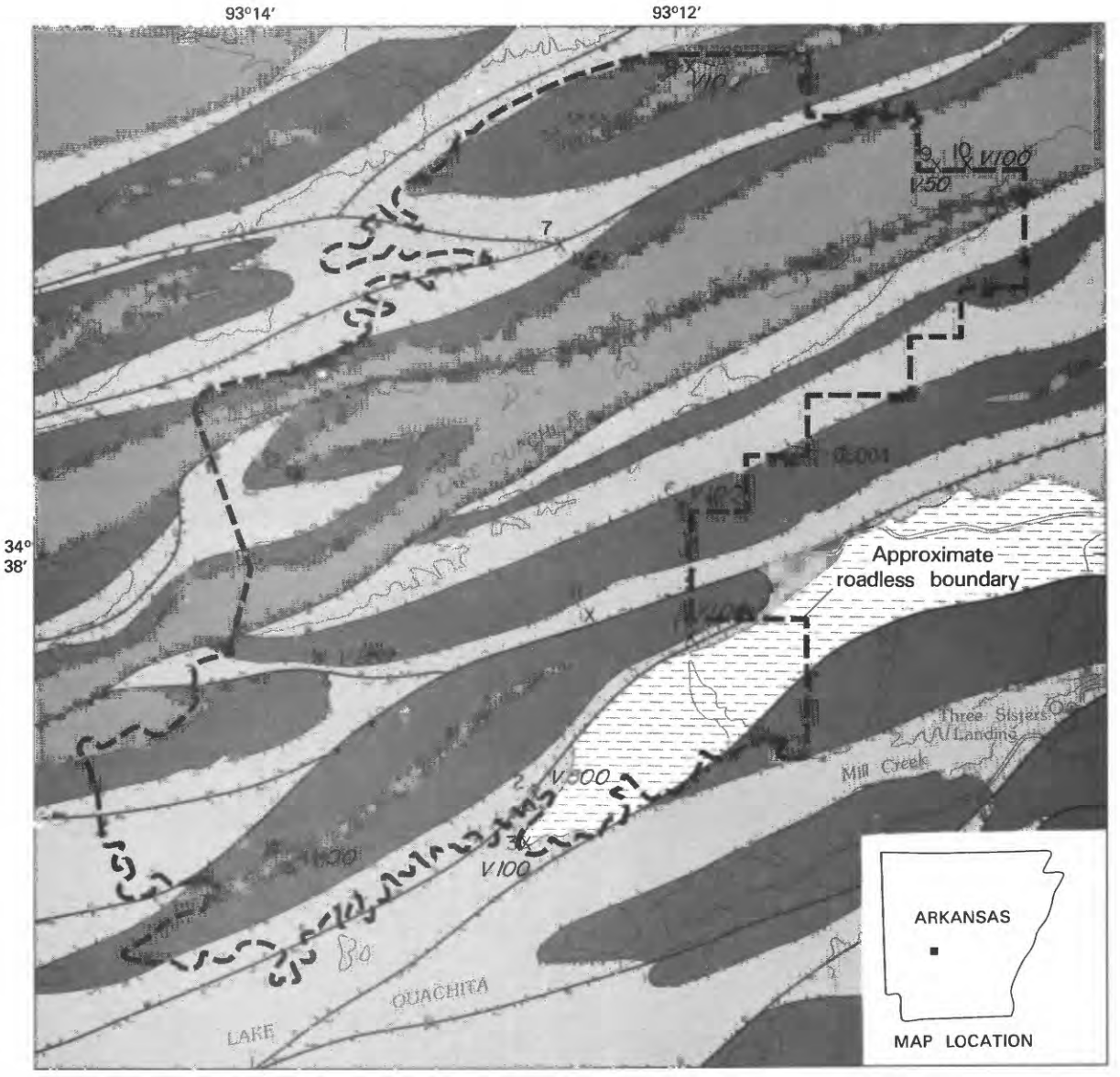

EXPLANATION

- Bigfork Chert (Ordovician)
- Womble Shale (Ordovician)
- Blakely Sandstone (Ordovician)
- Mazarn Shale (Ordovician)
- Contact
- Fault
- Mine
- Sample locality (X) showing V100 metal content (ppm)

Figure 2.--Map showing geology and mineral resource potential of the Little Blakely Roadless Area, Garland County, Ark. The roadless area has a high potential for quartz-crystal deposits in the Blakely Sandstone.