MINERAL RESOURCE POTENTIAL OF THE PINHEY CREEK WILDERNESS, STONE AND BARRY COUNTIES, MISSOURI

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Studies Related to Wilderness

Under the provisions of the Wilderness Act (Public Law 88-577, September 3, 1964) and the Joint Conference Report on Senate Bill 4, 88th Congress, 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 Piney Creek Wilderness, Mark Twain National Forest, Stone and Barry Counties, Mo. The area was established as a wilderness by Public Law 94-557, October 19, 1976.

MINERAL RESOURCE POTENTIAL

SUMMARY STATEMENT

There is no evidence of significant metallic-mineral deposits in the rock units that are exposed at the surface in the wilderness, but there may be some potential for mineral deposits of two different types at depths from 400 ft (120 m) to more than 2,100 ft (640 m) below the surface. Analyses of rock samples from a drill hole 15 mi (24 km) south of the area showed anomalous amounts of several metals in the Derby-Doerun (usage of the Missouri Geological Survey), Potosi, and Eminence Dolomite, which suggests that these units as well as the subsurface Ordovician carbonate units may have a potential for zinc-lead mineralization in the wilderness. Also, a high-amplitude magnetic anomaly along the northwest side of the wilderness suggests a potential for a small to moderate-sized magnetite (iron ore) deposit in the Precambrian basement rocks at a depth of at least 2,100 ft (640 m) below the surface, probably at least partly outside the boundary of the wilderness. In both cases the significance of the potential cannot be evaluated without deep drilling. In the case of the possible magnetite deposit, drilling should be preceded by a detailed magnetic survey to delineate the anomaly more clearly. The wilderness has little potential for resources of industrial minerals because they are readily available elsewhere in the region, and no known potential for energy resources.

INTRODUCTION

The U.S. Geological Survey and the U.S. Bureau of Mines made a geologic and mineral survey to assess the mineral resource potential of the Piney Creek Wilderness, southwest Missouri, in 1978-80. The wilderness covers 8,432 acres (3,412 hectares) of the Mark Twain National Forest in Stone and Barry Counties (fig. 1).

The wilderness is near the western edge of the Salem Plateau region of the Ozark uplift and contains timbered ridges, remnants of a maturely dissected upland surface, separated by the valley of Piney Creek and its tributaries. Exposed rocks are nearly flat lying limestones and dolomites of Mississippian and Ordovician ages. These are underlain by about 1,700 ft (520 m) of mostly carbonate sedimentary rocks of Ordovician and Cambrian ages, which rest on Precambrian basement igneous rocks. There is no known record of mineral production, development, or prospecting in the wilderness.

GEOLOGY

The Piney Creek Wilderness is on the southwest flank of the Ozark uplift. The rock units exposed are limestones of Mississippian age and dolomites of Ordovician age, which dip very gently northeast (fig. 2). These units are underlain by some 1,700 ft (520 m) of dolomites and minor sandstones of Ordovician and Cambrian ages, which rest upon basement igneous rocks of Precambrian age. The geologic structure is simple, and there are no known faults within the wilderness.

GEOCHEMISTRY

Stream-sediment samples and panned-concentrate samples from eleven drainages tributary to Piney Creek (fig. 2) were collected and analyzed for 30 elements by semiquantitative spectrographic methods. The analyses show a remarkably uniform content for each metal and indicate that anomalous
Figure 1.--Index map showing the Piney Creek Wilderness.
concentrations of metals probably are not present in the surface formations of the area. Enhanced metal values detected in the panned-concentrate samples reside in limonitic iron oxide derived from the ubiquitous, sparsely disseminated pyrite in the surface rocks of the area.

**GEOPHYSICS**

The magnetic map of Missouri (Missouri Geological Survey, 1943b) shows a crescent-shaped high-amplitude positive magnetic anomaly along the northwest side of the wilderness. The high amplitude and apparently steep gradient of this anomaly indicate a source at or near the surface of the Precambrian basement, which is about 2,100 ft (640 m) below the upland surface. However, the anomaly is based on magnetic readings at 2-mi (3.2-km) intervals along highways, and a more detailed magnetic survey of the area is needed to delineate the anomaly accurately before further inferences can be made as to its significance.

On the gravimetric map of Missouri (Missouri Geological Survey, 1943a), the wilderness is on the southeast limb of a gentle, oval-shaped northwest-trending positive gravity anomaly. The source of this feature must be at a deep level in the Precambrian basement and cannot be identified on the basis of available geologic data. Detailed gravity trends are not resolved within the wilderness because no gravity stations exist within several miles of its border.

**MINING DISTRICTS AND MINERALIZATION**

There is no mining activity within the wilderness at present, no production has been reported, no mineralization is discernible on the surface, and there is no evidence of prospecting in the wilderness. The wilderness is several miles southeast of the Tri-State zinc-lead mining district as broadly defined (Heyl and others, 1966), and is about 12 mi (20 km) from the McDowell deposit, the nearest known deposit of base-metal sulfides (McKnight and others, 1962). The McDowell and other small mines in Barry County have produced 507 tons (460 tonnes) of lead and 1,021 tons (926 tonnes) of zinc. A small prospect named the Wild Cat mine was opened on a show of galena in the Cotter Dolomite in the SW 1/4 NW 1/4 sec. 29, T. 23 N., R. 24 W., about 0.5 mi (0.8 km) east of the wilderness. Only sand, gravel, and limestone have been produced near the wilderness; some quarries are within 2 mi (3.2 km) of the wilderness. In the McDowell deposit in this area, but because of the lack of definition of the anomaly as well as the absence of specific data on the lithology of the basement in this area, the only inference possible is that a potential exists. This potential cannot be confirmed or ruled out without a detailed magnetic survey and physical (drilling) evidence of the basement lithology. If the anomaly is indeed caused by a magnetite deposit, the deposit is probably at a depth of at least 2,100 ft (640 m) below the upland surface, and is probably at least partly outside the boundary of the wilderness.

The wilderness has little potential for economic resources of industrial minerals that are not readily available elsewhere in the region. Dolomite and limestone occur within the wilderness, but abundant supplies are available in nearby areas. Sand, gravel, and limestone have been produced near the wilderness, and at the time of this investigation, quarries about 2 mi (3.2 km) south of the area were producing crushed stone from the Cotter Dolomite.
Figure 2.—Geologic map of the Piney Creek Wilderness.
DESCRIPTION OF MAP UNITS

Qal  ALLUVIUM (QUATERNARY)—Gravel, sand, and silt filling stream valleys

Mrs  REEDS SPRING FORMATION (LOWER MISSISSIPPIAN—OSAGEAN)—Gray to light-brown, thin- to medium-bedded, micritic to finely crystalline limestone. Includes 40-70 percent dark-gray to brown chert as irregular nodules and thin discontinuous beds. Weathers easily to a chert-strewn surface. Outcrops are rare in the Piney Creek area. Where formation is exposed, chert appears in weathered relief on ragged outcrops. Thickness about 80-100 ft (about 25-30 m)

Mp   PIERSON FORMATION (LOWER MISSISSIPPIAN—OSAGEAN)—Gray to light-brown, thin- to medium-bedded, fine- to medium-crystalline limestone, with as much as 50 percent gray to dark-gray chert occurring as nodules and beds predominantly in upper part. Generally separated from the Reeds Spring Formation by a thin shale layer. Formation name follows usage of Missouri Geological Survey. Thickness about 50 ft (15 m)

Mk   NORTHVIEW AND COMPTON FORMATIONS, UNDIVIDED (LOWER MISSISSIPPIAN—KINDERHOOKIAN)
Northview Formation—Red to gray limestone and green to light-blue-green shale; outcrops rare. Thickness about 1-3 ft (about 0.3-0.9 m)
Compton Formation—Light-gray to light-brown, medium- to thick-bedded, fine- to medium-crystalline limestone with light-green shale partings. Weathers to a characteristic wavy surface. Outcrops fairly common in roadcuts and on steep hillsides. Commonly forms a bench which is easily observed on aerial photographs. Thickness 15-20 ft (5-6 m)

Oc   COTTER DOLOMITE (LOWER ORDOVICIAN—CANADIAN)—Light-brown to gray, medium- to thick-bedded, fine-grained dolomite and minor chert. Weathers light or dark gray. Outcrops common along steep hill slopes and in valley floors. Thickness about 200 ft (60 m); base not exposed
There is no known potential for energy resources in the wilderness. The Ozark uplift is considered to be geologically unfavorable for oil and gas occurrence (Anderson and Wells, 1967). All the known coal-bearing strata in Missouri are of Pennsylvanian age; rocks as young as Pennsylvanian are not present in or near the wilderness, and in general southwestern Missouri is considered unfavorable for coal resources (Robertson, 1971). No evidence of potential for radioactive-mineral deposits or for geothermal-energy sources was found in the wilderness.

REFERENCES


