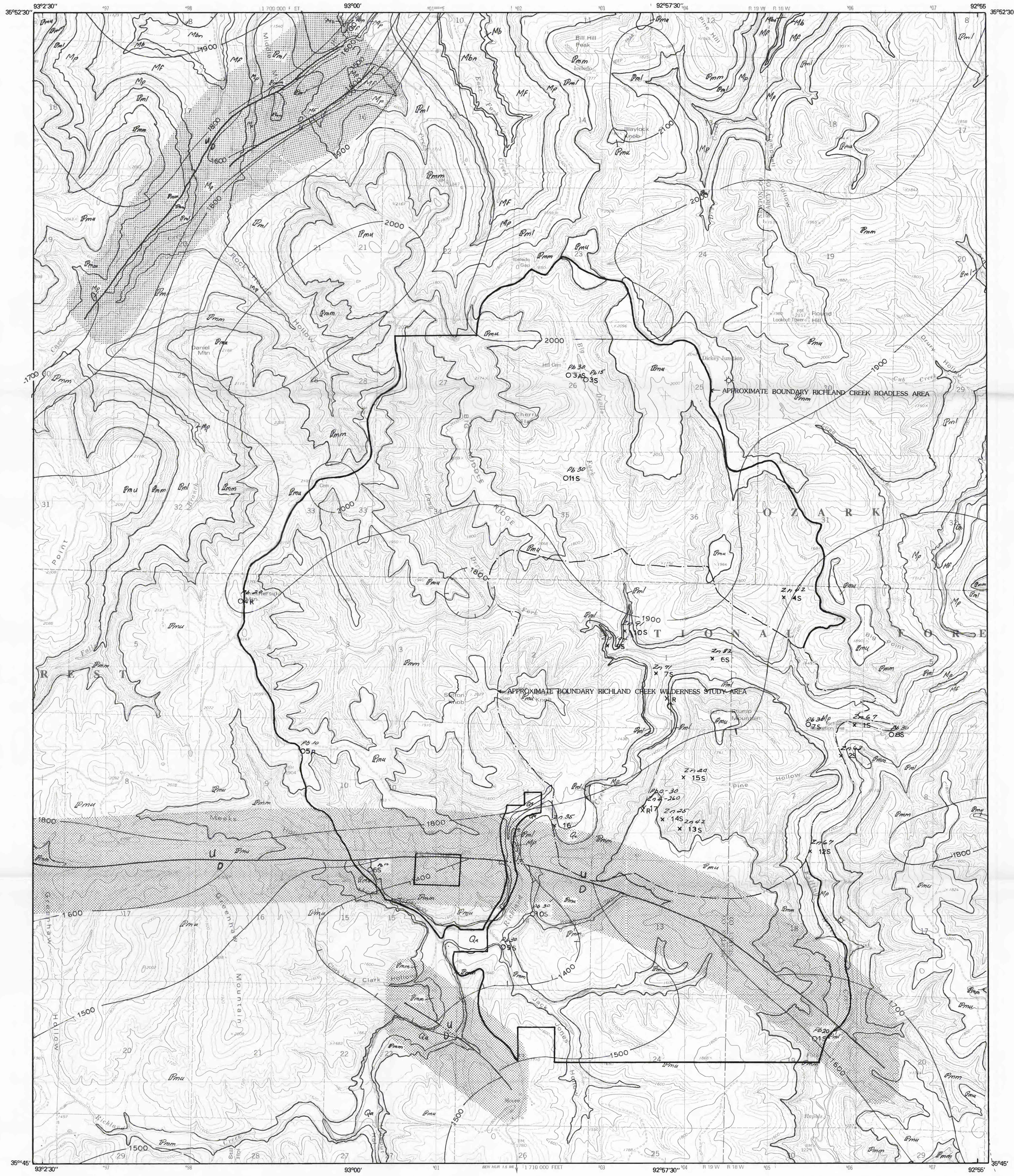
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF-1525
PAMPHLET ACCOMPANIES MAP



Base from U.S. Geological Survey
Lurton, Moore, 1980

SCALE 1:24 000

KILOMETERS

1 MILE

CONTOUR INTERVAL FEET
DATUM IS MEAN SEA LEVEL

Geology by E. E. Glick and S. E. Frezon, 1965, 1982

MINERAL RESOURCE POTENTIAL MAP OF THE RICHLAND CREEK ROADLESS AREA, NEWTON AND SEARCY COUNTIES, ARKANSAS

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CORRELATION OF MAP UNITS

Unit	Series	System
Qa		QUATERNARY
Pmu	Morrowan	PENNSYLVANIAN
Pmm	Morrowan	PENNSYLVANIAN
Pml	Morrowan	PENNSYLVANIAN
Mp	Chesterian	MISSISSIPPIAN
Mf	Chesterian	MISSISSIPPIAN
Mp	Chesterian	MISSISSIPPIAN
Mbn	Meremecian and Osagian	MISSISSIPPIAN

DESCRIPTION OF MAP UNITS

Qa ALLUVIUM (QUATERNARY)--Terrace and valley-fill deposits. Major constituents clay, silt, very fine sand, and gravel; material mapped includes colluvium, alluvium, alluvial-fan deposits, and dissected terrace deposits

MORROWAN SERIES (MIDDLE AND LOWER PENNSYLVANIAN)

Pmu Upper--Crossbedded, massive, fine- to coarse-grained sandstone unit underlies flat upland area; sandstone, shale, and siltstone that make up upper beds of this unit locally contain crinoid stems. Lower sandstone unit contains quartz pebbles. Thickness about 200 ft

Pmm Middle--Upper 250-300 ft of the middle Morrowan made up of dark-gray shale and fine- to medium-grained, massive, cross-laminated, glauconitic, limy sandstone; locally grades into sandy limestone. Layers commonly contain quartz pebbles and marine fossils. Basal unit complex channel fill of conglomerate, sandstone, and shale 100 ft thick. Thickness of unit 250-600 ft

Pml Lower--Sandstone, limestone, and interbedded shale make up the lower part of the Morrowan. Upper 100-200 ft is dark-gray silty shale; contains layers of clay ironstone and a few plant fossils. Thickness ranges from 0 to 340 ft

Mp PITKIN LIMESTONE (MISSISSIPPIAN)--Medium-gray massive limestone containing a few beds of dark-gray limy shale; crops out in cliffs and steep slopes in northern and east-central parts of area. Upper and middle beds contain abundant oolites. Lower beds grade upward into poorly exposed medium-gray limy shale and a few beds of limestone, which are silty in part; locally contain fine quartz grains. Bryozoans, crinoids, brachiopods, pelecypods, and corals are common throughout formation. Total thickness about 230 ft

Mf FAYETTEVILLE SHALE (MISSISSIPPIAN)--Ninety percent dark-gray shale and 10 percent dark-gray microcrystalline petroliferous limestone. Upper half of formation, mainly limestone, contains brachiopods, bryozoans, and crinoids; lower half of formation, predominantly shale, contains conodonts and pelecypods; middle and upper units of formation phosphatic. Thickness about 180-220 ft

Mb BATESVILLE SANDSTONE (MISSISSIPPIAN)--Light- to medium-gray, silty, fossiliferous limestone that contains oolites and very fine sand; thin dark-gray and brownish-gray shale and dark-gray siltstone beds near base. Thickness about 30 ft

Mbn BOONE FORMATION (MISSISSIPPIAN)--Upper unit interbedded light-gray, medium-crystalline, fossiliferous limestone and medium-gray to brownish-gray chert. Middle unit, 0-50 ft thick, brownish-gray, medium-bedded, clayey, very finely crystalline limestone; contains many crinoid fragments and some other unidentified fossils. Basal unit persistent sandstone, 0.5-10 ft thick, consists of well-rounded, fine- to coarse-grained sand, phosphatic pebbles, glauconite, and pyrite; contains conodonts. Total thickness about 375 ft

—1700— STRUCTURE CONTOUR DRAWN ON BASE OF UPPER MORROWAN--Contour interval 100 ft

U/D FAULT--U, upthrown side; D, downthrown side; dotted where concealed

DIRECTION OF DIP OF STRATA

APPROXIMATE BOUNDARY, ROADLESS AREA

APPROXIMATE BOUNDARY, WILDERNESS STUDY AREA

AREA OF ZINC AND LEAD POTENTIAL

CONTACT

Zn 42 X 45 STREAM-SEDIMENT SAMPLE LOCALITY, WILDERNESS STUDY AREA--Zinc and lead content in parts per million

Pb 0-30 Zn 4-260 X R 17 ROCK SAMPLE LOCALITY, WILDERNESS STUDY AREA--Zinc and lead content in parts per million

Pb 30 O 7S STREAM-SEDIMENT SAMPLE LOCALITY, ROADLESS AREA--Zinc and lead content in parts per million

Pb 20 O 4R ROCK SAMPLE LOCALITY, ROADLESS AREA--Zinc and lead content in parts per million

MEASURED SECTION SAMPLE LOCALITY

DRILL HOLE

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 their mineral resource potential. Results must be made available to the public and be submitted to the President and the Congress. This report presents the results of a mineral survey of the Richland Creek Roadless Area in the Ozark National Forest, Newton and Searcy Counties, Ark. Richland Creek Roadless Area (08001) 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.

SUMMARY

There is no record of mineral production from within the roadless area. Zinc and lead have been produced from the Boone and Everton Formations in northern Arkansas. On the basis of available information there is a low potential for zinc and lead resources in the Boone and Everton Formations within the roadless area. Only exploratory drilling will confirm or rule out the existence of such resources.

Most of the area is under lease for oil and gas, but two holes drilled near the eastern boundary outside the area were dry holes. There is a low potential for oil and gas. Although the Fayetteville Shale and shales from the middle Morrow Series are somewhat petroliferous (Haley and others, 1980), the potential for oil shale is considered to be low.

INTRODUCTION

Location and Topography

The Richland Creek Roadless Area covers about 8,620 acres of the Ozark National Forest in Newton and Searcy Counties in north-central Arkansas. This area is about 34 mi north of Russellville, Ark., and about 6 mi east of Lurton, Ark.

Access to the northern, western, and eastern borders of the area is by U.S. Forest Service roads. On the south, access is by trail from U.S. Forest Service roads. Nearly all the area is densely timbered. It is cut by Richland Creek and Falling Water Creek and their tributaries.

Elevation in the area ranges from about 1,120 ft along Falling Water Creek in the southern corner to about 2,000 ft on Big Middle Ridge in the northern part. Beds of the upper Morrowan Series form resistant caps on higher hills.

The map includes Richland Creek Roadless Area and Richland Creek Wilderness Study Area (Haley and others, 1980). Sample localities shown on the map are from the wilderness study area and the roadless area.

GEOLOGY

Formations that crop out in the roadless area, from oldest to youngest, are: Mississippian Boone Formation, Batesville Sandstone, Fayetteville Shale, Pitkin Limestone; and Pennsylvanian lower, middle, and upper beds of the Morrowan Series (Glick and Frezon, 1965; E. E. Glick, written commun., March 12, 1982). Units present in the subsurface, youngest to oldest, are: Devonian or Silurian Lafferty, Silurian St. Clair and Brassfield Limestones, and Ordovician Cason Shale, Fernvale Limestone, Plattin Limestone, and St. Peter Sandstone. The Ordovician Everton Formation and Powell Dolomite may be present in the subsurface in the area (Glick and Frezon, 1965; Haley and others, 1980).

STRUCTURE

The Richland Creek Roadless Area is on the southern margin of the Ozark Dome. A normal fault that cuts across the southern part of the area has a maximum displacement of 280 ft (Glick and Frezon, 1965; Haley and others, 1980).

GEOCHEMISTRY

Nine stream-sediment and two rock samples were collected from major streams and selected tributaries in or near the Richland Creek Roadless Area. One rock sample (no. 4) is from oxidized sandstone in the upper Morrowan Series, and one (no. 1) from shales in the middle Morrowan Series. Haley and others (1980) collected 16 stream-sediment, 3 soil, and 13 rock samples from the Richland Creek Wilderness Study Area. An additional 30 rock samples were collected from a measured section of Bloyd Shale and the Prairie Grove and Cane Hill Members of the Hale Formation by E. E. Glick (Glick and Frezon, 1965).

All stream-sediment samples were sieved, and the minus-50-mesh fraction of each was split and analyzed for 31 elements by a six-step semiquantitative spectrographic method (Grimes and Marranzino, 1968). Haley and others (1980) used the minus-80-mesh fraction of samples for spectrographic analyses. All rock samples were analyzed by the same spectrographic method.

Spectrographic analyses of stream-sediment and rock samples from the Richland Creek Roadless Area and Richland Creek Wilderness Study Area do not indicate any areas of anomalously high metal content. Zinc concentrations in some samples (as much as 120 ppm) are slightly higher than background values, but are not considered significant (Haley and others, 1980). Lead concentrations (as much as 30 ppm) are not anomalous.

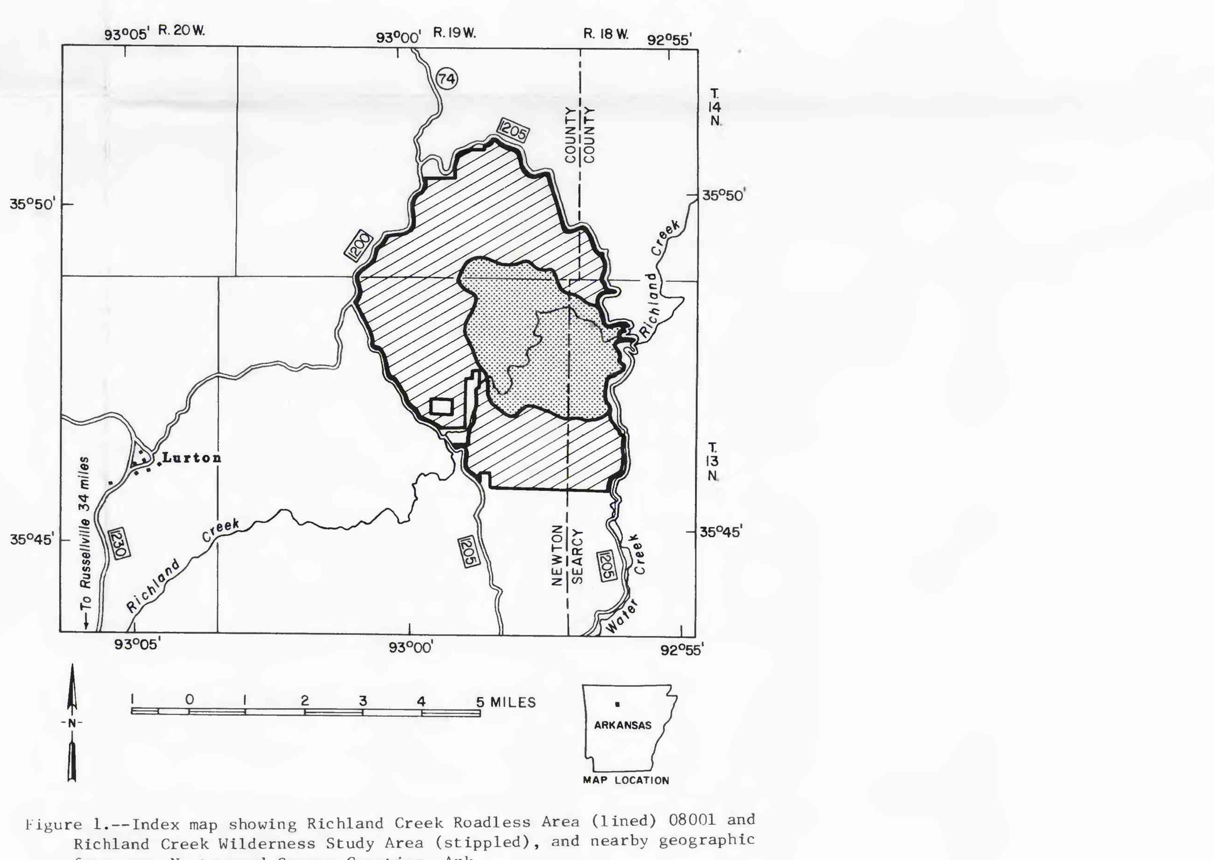

Figure 1.--Index map showing Richland Creek Roadless Area (lined) 08001 and Richland Creek Wilderness Study Area (stippled), and nearby geographic features, Newton and Searcy Counties, Ark.

GEOPHYSICS

No detailed magnetic or gravimetric surveys have been made of the roadless area. A Bouguer gravity map of Arkansas (Hendricks and others, 1981) shows no anomalous areas within or near Richland Creek Roadless Area. Four gravity stations are on or near the roadless area boundary.

MINING DISTRICTS AND MINERALIZATION

No mining districts lie in or adjacent to the roadless area. Past mining activity appears to be limited to claim staking in the late 1800's and early 1900's. During World War I minor amounts of zinc and lead concentrates were produced from the Cave Creek district about 3 mi north of the area (Stroud and others, 1969). Deposits in this district are in faults and fractures in the Boone Formation (McKnight, 1935), which underlies the Richland Creek Roadless Area.

In 1981 most of the area was under lease for oil and gas. Two exploratory oil and gas wells drilled adjacent to the eastern boundary of the area were dry holes. According to Haley and others (1980), the Batesville Sandstone, Fayetteville Shale, Pitkin Limestone, and middle and upper Morrowan units are possible reservoir rocks for natural gas. The Fayetteville Shale and middle and upper Morrowan units may be a source of shale oil. All these units underlie the Richland Creek Roadless Area.

Oolitic phosphorite occurs in the lower Morrowan unit (Glick and Frezon, 1965), and Haley and others (1980) reported phosphorites as much as 2 ft thick in the Fayetteville Shale underlying the area. The phosphorite is too thin and covers too small an area to be considered a resource (J. B. Cathcart, written commun., December 20, 1982). The lower Morrowan unit is exposed along Falling Water Creek and underlies the Richland Creek Roadless Area at depths as much as 800 ft; the Fayetteville Shale is 20-50 ft below the Morrowan.

ASSESSMENT OF MINERAL RESOURCE POTENTIAL

A low potential for zinc-lead deposits exists in the Boone Formation underlying the southern part of the Richland Creek Roadless Area where strata are faulted. The nearest zinc-lead deposits are in surface exposures of the Boone Formation associated with faulting in the Cave Creek mining district, 3 mi north of the roadless area.

On the basis of available information the area has a low potential for oil and gas, because some of the rock units underlying the area are potential petroleum reservoir rocks. The roadless area has a very low potential for oil shale from the Fayetteville Shale and the middle and upper Morrowan units.

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