



CORRELATION OF MAP UNITS

Pa	Atokan	PENNSYLVANIAN
Pamu	Morrowan	
Pmm	Morrowan	
Pch		MISSISSIPPIAN
Mp	Chesterian	
Mb		
Mbn	Osagean	

DESCRIPTION OF MAP UNITS

- Pa ATOKA FORMATION (PENNSYLVANIAN)--Alternating shale and sandstone beds; shale dominant rock. Thickness of unit about 320 ft.
- Pamu ATOKA FORMATION, LOWER, AND MORROWAN UNIT, UPPER, UNDIVIDED (PENNSYLVANIAN)--Crossbedded, coarse-grained sandstone, about 60 ft thick. Tan sandstone containing minor amounts of siltstone. Thickness of unit about 250 ft.
- Pmm MORROWAN UNIT, MIDDLE (PENNSYLVANIAN)--Light-gray limestone beds and a few siltstone and sandy shale layers in upper part of unit. Lower beds are sandy, gray limestone. Contains crinoids, brachiopods, gastropods, and trilobites. Thickness about 180 ft.
- Pch HALE FORMATION, CAVE HILL MEMBER (PENNSYLVANIAN)--Interbedded sandstone, siltstone, and shale layers; in places crossbedded and ripple marked. Thickness about 100-150 ft.
- Mp PITKIN LIMESTONE (MISSISSIPPIAN)--Massive, compact, light-gray oolitic limestone; sandy in places; contains abundant crinoids, brachiopods, and bryozoan Archimedes; has petroliferous odor when broken. Thickness about 100 ft.
- Mb FAYETTEVILLE SHALE (MISSISSIPPIAN)--Interbedded shale, siltstone, minor sandstone layers; shale is black, fissile, silty. Limonite-stained concretions in lower shale layers; shale has petroliferous odor when broken. Thickness ranges from about 80 to 200 ft.
- Mbn BATESVILLE SANDSTONE (MISSISSIPPIAN)--Fine- to medium-grained sandstone; upper part contains a few limestone beds; sandstone beds crossbedded locally. Thickness about 10 to 25 ft.
- Mbn BOONE FORMATION (MISSISSIPPIAN)--Made up mainly of medium to very thick limestone beds. Limestone near top contains several chert lenses; most beds contain brachiopods and crinoids. Thickness ranges from 220 to 400 ft.

- CONTACT
- APPROXIMATE BOUNDARY, WILDERNESS AREA
- APPROXIMATE BOUNDARY, ROADLESS AREA
- SAMPLE LOCALITY--S, stream-sediment; R, rock; may be combined with symbol showing element content in parts per million
- STRUCTURE CONTOURS--Drawn on top of Pitkin Limestone; contour interval 50 ft

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 Upper Buffalo Wilderness and the Buffalo Addition Roadless Areas in the Ozark National Forest, Newton County, Ark. The Upper Buffalo Wilderness was established by Public Law 93-622, January 3, 1975, and the Buffalo Addition Roadless Areas (08003) were recommended for wilderness designation during the Second Roadless Area Review and Evaluation (RARE II) by the U.S. Forest Service, January 1979.

MINERAL RESOURCE POTENTIAL SUMMARY STATEMENT

There is no evidence of metallic mineral resource potential in the Upper Buffalo Wilderness and the Buffalo Addition Roadless Areas except lead and zinc. Zinc and lead have been mined about 3 mi outside the study area near Boxley and Ponca, Ark., from fractures and minor faults in the Mississippian Boone Formation. There are no known zinc or lead occurrences or prospects within the study area, and the potential for zinc and lead deposits in the Upper Buffalo Wilderness and the Buffalo Addition Roadless Areas is very low. Although black shales in the study area contain minor amounts of uranium, these concentrations do not constitute a resource. Oil and other hydrocarbons are present in minor amount in Pennsylvanian shale in the region; however, the potential for oil and gas is low in the study area. Limestone and sandstone in the study area probably are suitable for construction purposes, and shale probably is suitable for building brick, but it is unlikely they would be used. Shale, limestone, and sandstone are readily available elsewhere in Newton County.

INTRODUCTION

The Upper Buffalo Wilderness and the Buffalo Addition Roadless Areas cover 10,590 and 1,504 acres, respectively, in the Ozark National Forest, Newton County, Ark. The wilderness and roadless areas are collectively referred to in this report as "the study area." The study area is about 38 mi southwest of Harrison and about 22 mi north of Clarksville, Ark. Access to the study area is via State Highways 21 and 16 and U.S. Forest Service roads and trails. Interior access is by unmaintained roads and trails, some of which are shown on the map. Access to the interior of the study area is severely hindered by 40- to 80-ft bluffs at an elevation of about 1,900 ft.

This study area is in the Boston Mountain section of the Ozark Plateaus physiographic province. Elevations range from 1,240 ft on the Buffalo River at the northern boundary to 2,463 ft on Turner War Knob. The Buffalo River bisects the area in a deeply incised valley.

Most surface and mineral rights in the Upper Buffalo Wilderness and all surface and mineral rights in the Buffalo Addition Roadless Areas are federally owned. Surface and mineral rights for 3.5 percent of the wilderness are in private ownership, and mineral rights for 4.2 percent of the federally owned surface are privately owned. Oil and gas rights are reserved until the year 2033 for about 1.5 percent of the Upper Buffalo Wilderness (Armstrong and Dunn, 1982, fig. 4).

A geologic map of the study area was prepared by E. E. Glick in 1976. A reconnaissance of the study area was made in 1979 by M. K. Armstrong and M. L. Dunn. M. H. Miller and M. C. Smith conducted a geological and mineral survey of the study area in 1982.

The U.S. Bureau of Mines personnel collected 20 samples of limestone, sandstone, and shale, which were analyzed for 40 elements by semiquantitative spectroscopy at the U.S. Bureau of Mines Research Center, Reno, Nev. The Research Center also performed radiometric determinations of U_{30} content for select samples. Ceramic properties of all shale samples were evaluated by the U.S. Bureau of Mines Tuscaloosa Research Center, Tuscaloosa, Ala. Oil content of select samples was determined by Fischer assay by the U.S. Department of Energy Laramie Energy Technology Center, Laramie, Wyo. Smith and Miller collected 1 rock and 13 stream-sediment samples, which were analyzed for 31 elements by semiquantitative spectrographic methods.

APPRECIATION

Appreciation is expressed to personnel of the U.S. Forest Service in Russellville and Jasper, Ark., and to R. H. Konigs, Department of Geology, University of Arkansas, Fayetteville, for helpful information about the region. A special thanks is extended to Sandy Swayne and Anne Holmes of the Circle Seven Riding Stable, Inc., Jasper, Ark., for providing horses for use in the study area as well as for considerable moral support.

GEOLOGY

Strata in the Upper Buffalo Wilderness and the Buffalo Addition Roadless Areas dip southward about 50 ft per mi. Mississippian formations exposed in the study area are the Boone Formation, the Batesville Sandstone, the Fayetteville Shale, and the Pitkin Limestone. The Pennsylvanian Cave Hill Member of the Hale Formation unconformably overlies the Pitkin. Other Pennsylvanian formations exposed in the study area are the middle and upper Morrowan units and the Atoka Formation.

No faults have been mapped in the Upper Buffalo Wilderness or the Buffalo Addition Roadless Areas. Interpretation by Smith (1976) of lineaments shown on ERTS (Earth Resources Technology Satellite) imagery indicates that the alignment of zinc-lead deposits in the Ponca-Boxley mining district coincides with a north-south-trending lineament, which is about 1 mi northwest of the study area. It is thought that this and similar lineaments reflect major fractures or shear zones in the study area. Selected lineaments functioned as channels for fluid migration (Konig, 1974). Kirk and Walters (1968) show another lineament that crosses the wilderness coincident to part of the upper Buffalo River. This lineament is not verified by geochronological or geophysical data.

GEOCHEMISTRY

For this study, 13 stream-sediment samples and 21 rock samples were collected from the Upper Buffalo Wilderness and the Buffalo Addition Roadless Areas. The rock samples were analyzed by semiquantitative spectrographic methods (Armstrong and Dunn, 1982). The 13 stream-sediment samples were sieved, and the minus-50-mesh fraction from each was analyzed for 31 elements by a six-step, semiquantitative spectrographic method (Grimes and Maranzino, 1968) and by atomic-absorption methods for U_{30} , zinc, cadmium, bismuth, antimony, and arsenic. Selected samples were radiometrically analyzed for U_{30} ; the average content was less than 0.002 percent U_{30} (Armstrong and Dunn, 1982). A Fischer assay of a sample of Fayetteville Shale yielded small amounts of oil (1.9 gal/ton).

One stream-sediment sample and 20 rock samples contained zinc (10-1,000 ppm) and all but one stream-sediment sample contained very small amounts of lead (10-30 ppm). Although the zinc content of six samples is somewhat higher than the background value (200 ppm), the zinc content is not considered significant.

On the basis of available data there appear to be no major areas of metallic mineralized rock at the surface in the Upper Buffalo Wilderness and the Buffalo Addition Roadless Areas.

GEOPHYSICS

No detailed ground magnetic or gravimetric surveys have been made of the study area. Smith (1978) conducted a ground magnetic survey and a gravity traverse of the Ponca lineament, which crosses the region about 1 mi northwest of the study area. Smith's interpretation of these data suggests major fracture or shear zones cutting the Earth's crust parallel or coincident to the lineament. A Bouguer gravity map of Arkansas (Hendricks and others, 1981) shows a gravity low just southwest of the study area. Widely spaced gravity stations effectively mask minor highs and lows; thus, no anomaly appears to coincide with either the Ponca lineament or the lineament that parallels the Buffalo River.

MINING DISTRICTS AND MINERALIZED AREAS

There are no patented mining claims, and no mines or prospects were found in the Upper Buffalo Wilderness or the Buffalo Addition Roadless Areas. The Ponca-Boxley and Little Buffalo zinc-lead districts are about 3 mi north and northeast of the study area. Ores in these districts, mainly zinc carbonate and galena, occur principally in fractures and minor faults in the Mississippian Boone Formation (McKnight, 1935). The Ponca-Boxley mining district, active periodically from the Civil War through World War I, produced about 4,600 tons of zinc and lead concentrates. The Little Buffalo mining district produced about 3,300 tons of zinc and lead concentrates. In other areas of northern Arkansas, zinc and lead deposits have also been mined from the Ordovician Everton Formation (McKnight, 1935; Stroud and others, 1969).

The Mississippian Boone Formation crops out along the upper Buffalo River near the northern boundary of the study area and underlies the entire study area. The Ordovician Everton Formation crops out near Ponca about 7 mi northeast of the study area, and probably is present in the subsurface in the study area. The Boone and Everton Formations in the study area may possibly contain zinc and lead minerals.

Formations that yield dry gas in the Arkoma basin, about 20 mi southwest of the study area, are exposed and lack favorable structure in the region near the study area, indicating a low probability for structurally trapped oil and gas. Oil seeps and other hydrocarbon indicators occur in formations also present in the study area (Cronis, 1930). Several exposures of Pitkin Limestone and Fayetteville Shale gave off a strong petroliferous odor when struck with a hammer, which suggest that where favorable stratigraphic traps exist these strata may be potential reservoir or source rocks. These favorable conditions may exist in the Boston Mountains near the study area.

Black shales in the study area contain minor amounts of uranium, but the concentrations are not significant (Armstrong and Dunn, 1982). Several rock formations present in the study area are suitable for aggregate or building stone, and shales may be suitable for use as building brick. Formations having similar qualities of aggregate or building stone are more accessible to local markets.

ASSESSMENT OF MINERAL RESOURCE POTENTIAL

The Boone Formation, present in the Upper Buffalo Wilderness and the Buffalo Addition Roadless Areas, contains zinc and lead deposits in other areas of Newton County, in other northern Arkansas counties, and in the Tri-State mining district, southwest Missouri. Zinc and lead deposits in the Ponca-Boxley and Little Buffalo mining districts, about 3 mi north and northeast of the study area, are in fractures and minor faults, mainly in the Boone Formation. No faults were mapped in the study area, and the possibility of locally major deposits of zinc and lead seems unlikely. The potential for zinc and lead in the study area is very low.

Although oil and hydrocarbons are present in the region in minor amounts in the Pitkin Limestone and Fayetteville Shale, the potential for oil and gas in the study area is low.

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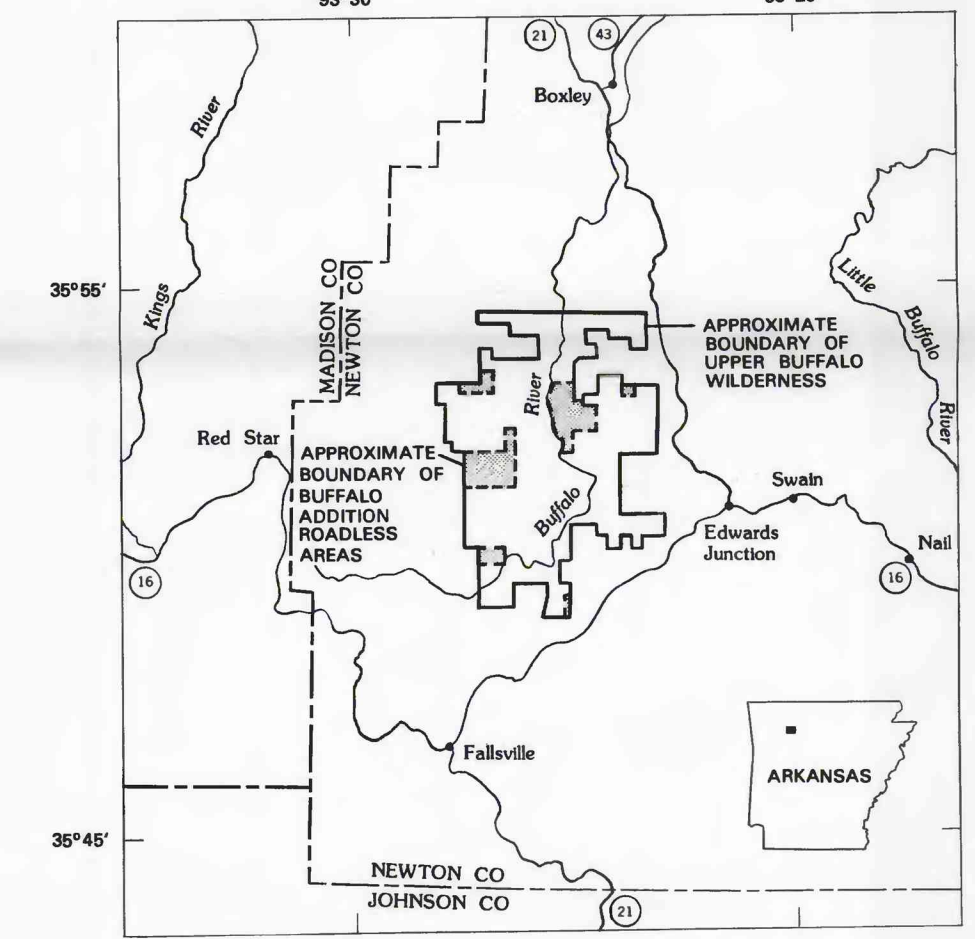
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INDEX MAP SHOWING LOCATION OF THE UPPER BUFFALO WILDERNESS AND THE BUFFALO ADDITION ROADLESS AREAS (STIPPLED) (08003), NEWTON COUNTY, ARK.

MINERAL RESOURCE POTENTIAL AND GEOLOGIC MAP OF THE UPPER BUFFALO WILDERNESS AND THE BUFFALO ADDITION ROADLESS AREAS, NEWTON COUNTY, ARKANSAS

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