

Figure 1.—Index map showing location of the Burden Falls Roadless Area and other roadless areas in southeastern Illinois.

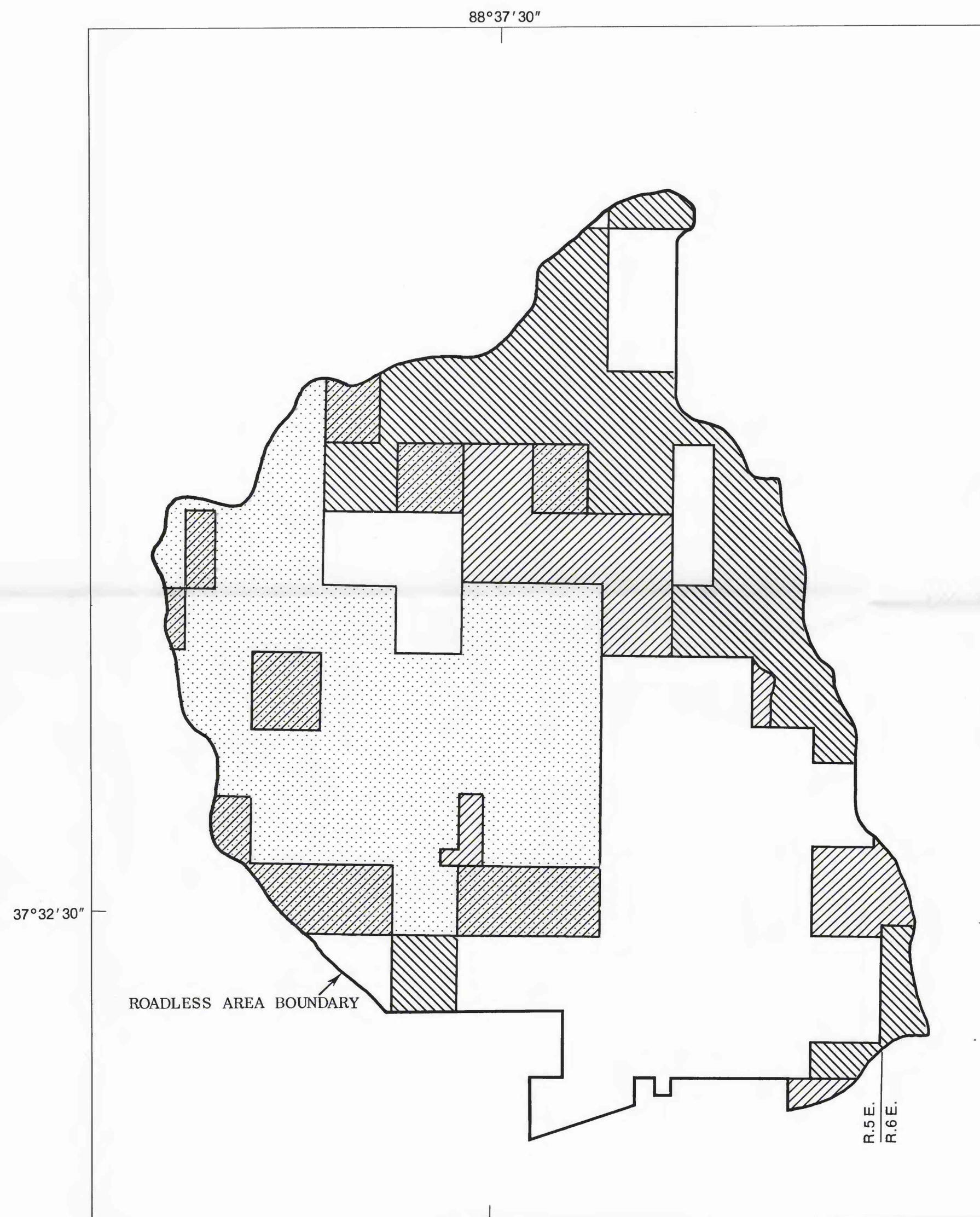


Figure 2.—Surface- and mineral-rights ownership within the Burden Falls Roadless Area.

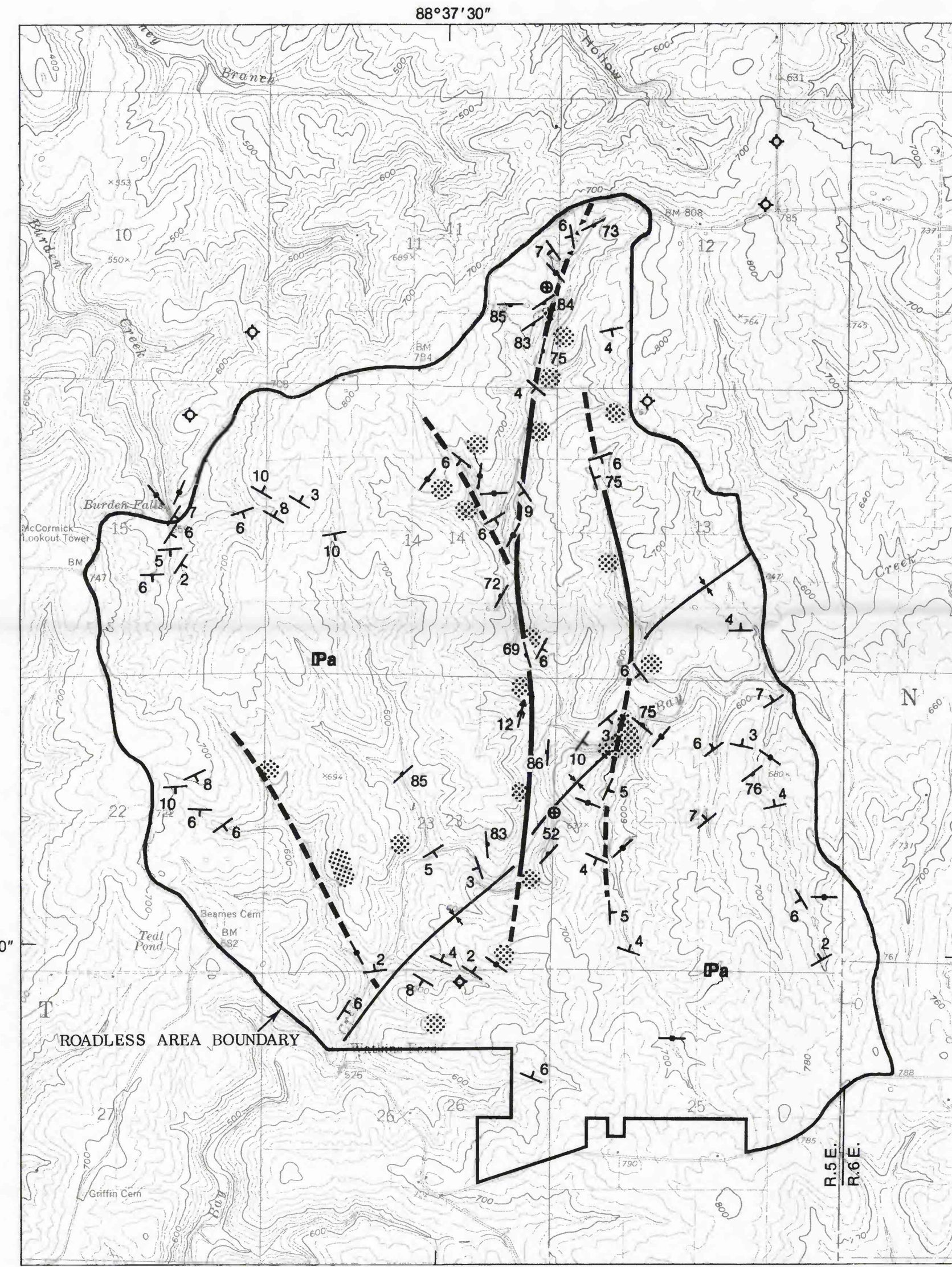


Figure 3.—Geologic map of the Burden Falls Roadless Area.

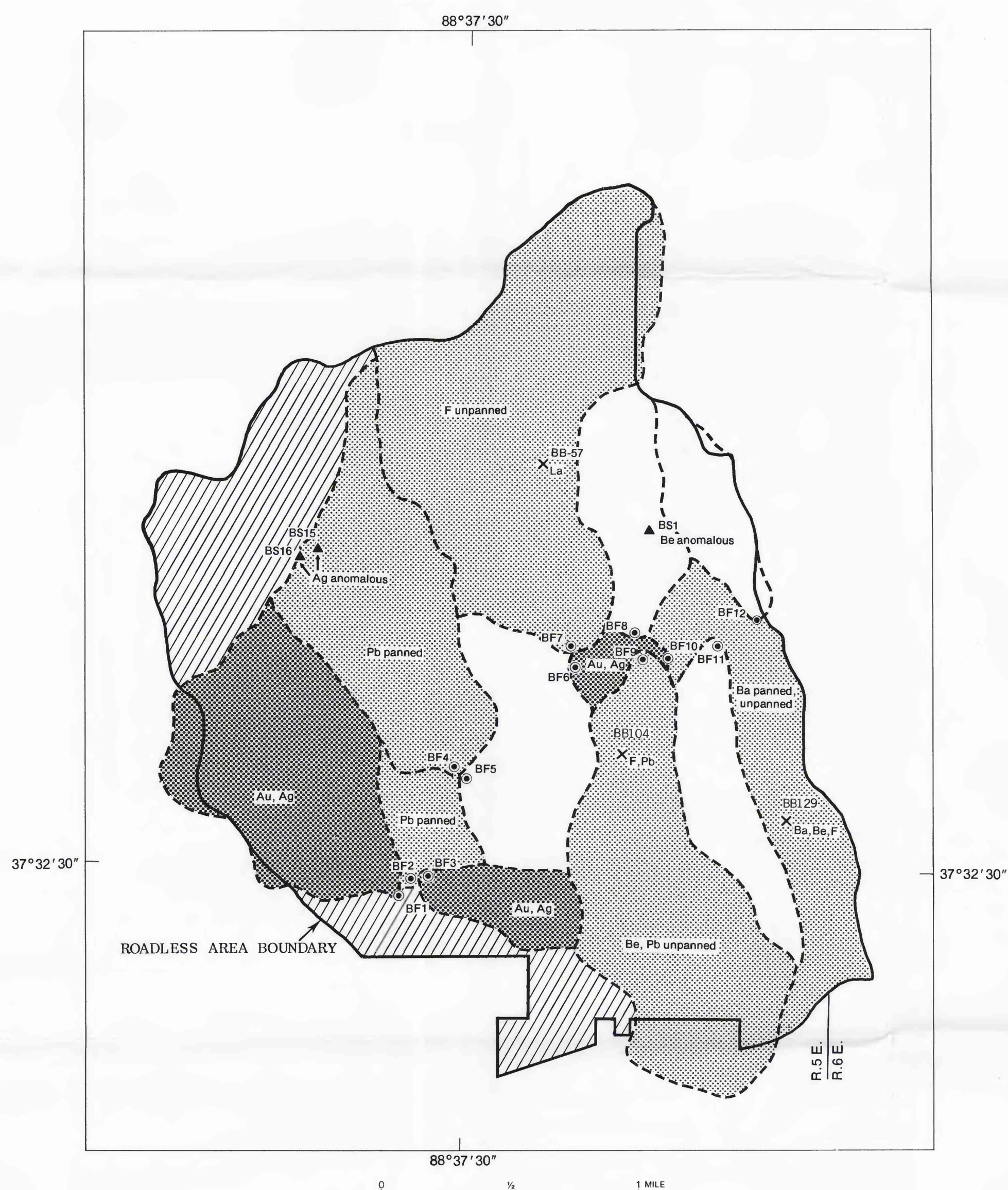


Figure 4.—Drainage basins sampled in the Burden Falls Roadless Area and localities of high or anomalous elemental concentrations in soil and stream-sediment samples (Klaser and Day, in press). Anomalous means that the elemental value is greater than two standard deviations above the mean.

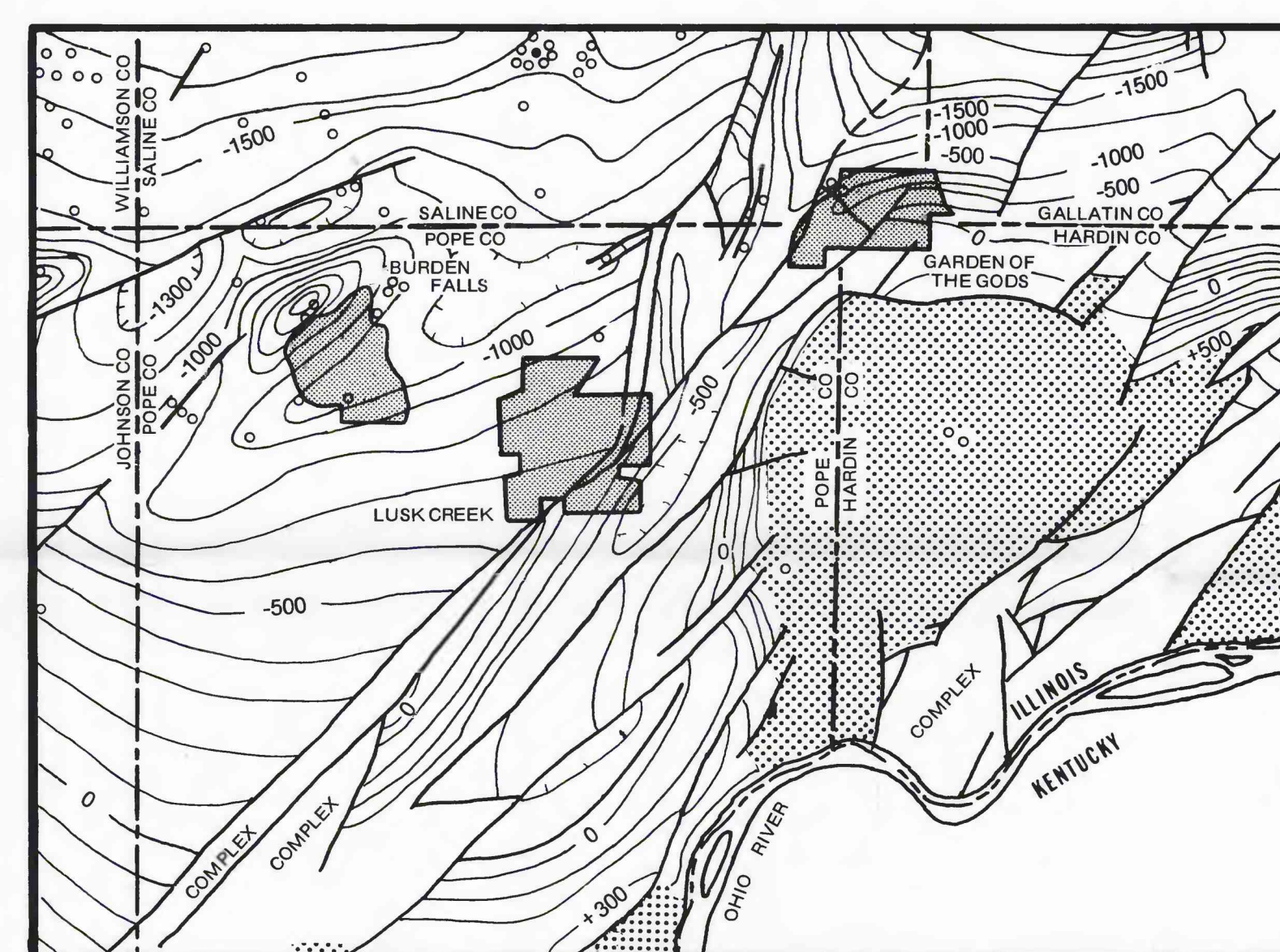


Figure 5.—Structure-contour map of the Mississippian-age Beech Creek Limestone and localities of an oil well and dry holes relative to the Burden Falls Roadless Area. Structure from Bristol (1967).

Table 1.—Comparison of elemental abundances in rocks from the Burden Falls Roadless Area with average crustal abundances of elements as given in Turekian and Wedepohl (1967). [All figures in parts per million (ppm)]

Element	SHALE 3 samples		SANDSTONE 14 samples	
	T	H/A	T	H/A
Ba	580	300/217	x0.	150/88
Be	3	3/2	0.x	1/1
F	240	300/200*	270	100/N
Pb	20	50/25	7	50/N

T = Crustal abundances from Turekian and Wedepohl.
H = Highest value measured in Burden Falls Roadless Area.
A = Average value measured in Burden Falls Roadless Area.
x0., 0.x, 0.x-tens of ppm.
0.x-tenths of ppm.
N = Element not detected at limit of detection.
* Two samples had values of 300 and the other had a value 100; the exact value is not known.

MINERAL RESOURCE POTENTIAL MAP OF THE BURDEN FALLS ROADLESS AREA, POPE COUNTY, ILLINOIS

By
John S. Klaser, U.S. Geological Survey and Western Illinois University
T. M. Kehn, U.S. Geological Survey
and
Robert M. Thompson, U.S. Bureau of Mines
1983

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 represents the results of a mineral resource survey of the Burden Falls Roadless Area (69-103) in the Shawnee National Forest, Pope County, Ill. Burden Falls Roadless Area was classified as a further planning area during the Second Roadless Area Review and Evaluation (RARE II) by the U.S. Forest Service, January 1978.

SUMMARY

The Burden Falls Roadless Area contains 3658 acres in the Shawnee National Forest, Pope County, Ill. Bedrock consists of gently dipping beds of sandstone of Pennsylvanian age, partly covered with loess of Pleistocene age. Several faults of unknown displacements cut the bedrock. Rock suitable for construction material is the only identified mineral resource. Numerous sources of similar rock outside the study area are more readily accessible. There is low resource potential for fluorspar, coal, oil, and gas.

DESCRIPTION OF AREA

The Burden Falls Roadless Area (fig. 1) covers 3658 acres in the Shawnee National Forest, Ill. It is located in T. 11 S., R. 5 and 6 E., about 4 mi northwest of Eddyville, Ill. Access to the area is good via a network of county roads, but only a few jeep trails penetrate the interior. Altitudes range from about 526 ft near Watkins Ford in the southwest corner of the study area to about 300 ft in the northwest corner; local relief is much less than the maximum regional relief of 274 ft. The area is drained by Big Creek, which flows southwest through the area, and by Burden Creek, which flows north from its origin in the northwest part of the study area.

SURFACE- AND MINERAL-RIGHTS OWNERSHIP

Forest Service records indicate Federal ownership of about 82 percent of the surface rights and 62 percent of the mineral rights within the study area (fig. 2). Federal-land tracts are designated as having outstanding mineral rights where one or more mineral commodities are retained under purchase or exchange under the authority of the Weeks Act of 1911 by the U.S. Department of Agriculture, Forest Service.

An oil and gas lease application, filed in 1972, includes about 36 percent of the roadless area (fig. 2). Portions of the area applied for under that document have oil and gas rights held by private interests.

GEOLOGY

The Burden Falls Roadless Area is located in the loess-covered unglaciated Shawnee Hills section of the Interior Low Plateaus Physiographic Province (Leighton and others, 1948). Structurally, it lies near the southern edge of the Illinois Basin within strata of Pennsylvanian age. The axis of the McCormick anticline (Treworgy, 1961) is located along its northwest margin, and the study area is situated about 6 mi west of the Lusk Creek fault zone (Weller and others, 1952), which marks the western edge of the Illinois-Kentucky fluorspar district.

Bedrock consists primarily of gently dipping beds of Pennsylvanian sandstone as shown in figure 3. Major structures in the area are a northeast-trending syncline and north-trending faults of unknown displacement which appear to offset the synclinal axis (Klaser, in press).

MINERAL RESOURCE POTENTIAL

The only identified mineral resource in the Burden Falls Roadless Area is rock suitable for construction materials. Other commodities that may be present in the area but have low resource potential include fluorspar and associated barite, galena and sphalerite, as well as coal, oil, and gas. Silver and gold were detected in the geochemical samples (Klaser and Day, in press [a]), but not in quantities large enough to suggest the presence of a potential resource.

Construction Materials

Sandstone from this area could be utilized as construction fill for local projects, but numerous sources of this type of material are present throughout the Shawnee Hills. Analyses of Pennsylvanian sandstone samples range in silt content from 88 to 93 percent, generally greater than 1 percent Fe₂O₃, and moderate amounts of other impurities, indicating that the sandstones have little potential as a source of high-silica sand (Thompson, 1981, p. 11).

Preliminary ceramic evaluation of samples of an exposed shale indicate potential use for structural-clay products (Thompson, 1981, p. 11). This shale is overlain by thick beds of sandstone, however, and is too thin to be a potential resource.

Fluorspar and Associated Minerals

Because barite, galena, and sphalerite are commonly associated with deposits of fluorspar, they are considered jointly in the following discussion. Geochemical data (Klaser and Day, in press [a]) indicated that the major indicator elements for fluorspar, including beryllium, barium, fluorine, and lead, occur in rock from the study area at values that are about the same as or lower than average crustal concentrations of these elements (Turekian and Wedepohl, 1967) for the same rock types (table 1). Zinc, which also commonly occurs with fluorspar, was not detected spectrographically in any bedrock samples at a limit of detection of 200 parts per million (ppm). The association of anomalous values (two standard deviations above the mean) of fluorspar-indicator elements with magmatic rocks in the study area, however, suggests that some fluorspar and associated mineralization has taken place in the subsurface (fig. 4). But even these anomalous values are not significantly higher than average crustal values given in Turekian and Wedepohl (1967). In addition, geochemical data from the Lusk Creek Roadless Area (Klaser and Day, in press [a]), when compared with that from the Burden Falls Roadless Area, suggests that fluorspar mineralization was not as intense at Burden Falls as at Lusk Creek. Because of this, the Burden Falls Roadless Area has low fluorspar resource potential.

Coal

No outcrops of coal were found within the study area and available data indicate that only thin coal beds, estimated to be less than 14 in. thick, may occur in the area. These coal occurrences, however, could not be found. Traces of coal were reported in a few of the well logs near the study area and all beds are estimated to be less than 14 in. in thickness. No coal-resource estimates were made for the study area.

Oil and Gas

Resource potential for oil and gas in the Burden Falls Roadless Area is estimated to be low. As shown in figure 5, several dry oil and gas test holes have been drilled around the study area, as well as one within the study area boundary. Two of these holes were drilled on an anticline that lies along the northwest margin of the study area. Weller (1940, p. 59) reports that there were shows of oil in some of the test holes drilled near the study area, but none were of commercial interest.

Strata older than Mississippian have oil-producing potential elsewhere in Illinois (Bell and others, 1964) but have not been tested by any of the holes drilled near the Burden Falls Roadless Area. Weller (1940, p. 14), however, states that "prospects for oil and gas production in southern Illinois are not particularly favorable" and "the presence of fresh water in beds as old as Ordovician in several places and at considerable depth suggests that underground circulation may have been effective enough to flush out any oil that may have existed in some structurally favorable localities."

Even though oil and gas lease applications have been filed on 36 percent of the study area, the six oil test holes within and adjacent to the area, as well as Weller's data on deeper geologic horizons, indicates that the potential for commercial accumulations of oil and gas within the Burden Falls Roadless Area is low.

REFERENCES CITED

Bell, A.H., Atherton, Elwood, Buschbach, T.C., and Swann, D.L., 1964, Deep oil possibilities of the Illinois basin: Illinois State Geological Survey Circular 368, 38 p.
Bristol, H.M., 1967, Structure map on the base of the Beech Creek (Barlow) limestone in Illinois: Illinois State Geological Survey, scale 1 in. = 5 mi.
Klaser, J.S., in press, Geologic map of the Burden Falls Roadless Area, Pope County, Illinois: U.S. Geological Survey Miscellaneous Field Studies Map MF-1565-A.
Klaser, J.S. and Day, C.W., in press [a], Geochemical survey of the Burden Falls Roadless Area, Pope County, Illinois: U.S. Geological Survey Miscellaneous Field Studies Map MF-1565-B.
Klaser, J.S. and Day, C.W., in press [b], Geochemical survey of the Lusk Creek Roadless Area, Pope County, Illinois: U.S. Geological Survey Miscellaneous Field Studies Map MF 1495-B.
Leighton, M.M., Eblow, G.E., and Herbart, Leland, 1948, Physiographic divisions of Illinois: Illinois State Geological Survey Report of Investigation 129, 19 p.
Thompson, R.M., 1981, Mineral resource investigation, Burden Falls Rare II further planning area, Pope County, Illinois: U.S. Bureau of Mines Open-File Report MLA 82-81, 19 p.
Treworgy, J.D., 1961, Structural features in Illinois—a compendium: Illinois State Geological Survey Circular 315, 22 p.
Turekian, K.K., and Wedepohl, K.H., 1967, Distribution of the elements in some major units of the earth's crust: Geological Society of America Bulletin v. 72, p. 175-192.
Weller, J.M., 1940, Geology and oil possibilities of extreme southern Illinois—Union, Johnson, Pope, Hardin, Alexander, Pulaski and Massie Counties: Illinois State Geological Survey Report of Investigation 71, 71 p.
Weller, J.M., Grogan, R.M., and Tippie, F.E., 1952, Geology of the fluorspar deposits of Illinois: Illinois State Geological Survey Bulletin 76, 147 p.