DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF-1377-C
PAMPHLET

MINERAL RESOURCE POTENTIAL OF HERCULES GLADES WILDERNESS, TANEY COUNTY, MISSOURI

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Studies Related to Wilderness

Under the provisions of the Wilderness Act (Public Law 88-577, Sept. 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 Hercules Glades Wilderness, Mark Twain National Forest, Taney County, Missouri.

MINERAL RESOURCE POTENTIAL SUMMARY STATEMENT

Based on this study, the mineral resource potential in the Hercules Glades Wilderness is low. Upper Cambrian formations, which are known to contain economic deposits of lead, zinc, silver, and copper in the Viburnum Trend and Southeast Missouri mining districts, occur in the subsurface within the study area. Zinc and lead deposits in the Tri-State (Missouri-Kansas-Oklahoma) district occur mainly in rocks of Mississippian age; minor Mississippian outcrops occur within the study area. No unique features of the limestone and dolomites exposed in the study area would make them more valuable than similar materials found in abundant amounts throughout southwestern Missouri.

INTRODUCTION

The Hercules Glades Wilderness was mapped geologically, and samples were collected and analyzed to assess the mineral resource potential.

The geology and regional structural patterns are shown on U.S. Geological Survey Miscellaneous Field Studies Map MF-1377-A (Miller and others, 1981). U.S. Geological Survey Miscellaneous Field Studies Map MF-1377-B (Miller and Chesson, 1982) shows geochemical analyses of rock and stream-sediment samples collected from the study area.

The Hercules Glades Wilderness, outlined on the index map (fig. 1), comprises about 20 sq mi (52 sq km) of the Mark Twain National Forest in east-central Taney County, Missouri, approximately 40 mi (64 km) southeast of Springfield.

The principal access to the wilderness area is from Missouri State Highway 125, which passes along the eastern side of the study area. U.S. Highway 160 and Blair Ridge Road provide access from the south. The western and northern boundaries abut privately owned lands.

GEOLOGY

Surface Geology

Strata in southwestern Missouri are cut by faults that trend northwest, northeast, or east-west, but no faults are known to occur in the study area. Units are nearly horizontal, and the regional dip is about one-half degree west. Northeast-trending lineations observed on aerial photographs reflect fractures in bedrock.

The lowermost formation cropping out in the area of the Hercules Glades Wilderness is the Jefferson City Dolomite of Early Ordovician age. The upper 10–25 ft (3–7.5 m) of this formation is exposed along parts of Beaver and Cane Creeks in the northwestern and western parts of the area.

A chert breccia unit makes up the upper part of the Jefferson City Dolomite, and the contact between the Jefferson City and the Cotter Dolomites is placed at the top of this breccia unit. In this area, the major part of the Jefferson City is a light- to dark-gray, fine-grained, and massively bedded dolomite that is more than 150 ft (45 m) thick.

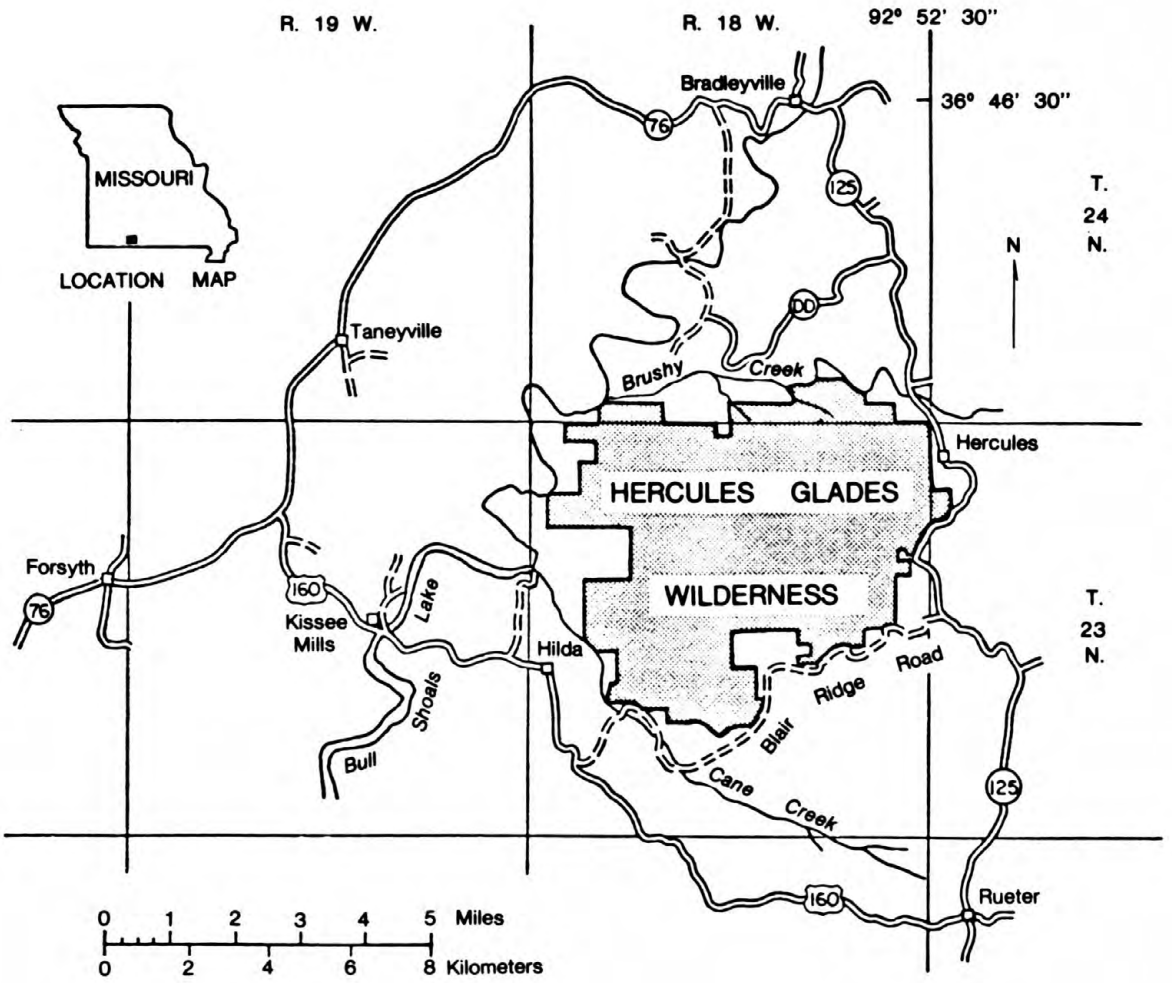


Figure 1.--Index map showing location of Hercules Glades Wilderness, Mark Twain National Forest, Missouri.

Conformably overlying the Jefferson City Dolomite is the Cotter Dolomite, which makes up the major portion of exposed beds in the Hercules Glades Wilderness. The Cotter is a fine-grained, light-brown to gray, medium- to thick-bedded dolomite that weathers to a light or dark gray. This unit contains minor chert and some sandstone lenses. Outcrops are common on the hillsides. The upper part of the Cotter does not support the dense vegetation common on the lower part; hence, the name Glades refers to that area where the upper beds of the Cotter are sparsely dotted with juniper trees.

Rocks of Devonian age crop out in McDonald and Barry Counties, west of Taney County, but none are known to occur in the study area.

Overlying the Cotter Dolomite is the Compton Limestone of Early Mississippian age. This formation is made up of light-gray to light-brown, fine- to medium-crystalline limestone in thin to medium beds. The limestone has green shale partings, is about 20 ft (6 m) thick, and weathers to a wavy surface. Fairly good exposures of the Compton Limestone occur along Missouri Highway 125 east of the Hercules Glades Wilderness and in sec. 25, T. 23 N., R. 18 W. along Blair Ridge Road south of the study area.

The uppermost lithified unit that crops out in the Hercules Glades Wilderness Area is the Lower Mississippian Pierson Limestone of Weller (1901). In this area the Pierson is approximately 80 ft (25 m) thick, and consists of fine- to medium-grained, crystalline, gray to light-brown limestone in thin to medium beds.

Sand and gravel in the bottoms of creeks and along the stream banks, together with soils developed in these areas, are mapped as Quaternary alluvium. The sands and gravels are made up principally of fragments of chert, limestone, and quartz grains rounded by stream action and fairly well sorted.

Subsurface Geology

No drill-hole data are available from within the wilderness, but one hole, for which information is available, was drilled into the Precambrian basement rocks by St. Joe Minerals Corp. in the $SW\frac{1}{4}NE\frac{1}{4}$ sec. 24, T. 25 N., R. 20 W., about 6 mi (9.5 km) northwest of the area (Kurtz and others, 1975).

The Lower Ordovician Roubidoux Formation lies below the Jefferson City Dolomite, but it does not crop out in the wilderness area. The Roubidoux consists of sandstone, dolomitic sandstone, and cherty dolomite, and ranges in thickness from 100–200 ft (30–60 m).

Beneath the Roubidoux is the Lower Ordovician Gasconade Dolomite, which is predominantly a light-brownish-gray cherty dolomite. In Taney County the Gasconade is approximately 200–300 ft (60.9–91.4 m) thick.

The contact between the Gasconade and Eminence Dolomites represents an erosional unconformity. The Eminence Dolomite, medium to massively bedded, is a light-gray, medium- to coarse-grained dolomite. The thickness of the Eminence is approximately 200–250 ft (60.9–66 m); drill-hole data suggest that the Eminence may reach 325–350 ft (99–107 m) in thickness in Taney County. These beds conformably overlie the Upper Cambrian Potosi Dolomite, which is a massive, thickly bedded, medium- to fine-grained dolomite that contains quartz druse associated with chert. The Potosi is brownish gray and weathers to light gray. In Taney County, the Potosi Dolomite is approximately 80 ft (24.4 m) thick (Kurtz and others, 1975). The Potosi Dolomite conformably overlies the Derby-Doe Run Dolomite (of Missouri Geological Survey usage), which is made up of thin- to medium-bedded dolomite beds and thin-bedded siltstone and shales. In this area the Derby-Doe Run Dolomite is about 90 ft (27.4 m) thick.

Conformably below the Derby-Doe Run Dolomite is the Upper Cambrian Davis Formation, which is made up of shale, siltstone, sandstone, dolomite, and limestone conglomerate. The Davis here is about 145 ft (44.2 m) thick, and conformably overlies the Upper Cambrian Bonneterre Dolomite. The Bonneterre is light-gray, medium- to fine-grained, medium-bedded dolomite. In Taney County it is about 225 ft (67.5 m) thick, and appears to contain considerable siltstone, sandstone, and some shale (Kurtz and others, 1975). The Bonneterre Dolomite conformably overlies the Upper Cambrian Lamotte Sandstone, which is predominantly a quartzose sandstone. In the area of Hercules Glades Wilderness the Lamotte Sandstone is about 200 ft (61 m) thick.

Drill-hole data indicate that the Precambrian rocks underlying the Hercules Glades Wilderness are granitic (Kisvarsanyi, 1975, p. 16).

GEOCHEMISTRY

Thirty-two dry stream-sediment samples (from 16 sites) and two rock samples were collected within or near the Hercules Glades Wilderness. Sample sites are shown on figure 2. At each site, a grab sample and a composite sample across the stream bed were collected. All stream-sediment samples were sieved, and the minus-50-mesh fraction was split and analyzed for 31 elements by the six-step semiquantitative spectrographic method (Grimes and Marranzino, 1968). E. L. Mosier was the analyst.

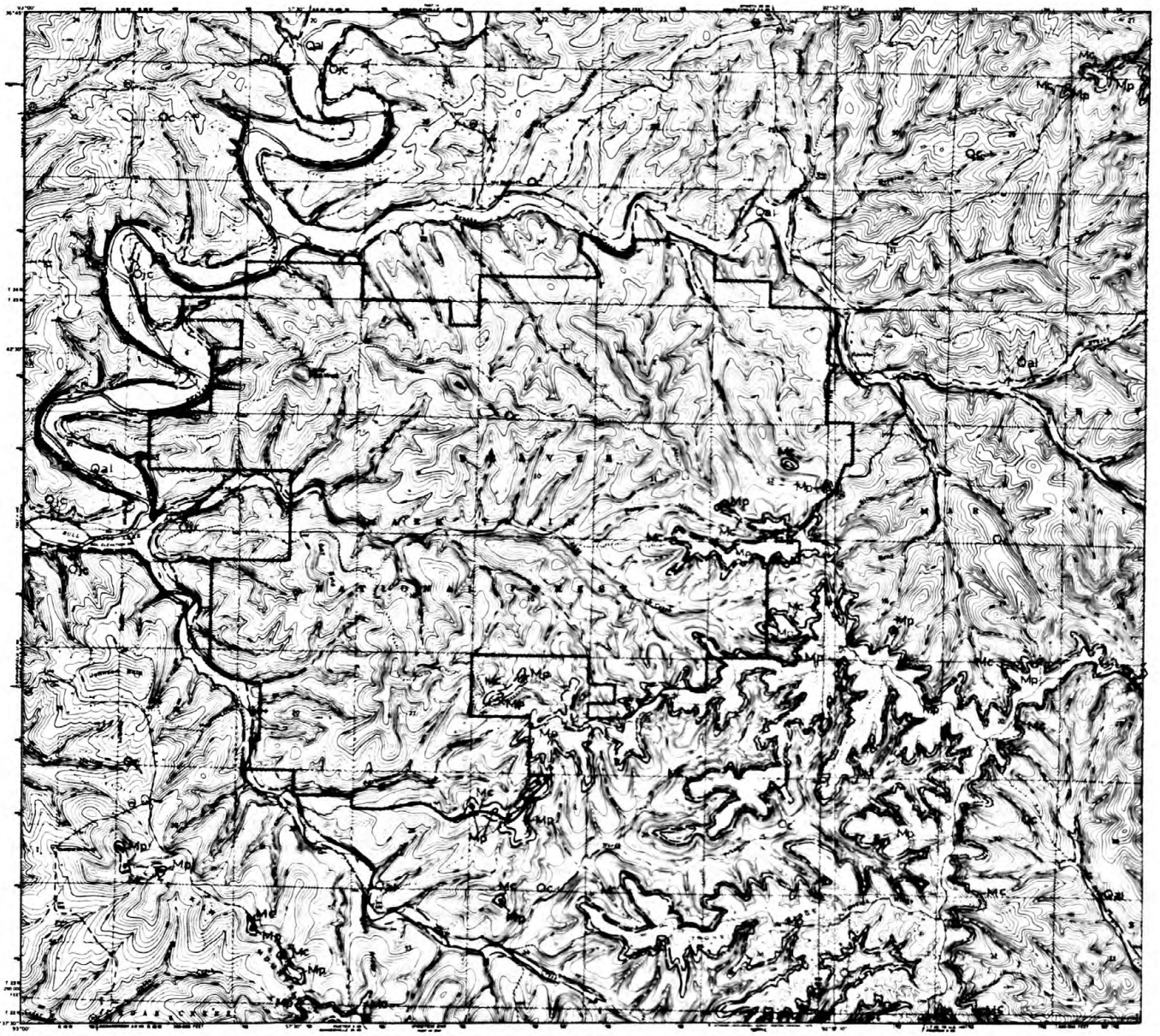
The bedrock areas from which samples were derived are dolomites and limestones; the analytical data are very uniform.

Spectrographic analyses of stream-sediment and rock samples from the Hercules Glades Wilderness do not show anomalous amounts of metal in the formations exposed. The metals detected probably are concentrated in pyrite-marcasite or iron oxides as indicated by Erickson and others (1978, 1979) for areas farther east in Missouri. Analytical data from drill core may indicate presence of mineralization in subsurface rocks (Kurtz and others, 1975). Unfortunately, no drill-hole data are available from within the Hercules Glades Wilderness.

Geochemical data available indicate that there is no major surface mineralization within the study area.

GEOPHYSICS

No detailed gravimetric survey has been made of the study area. Regional geophysical maps of Missouri (Missouri Geological Survey, 1943a, 1943b) show no anomalies in the study area. In July 1981, the U.S. Geological Survey made an aeromagnetic survey of



Base from U.S. Geological Survey
1:24,000. Hilda, 1967; Protem NE, 1968

1 ½ 0 1 2 3 MILES

1 .5 0 1 2 3 KILOMETERS

CORRELATION OF MAP UNITS		DESCRIPTION OF MAP UNITS	
Qal	QUATERNARY	Qal	ALLUVIUM (QUATERNARY)
UNCONFORMITY		Mp	PIERSON FORMATION OF WELLER (1901) (LOWER MISSISSIPPIAN--OSAGEAN)
Mp, Mc	MISSISSIPPIAN	Mc	COMPTON LIMESTONE (LOWER MISSISSIPPIAN--KINDERHOOKIAN)
		Oc	COTTER DOLOMITE (LOWER ORDOVICIAN--CANADIAN)
UNCONFORMITY		Ojc	JEFFERSON CITY DOLOMITE (LOWER ORDOVICIAN--CANADIAN)
Oc, Ojc	ORDOVICIAN	———	CONTACT--Dashed where approximately known
		———	APPROXIMATE BOUNDARY OF HERCULES GLADES WILDERNESS

Figure 2.--Mineral resource potential map of the Hercules Glades Wilderness, Taney County, Missouri. Geology from Miller and others (1981).

Hercules Glades Wilderness and adjacent areas. A preliminary study of these data do not show any significant magnetic anomalies (Ronny Martin, personal commun., 1982).

MINING DISTRICTS AND MINERALIZATION

Hercules Glades Wilderness contains no local formal mining district. Samples were obtained by U.S. Bureau of Mines personnel from two very old prospect pits in which no structural features were observed. Another sample was taken from the edge of a depression that is probably a small sink hole and does not represent a mineral prospect.

There has been no mining activity or filing of claims within the study area, and there is almost no evidence of prospecting. Lead and zinc have been produced from small operations south and east of Hercules Glades Wilderness. Gravel, sand, and stone are produced in the county outside the study area. All mineral production has been from occurrences 6 mi (10 km) or more outside the study area. One prospect pit in section 18, T. 23 N., R. 18 W. is said to have been opened in search of brown iron ore.

Two iron prospects are listed in the Bureau of Mines Mineral Information Location System (MILS) data, but only one prospect pit was located and sampled. Rocks in the pit area are weathered limestones with a yellow iron stain. Sample assays indicate that no iron resource is present.

ASSESSMENT OF MINERAL RESOURCE POTENTIAL

Several formations known to occur in the subsurface in the Hercules Glades Wilderness contain mineral deposits in other parts of Missouri. The most important of these are Upper Cambrian carbonates that have lead, zinc, silver, and copper mineralization in southeast Missouri. Major mineral deposits in the Viburnum Trend and the Southeast Missouri districts (fig. 3) (100 and 140 mi northeast of the study area) are in the Bonneterre Dolomite, and less important deposits occur in the Lamotte Sandstone, and Potosi, Eminence, Gasconade, and Jefferson City Dolomites. In the Tri-State district (Missouri, Kansas, and Oklahoma), which is 80-150 mi west of Hercules Glades Wilderness, the most productive zinc and lead deposits occur in Mississippian carbonates; minor deposits are in carbonates of Ordovician age (Kiilsgaard and others, 1967, p. 60). Most carbonates in this region could be host rocks for lead and zinc. All carbonate-hosted deposits in southeast Missouri occur: (1) in dolomite near the limestone-dolomite interface; (2) in "brown rock" near the interface with white rock; (3) near areas of faults and fractures; and (4) near or within algal reefs. Some of the best ore occurs in solution-collapse breccia. Most mineral deposits in the Bonneterre Dolomite occur where it is 200-400 ft thick and where its insoluble residue is more than 50 percent shale (Pratt, 1981, p. 10-22). Most deposits in the Tri-State district occur in dolomite, but information about other criteria is not available.

Although galena has been observed in minor fractures in Taney County, no lead production has been recorded within or near the study area. Small lead and zinc operations have existed 6-12 mi (10-19 km) to the south and east. Prospectors probably have explored the surface within the area thoroughly.

Generally sand and gravel are restricted to drainage areas. Larger, more economic deposits of these resources exist outside the study area.

Coal, gas, and oil are produced from Pennsylvanian formations in western Missouri (Anderson and Wells, 1967; Searight, 1967); however, no Pennsylvanian rocks occur in the Hercules Glades Wilderness. Deposits of barite, iron, lead, or zinc are mined several places elsewhere in the state from geological formations that occur in the study area; however, no occurrences of economic significance are known to occur in this area.

The mineral resource potential of the area is considered to be very low.

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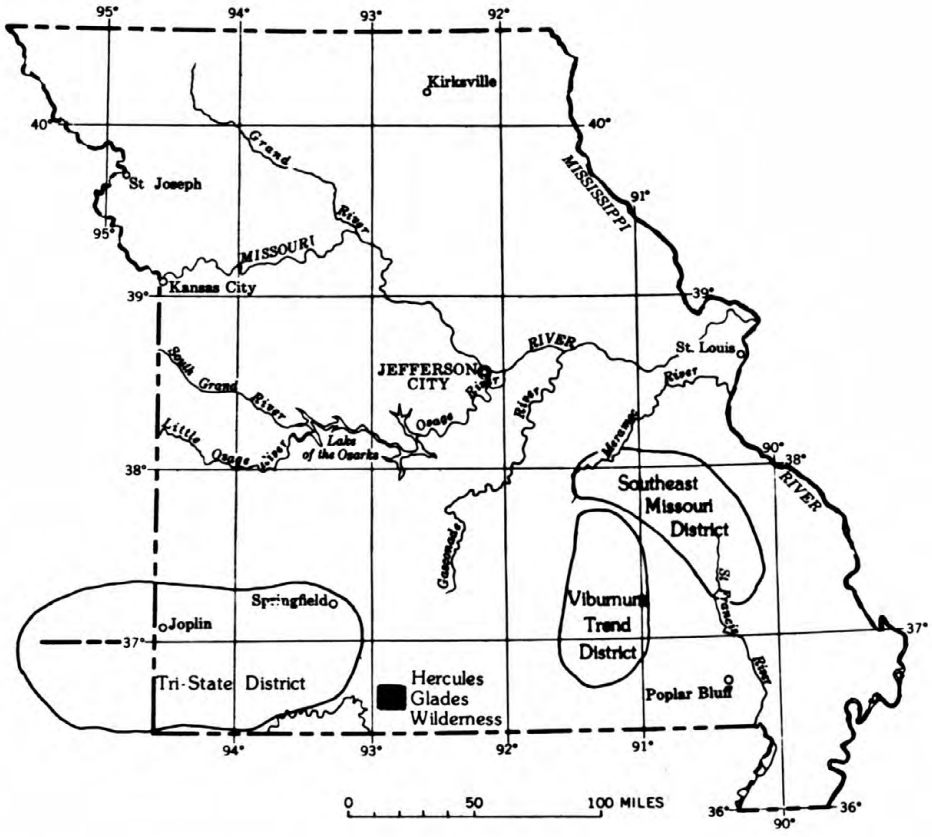

INDEX MAP OF MISSOURI

Figure 3.--Index map of Missouri showing lead-zinc districts.

Miscellaneous Field Studies Map MF-1377-B, scale 1:50,000.

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