U.S. DEPARTMENT OF THE INTERIOR

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PRELIMINARY GEOLOGIC MAP OF THE SPRING VALLEY 30' X 60' QUADRANGLE, MISSOURI

by

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Preliminary Geologic Map of the Spring Valley 30' X 60' Quadrangle, Missouri

The preliminary geologic map of the Spring Valley 30' X 60' quadrangle, Missouri, was compiled as a reference map for geologic and hydrogeologic studies for the area surrounding the Ozark National Scenic Riverways and to identify areas in which further detailed geologic mapping at 1:24,000 would be useful. A geologic framework for this area is necessary in order to resolve issues related to land-use management, utilization and conservation of natural resources, ground-water management, and environmental protection.

The Spring Valley 30' X 60' quadrangle is located in part of the Salem Plateau in the Ozark Plateaus province of south-central Missouri, which, in this area is a karst terrain characterized by dissolution-induced sinkholes, caves, and underground drainage. The region contains some of the largest single-conduit springs in the United States, several of which discharge hundreds of millions of gallons of water per day. Bedrock consists mainly of Cambrian and Ordovician dolomite with lesser amounts of sandstone and chert. The southeastern part of the quadrangle includes knobs of Middle Proterozoic rhyolite. The southern end of the world's largest lead/zinc mining district, the Viburnum Trend of Mississippi Valley type ore deposits (Hagni, 1986), occurs in the northeastern part of the Spring Valley 30' X 60' quadrangle. Federal and State lands in other parts of the quadrangle have been intensively explored in the past. These areas have similar geologic characteristics and controls on mineralization to the Viburnum Trend.

DESCRIPTION OF MAP UNITS

Qa **Alluvium (Holocene and Pleistocene)**--Gravel, sand, clay, and silt derived from local bedrock. Gravel is angular to subrounded and consists of mostly chert and sandstone. Unit includes both Holocene alluvium and Holocene and Pleistocene terrace deposits. Terrace deposits lie as much as 10 m above modern flood plain. Unit is as much as 15 m thick

rp **Residuum derived from Pennsylvanian rocks (Quaternary? to Cretaceous?)**--Red, yellow, purple, green, and white clay containing chert pebbles and sandstone blocks probably derived from undifferentiated Pennsylvanian rocks based on lithologic similarity (Bridge, 1930). Pennsylvanian bedrock does not occur in map area. Thickness of unit is 0.5 to 3m

rm **Residuum derived from Mississippian rocks (Quaternary? to Cretaceous?)**--Clay containing boulders of dense, grayish-white chert with Mississippian fossils, mostly crinoid stems (Bridge, 1930). Mississippian bedrock does not occur in map area. Thickness of unit is 0.5 to 3 m

rr **Residuum derived from Roubidoux Formation (Quaternary? to Cretaceous?)**--Red and reddish orange sandy clay containing angular sandstone and chert boulders and blocks. Occurs on tops of hills in areas where bedrock of the Roubidoux Formation has been removed. Unit is generally less than 2 m thick

Ojc **Jefferson City Dolomite (Lower Ordovician)**--Dolomite, quartz sandstone, chert, and minor shale. Dolomite is light gray and typically weathers buff, fine to medium grained, and thin to thick bedded. Sandstone is thin to thick bedded, fine grained, well sorted, and commonly contains irregular chert nodules. Chert occurs both as thin layers and irregular nodules, and consists of light to dark gray, porcelaneous, sandy, banded and oolitic varieties. A persistent marker bed (Quarry Ledge of Thompson, 1991) 2 to 5 m thick of thick-bedded to massive, brown to gray, medium-crystalline dolomite, which weathers to a distinctive pitted surface, occurs about 10 m above base. Maximum exposed thickness is as much as 100 m in southwest part of quadrangle. Contact with underlying Roubidoux Formation is projected 10 m below the Quarry Ledge bed

Or **Roubidoux Formation (Lower Ordovician)**--Dolomite, quartz sandstone, orthoquartzite, and chert. Dolomite is light gray to tan, fine to medium grained, pure to sandy, thin to thick bedded, and contains irregular chert nodules. Sandstone is fine to coarse grained, poorly sorted, and contains lenses of orthoquartzite, mudcracks, and symmetrical and asymmetrical ripple marks. Chert is light to dark gray, nodular to irregularly bedded and consists of banded, sandy, oolitic, and porcelaneous varieties. Maximum thickness is about 60 m. Contact with underlying Gasconade Dolomite is placed at first sandstone or sandy dolomite of the Roubidoux Formation

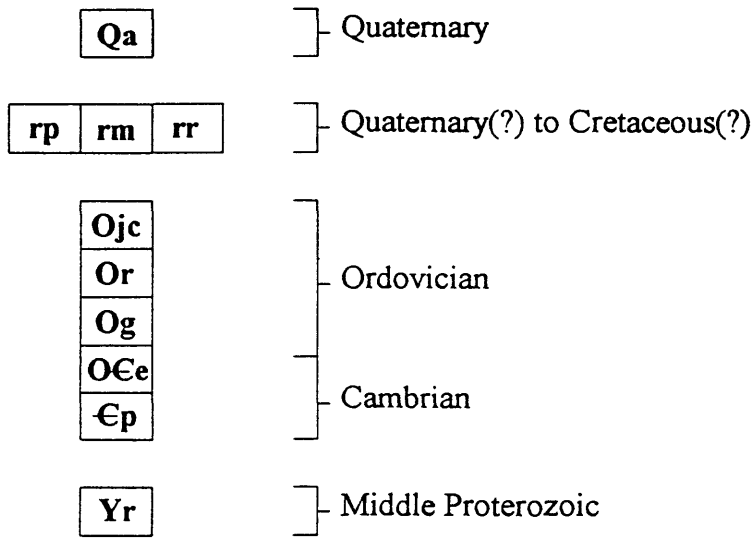
Og **Gasconade Dolomite (Lower Ordovician)**--Dolomite, chert, sandstone, and orthoquartzite. Unit is divided into an upper part, middle part, and basal Gunter Sandstone Member. Dolomite in upper part is light gray, massive to thick bedded, medium to coarsely crystalline, contains sparse chert nodules and stringers, and weathers to a pitted surface. Thickness is about 20 m. Middle unit is dolomite similar to upper unit, but contains much more chert as nodules, stringers, and beds, and unit becomes finely crystalline down section. Thickness is as much as 70 m. Boundary between upper and middle units is marked by a cryptozoan chert bed 1 to 2.5 m thick. Basal part of unit is Gunter Sandstone Member. The member is light-gray to white sandstone, sandy dolomite, or orthoquartzite interbedded with finely crystalline, thin-bedded, light-gray to tan dolomite. Thickness of the Gunter is as much as 6 m. Total thickness of Gasconade Dolomite is about 125 m. Contact with underlying Eminence Dolomite is placed at base of lowest sandstone or sandy dolomite of the Gunter Sandstone Member. Contact is locally unconformable

O€e **Eminence Dolomite (Lower Ordovician and Upper Cambrian)**--Dolomite and chert. Dolomite is massive to thick bedded, medium to coarsely crystalline, light gray and weathers to a pitted surface. Unit contains variable amounts of light-gray and white chert throughout. Thickness of unit is variable due to unconformity at base of overlying Gasconade Dolomite and thinning of unit near knobs of Middle Proterozoic rhyolite; maximum thickness about 50 m in outcrop near knobs where entire unit is exposed; elsewhere, unit is greater than 100 m thick. Contact with underlying Potosi Dolomite is gradational and placed above the last brown or drusy dolomite of the Potosi. Unit also unconformably overlies Middle Proterozoic rhyolite in Eminence area

€p **Potosi Dolomite (Upper Cambrian)**--Dolomite and chert. Dolomite is light brown, brown, and light gray, massive to thick bedded, medium crystalline and contains quartz druse (locally extensive). Brown dolomite has fetid odor when freshly broken. Quartz druse developed as irregular masses of chalcedony with small quartz crystals coating surfaces. White to light-gray chert occurs as nodules and stringers. Base of unit not exposed. Unit unconformably overlies Middle Proterozoic rhyolite in Eminence area

Yr **Rhyolite (Middle Proterozoic)**--Rhyolite, alkali rhyolite, and trachyte ash-flow tuff, lava, and air-fall tuff. Unit is dark red, maroon, and purple, and varies from crystal rich to crystal poor, to aphanitic with phenocrysts of alkali feldspar and locally contains minor quartz. Consists of multiple flow units, most of which are massive or flow banded; vesicular and spherulitic units occur locally. Typically contains magnetite in disseminated crystals. Air-fall tuff commonly is silicified and contains minor amounts of pyrite

Correlation of Map Units



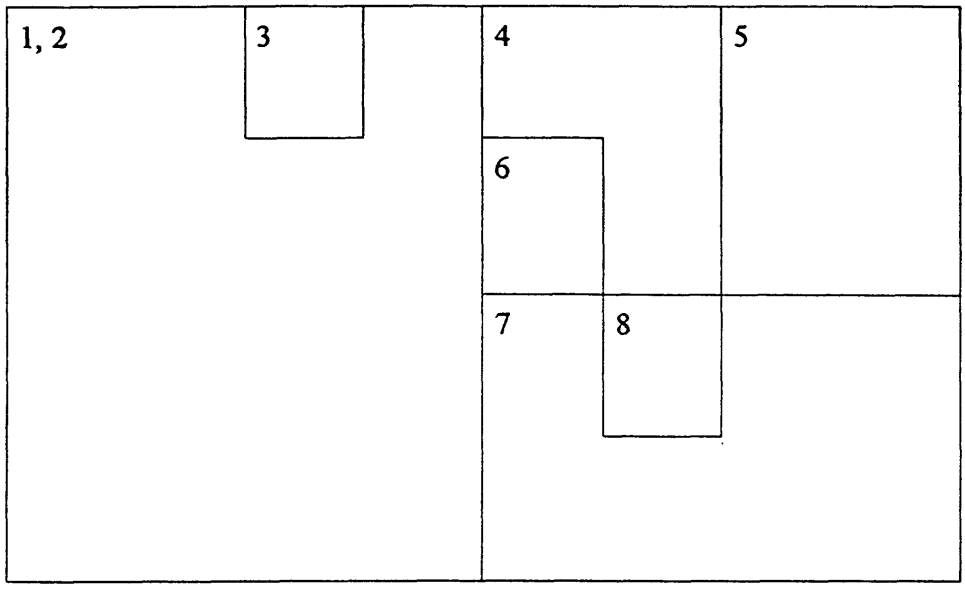
EXPLANATION OF MAP SYMBOLS

Contact

Fault--dashed where approximately located; dotted where concealed; bar and ball on downthrown side; arrows show relative strike-slip movement

Active mine in Viburnum Trend (northeastern part of map)

Geology compiled from Anderson and Wharton (1975), Bridge (1930), Fisher (1969), Hayes (1960a, b, 1961), Pratt and others (1992), Satterfield and others (1982), and Whitfield (1969)



Sources of Geologic Mapping

1) Pratt and others (1992)
2) Satterfield and others (1982)
3) Whitfield (1969)
4) Hayes (1960b)
5) Hayes (1960a, 1961)
6) Anderson and Wharton (1975)
7) Bridge (1930)
8) Orndorff, Harrison, and Weary 1996-97 (unpublished geologic mapping)

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