



EXPLANATION

- Outcrop area of Western Interior Plains confining system
- Outcrop area of unnamed geohydrologic units that are stratigraphically equivalent to the Western Interior Plains confining system
- Outcrop area of rocks comprising geohydrologic units older than Western Interior Plains confining system
- Area where Western Interior Plains confining system and stratigraphically equivalent units are missing in subsurface

— Contact—Dashed where approximately located

— Approximate boundary of Ozark Plateaus aquifer system

— Structure contour—Shows altitude of top of Western Interior Plains confining system and stratigraphically equivalent units. Contours in outcrop areas are modified from 1:500,000 scale. Missouri, Kansas, Oklahoma, and Arkansas State base maps. Contour interval, in feet, is variable. National Geodetic Vertical Datum of 1929

● Control data point—Part of Central Midwest Regional Aquifer-System Analysis data base. Number is altitude, in feet, of the top of Western Interior Plains confining system and stratigraphically equivalent units. National Geodetic Vertical Datum of 1929

○ Auxiliary control data point

INTRODUCTION

An investigation of the geohydrologic system in the Ozark Plateaus province (index map and Fenneman, 1938), has been made as part of the Central Midwest Regional Aquifer-System Analysis (Jorgensen and Sigor, 1981), a major study that encompasses parts of 10 States. The study is one of several by the U.S. Geological Survey that are designed to increase knowledge of the flow regime and geohydrologic properties of regional aquifer systems in the United States. Because a large amount of fresh groundwater is available in aquifers underlying the Ozark Plateaus province, a subregional project has been established to study the geohydrologic units of this area in more detail than is practical in the regional study. The stratigraphic relationship among the primary geohydrologic units in the Ozark Plateaus province is discussed in Chapter A of this Hydrologic Investigations Atlas. This chapter focuses on the Western Interior Plains confining system, geohydrologic unit that confines the western and southern edges of the Ozark Plateaus aquifer system.

THE WESTERN INTERIOR PLAINS CONFINING SYSTEM

DEFINITION

The Western Interior Plains confining system is an extremely thick (as much as 20,000 feet) and areally extensive geohydrologic unit that extends from the Rocky Mountains to western Missouri and northern Arkansas (Jorgensen, Helgeson, and Imes, in press). The rocks that compose this confining system mainly are relatively impermeable shale that impede the vertical flow of ground water. The confining system is complex because permeable sandstone and limestone, which may be aquifers of limited extent, exist within the confining system. Regionally, the confining system includes rocks that range from Late Mississippian to Jurassic age, but along the western and southern flanks of the Ozark Plateaus province, where it confines the Ozark Plateaus aquifer system, it contains only Late Mississippian and Pennsylvanian-age rocks.

In and adjacent to the Ozark Plateaus province, the Western Interior Plains confining system is represented by a sequence of rocks ranging from the Cartersville Formation of Mississippian age to the Kansas City Group of Pennsylvanian age. The Mississippian rocks contribute a small part of the total thickness of the confining system and are limited to southwestern Missouri, northeastern Oklahoma, and northern Arkansas. The Cartersville Formation is included in the Western Interior Plains confining system in northern Arkansas. However, the formation is more permeable in northeastern Oklahoma and is assigned to the underlying Springfield Plateau aquifer in that area.

Isolated areas of Pennsylvanian rocks are present in St. Louis County, Missouri, and throughout the north-central part of the Salem Plateau. Because these rocks are stratigraphically equivalent and hydraulically similar to those farther west in the Western Interior Plains confining system, they are described briefly in this report; however, the rocks are not included as part of the confining system. Similarly, the thick sequence of Late Mississippian rocks (Aux Vases Sandstone to Vienna Limestone) present in a small area of Ste. Genevieve and Perry Counties, Missouri, is described in this report, but actually are part of a separate, but stratigraphically equivalent, geohydrologic unit on the eastern border of the Ozark Plateaus province.

STRUCTURAL FEATURES

The Western Interior Plains confining system is missing from the Ozark Plateaus province, except along the western and southern boundaries. The confining system extends west and southwest from the Ozark Plateaus into the plains area where it is one of the major regional geohydrologic units. The confining system is stratigraphically the uppermost geohydrologic unit in the map area, excluding unconsolidated alluvial material that has been deposited along streams and rivers (not shown on map) and post-Paleozoic deposits of the Mississippian Alluvial Plain. Throughout the plains area west of the Ozark Plateaus, the top of the confining system is characterized by gently rolling hills and broad alluvial valleys. To the south, the surface of the confining system reflects the rugged topography of the Boston Mountains. The confining system has been removed by erosion from the Mississippi Alluvial Plain in southeastern Missouri and northeastern Arkansas.

GENERALIZED STRATIGRAPHIC COLUMN SHOWING GEOLOGIC FORMATIONS OF THE WESTERN INTERIOR PLAINS CONFINING SYSTEM THAT CONTAIN THE OZARK PLATEAUS AQUIFER SYSTEM.

| FORMATION | SOUTHEASTERN MISSOURI | SOUTHWESTERN MISSOURI | SOUTHEASTERN KANSAS | NORTHEASTERN OKLAHOMA | NORTHERN ARKANSAS | WESTERN INTERIOR PLAINS CONFINING SYSTEM |
|---------------|-----------------------|-----------------------|---------------------|-----------------------|-------------------|--|
| PENNSYLVANIAN | Kansas City Group | Kansas City Group | Kansas City Group | Kansas City Group | Kansas City Group | |
| | Pleasanton | Pleasanton | Pleasanton | Pleasanton | Pleasanton | |
| | Meramec | Meramec | Meramec | Meramec | Meramec | |
| | Clinton | Clinton | Clinton | Clinton | Clinton | |
| PALEOZOIC | Clinton | Clinton | Clinton | Clinton | Clinton | |
| | Clinton | Clinton | Clinton | Clinton | Clinton | |
| | Clinton | Clinton | Clinton | Clinton | Clinton | |
| | Clinton | Clinton | Clinton | Clinton | Clinton | |
| | Clinton | Clinton | Clinton | Clinton | Clinton | |
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| | Clinton | Clinton | Clinton | Clinton | Clinton | |
| | Clinton | Clinton | Clinton | Clinton | Clinton | |
| | Clinton | Clinton | Clinton | Clinton | Clinton | |
| Clinton | Clinton | Clinton | Clinton | Clinton | | |
| MISSISSIPPIAN | Clinton | Clinton | Clinton | Clinton | Clinton | |
| | Clinton | Clinton | Clinton | Clinton | Clinton | |
| | Clinton | Clinton | Clinton | Clinton | Clinton | |
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Geologic formation in southeastern Missouri that is stratigraphically equivalent to geologic formation in the Western Interior Plains confining system, but not part of the confining system.

The Western Interior Plains confining system also includes younger geologic formations west of the map area.

CONVERSION FACTORS

| Multiply inch-pound unit by | To obtain SI unit |
|-----------------------------|----------------------------|
| foot | 0.3048 meter |
| mile | 1.609 kilometer |
| foot per mile | 0.1894 meter per kilometer |
| gallon per minute | 0.06308 liter per second |

Scale from U.S. Geological Survey
Scale base maps: 1:500,000, Missouri, 1967; Kansas, 1983; Missouri, 1977; Oklahoma, 1977

SCALE 1:750,000

Altitude of top of Western Interior Plains confining system

MAJOR GEOHYDROLOGIC UNITS IN AND ADJACENT TO THE OZARK PLATEAUS PROVINCE, MISSOURI, ARKANSAS, KANSAS, AND OKLAHOMA—WESTERN INTERIOR PLAINS CONFINING SYSTEM

By
Jeffrey L. Imes
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