WATER FACT SHEET

U.S. DEPARTMENT OF THE INTERIOR, U.S. GEOLOGICAL SURVEY

NATIONAL WATER-QUALITY ASSESSMENT PROGRAM--
Ozark Plateaus Ground-Water Study

BACKGROUND

The U.S. Geological Survey (USGS) began implementation of the National Water-Quality Assessment (NAWQA) Program in 1991 to provide a nationally consistent description of the quality of the Nation's water resources. The long-term goals of the NAWQA Program are to describe the status and trends in the quality of the Nation's ground- and surface-water resources, and to provide a sound understanding of the natural and human factors that affect these resources. To meet these goals, nationally consistent ground- and surface-water quality data and ecological information useful to policy makers and managers at local, study-unit, regional, and national levels are being collected and analyzed. Factors such as climate, geology, hydrology, land use, and agricultural practices that affect water quality are also being studied along with specific water-quality issues that affect large hydrologic regions of the United States.

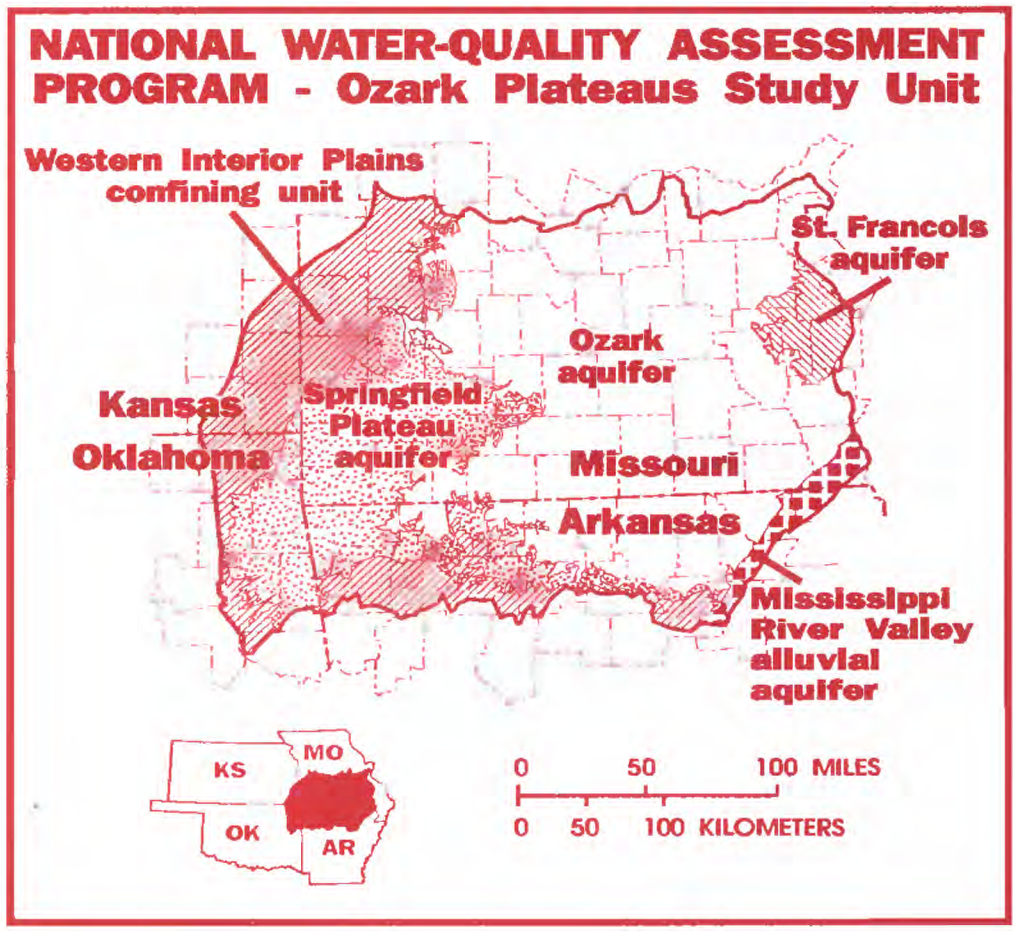
When fully implemented, the NAWQA Program will include a total of 60 study units. The areas covered by these 60 study units are the source of 60 to 70 percent of the Nation's public water supply withdrawn from surface- and ground-waters. The Ozark Plateaus region was among the first 20 NAWQA study units selected for study. The initial phase of the Ozark Plateaus NAWQA study began in 1991 and is expected to continue through 1996. This report will focus on the ground-water aspects of the Ozark Plateaus NAWQA.

DESCRIPTION OF THE OZARK PLATEAUS STUDY UNIT

The Ozark Plateaus study unit is approximately 48,000 square miles in size and includes parts of northern Arkansas, southeastern Kansas, southern Missouri, and northeastern Oklahoma. The boundaries of the study unit approximate the natural flow boundaries of the Ozark Plateaus aquifer system.

The extensive karst features of the Ozark Plateaus create an intricate ground-water flow system, which results in rapid and complex interactions between ground and surface water. Where the rocks of the Ozark Plateaus' aquifers are exposed at the surface, the aquifer is potentially vulnerable to contaminants being transported quickly from the surface into the aquifer through sinkholes or losing streams. Contaminants may then be carried along solution channels, fractures, and conduits to eventually be intercepted by wells or discharged at springs.

The hydrogeologic system of the Ozark Plateaus can be divided into four major aquifers and four confining units on the basis of rock permeability and well yields. The youngest hydrogeologic unit, the Mississippi River Valley alluvial aquifer, consists of interbedded, alluvial deposits of sands, gravels, and clays of Quaternary age. Wells completed in the Mississippi River Valley alluvial



aquifer can produce yields greater than 2,000 gal/min (gallons per minute) in some areas. The Western Interior Plains confining system consists of shales, limestones, sandstones, and coal deposits of Mississippian and Pennsylvanian age; wells completed in these rocks usually yield less than 20 gal/min. Beneath the Western Interior Plains confining system lies the Springfield Plateau aquifer. This aquifer consists primarily of limestone of Mississippian age, and is an important source of water for small-yield, domestic wells which commonly yield 10 to 25 gal/min. Beneath the Springfield Plateau aquifer is the Ozark confining unit which consists of shales and limestones of Late Ordovician through Mississippian age. The Ozark aquifer, which lies beneath the Ozark confining unit, consists of dolostones, limestones, and sandstones of Late Cambrian through Devonian age. Wells completed in the Ozark aquifer can have yields greater than 1,000 gal/min. Beneath the Ozark aquifer is the St. Francois confining unit, which consists of shales of Late Cambrian age. The St. Francois aquifer, which lies beneath the St. Francois confining unit, consists of sandstones, siltstones, and dolostones of Late Cambrian age. Wells completed in the St. Francois aquifer commonly yield 100 to 500 gal/min. The oldest and deepest unit is the Basement confining unit, which consist of virtually impermeable, igneous and metamorphic rocks of Precambrian and Cambrian age. Wells completed in this Basement unit yield from 0 to 70 gal/min to wells.

GROUND-WATER STUDY OBJECTIVE AND APPROACH

The objective of the ground-water segment of the Ozark Plateaus NAWQA study is to identify, describe, and explain the major factors that affect observed ground-water-quality conditions and trends. The study's major activities include compilation and analysis of available ground-water-quality information; sampling network design; intensive sample collection and analysis for a wide array of physical and chemical characteristics; data interpretation; and the reporting of results.

Ground-water-quality data from all major data sources are being assembled, screened, evaluated, and stored in a computerized USGS data base. These data provide an initial description of water-quality conditions and help define additional data needs. Quality assurance data and ancillary data on basin characteristics, such as climate, geology, hydrology, land use, and agricultural practices, are also being stored in the data base.

Current ground-water-quality conditions are being assessed through the implementation of three different types of sampling networks. The first sampling network, the Study-Unit Survey, consist of 50 randomly selected, existing domestic shallow wells and 50 randomly selected, small springs that tap major aquifer systems throughout the study unit. The second sampling network, the Land-Use Study, covers natural and human factors affecting the quality of shallow ground-water that underlies key types of land use within the study unit. In evaluating the effects of land use on ground-water quality, shallow wells that are in recharge areas and directly downgradient from a single land-use setting are being sampled. Types of land use being studied within the Ozark Plateaus include forest, pasture, cropland, and areas of lead and zinc mining. The third sampling network, a Flowpath Study, uses a transect of clustered, multilevel observation wells that extend along a ground-water flowpath from the local ground-water divide to a stream or other surface-water body within a single basin. The Flowpath Study examines the relations between land-use practices, ground-water flow, surface- and ground-water interaction, and the occurrences and transport of contaminants. As many as six well pairs are located along the transect.

The analysis of water samples focuses on a national list of physical properties that includes temperature, specific conductance, pH, and dissolved oxygen; and chemical constituents that includes major ions, nutrients, trace elements, radionuclides, pesticides, and other synthetic organic compounds. Wells and springs selected for the Study-Unit Survey and Land-Use Study have been randomly selected by computer from known site locations listed in the USGS ground-water data base. Ground-water samples collected in the field by USGS personnel are sent to the USGS National Water-Quality Laboratory in Denver, Colorado, for analysis. Results of these analysis are published in annual USGS data reports. Interpretation and analysis of the ground-water quality information in the Ozark Plateaus study unit are published in several USGS interpretive reports as data and study results become available.

FURTHER INFORMATION

The Ozark Plateaus NAWQA study is headquartered in the USGS office in Little Rock, Arkansas, with assistance from USGS personnel in Fayetteville, Arkansas; Lawrence, Kansas; Rolla, Missouri; and Oklahoma City, Oklahoma. Many other Federal and State agencies are also providing valuable technical advice and assistance. Further information on the Ozark Plateaus NAWQA study can be obtained from:

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SELECTED REFERENCES

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