



# WATER FACT SHEET

U.S. GEOLOGICAL SURVEY, DEPARTMENT OF THE INTERIOR

## U.S. GEOLOGICAL SURVEY GROUND-WATER STUDIES IN OHIO

### GROUND-WATER ISSUES

Ground water is a vital resource for Ohio. At one time, it was a "hidden resource," often taken for granted. Its quality and availability were not questioned. Recently, however, ground-water contamination has become one of the major environmental issues confronting Ohio as well as the Nation.

Industry, agriculture, cities, and citizens in Ohio use approximately 1 billion gallons of ground water every day. Nearly 42 percent of all Ohioans use ground water for drinking and household uses. Industry uses about 350 million gallons of ground water every day for manufacturing and cooling, and agriculture uses about 10 million gallons per day for irrigation. Three of Ohio's largest cities—Dayton, Canton, and Springfield—use ground water exclusively for all purposes. Approximately 700,000 rural households depend on wells for drinking water, as do about 75 percent of Ohio's 1,600 community systems. The major issues related to ground water in Ohio are:

- Contamination of the resource,
- Occurrence of radium, and
- Availability of supply.

### U.S. GEOLOGICAL SURVEY PROGRAMS

The U.S. Geological Survey (USGS), established in 1879, is the principal source of scientific and technical expertise in the earth sciences within the Federal government. USGS activities include research and services in the fields of geology, hydrology, and cartography. The mission of the Water Resources Division of the USGS is to develop and disseminate information on the Nation's water resources. The activities of the Water Resources Division in Ohio are conducted by scientists, technicians, and support staff in offices in Columbus and New Philadelphia.

Hydrologic-data stations are maintained at selected locations throughout Ohio to record stream discharge and stage, reservoir and lake storage, ground-water levels, and the quality of surface and ground water. These data are used by water planners and others to make decisions that affect Ohio's water resources.

During 1987, the USGS, in cooperation with various Federal, State, and local agencies, maintained a network of about 775 observation wells in Ohio to monitor fluctuations and trends in water levels. In addition, samples were collected from 196 wells to determine concentrations of various chemical constituents. Ground-water data, however, need to be integrated

with other observations and interpretive investigations to be most useful.

The USGS has conducted more than 100 hydrologic investigations in Ohio. During fiscal year 1987, the USGS entered into agreements with 21 Federal, State, and local agencies involving 29 hydrologic investigations in Ohio; 13 investigations included studies of ground-water quantity and quality. These investigations will provide information needed to answer questions that are specific to the State's principal ground-water issues. Three examples of studies by the USGS that address ground-water issues in Ohio are discussed in the following sections.

### Hydrogeology and Water Quality Near a Landfill at Northwood

Ohio has numerous solid- and hazardous-waste landfills, many of which are near the urban/industrial areas of the State. One such landfill is in Northwood in northwestern Ohio. In an effort to protect and manage its water resources, the city of

#### STUDY AREAS



Northwood undertook a cooperative study with the USGS to document the hydrogeology and water quality near the landfill and to assess the effects of the landfill on its water resources. The landfill contains solid and hazardous waste stored in cells that overlie an extensive carbonate aquifer. Chemical analysis of ground water near the landfill showed considerable differences in quality throughout the study area; however, levels of toxic metals were within Ohio drinking-water limits, except for several wells near the landfill perimeter. A ground-water "mound" detected under the landfill, as well as elevated concentrations of common chemical constituents in the ground water down-gradient from the landfill, indicate that the landfill is influencing local ground-water flow and quality. The contamination is limited to increased concentrations of common ions and selected groups of organic compounds. The results of this study will be used by the city of Northwood to manage future waste disposal and ground-water development.

### **Ground-Water Assessment of Lucas, Sandusky, and Wood Counties**

Three northwestern counties—Lucas, Sandusky, and Wood—have undertaken a cooperative study with the USGS to describe the hydrogeology and ground-water quality of the area's aquifers. As part of the water-quality assessment, about 25 public and private wells in each county were sampled and the water was tested for radiation. The results of the testing for gross alpha radiation indicated that about 38 percent, or 27 of 70 wells, had concentrations greater than 5 picoCuries per liter (pC/L). Additional testing for radium concentrations is required of public water supplies when gross alpha concentrations are 5 pC/L or greater. As a result of this study, the counties have started programs to resample wells in selected areas for further radiation testing. Few data are available for radium concentrations in ground water. Radium probably occurs naturally in the ground water of the area.

### **Ground-Water Resources of Williams County**

The northwestern corner of Ohio, particularly Williams County, has always had abundant ground water that is suitable for most uses. The county entered into a cooperative program with the USGS to obtain information on the quantity and quality of ground water from the shallow glacial aquifers to ensure continued safe water supplies. To obtain the necessary information, water levels were measured in 90 wells, water-quality samples were collected from 50 wells, and ground-water flow in the county was simulated by computer model. The study indicated that most of Williams County's ground water is in the 80- to 330-foot-thick cap of unconsolidated glacial deposits. Well yields of 500 gallons per minute are available throughout the county, except for the southeastern corner. The water is principally of the calcium-magnesium-bicarbonate type and is generally suitable for most uses, but is hard and high in iron content. The mean hardness of the water is 304 milligrams per liter and mean iron concentration is 1,500 micrograms per liter. Using the computer model, several pumping plans were simulated to demonstrate their potential effects on the aquifer.

## **GROUND-WATER MANAGEMENT**

The principal State agencies in Ohio responsible for ground-water management are the Department of Natural Resources, the Environmental Protection Agency, and the Department of Health. The Department of Natural Resources is primarily responsible for resource mapping and water-quantity determination, whereas the Environmental Protection Agency has the responsibility for resource protection and water-quality determination. The Department of Health controls the construction and operation of private water wells. Also, the Public Utilities Commission of Ohio, the Department of Agriculture, and the Department of Commerce, Division of State Fire Marshal, are involved in ground-water management. During fiscal year 1987, the following Federal, State, and local agencies entered into interagency or cooperative cost-sharing agreements with the USGS to conduct ground-water investigations in Ohio:

Cities of Akron, Columbus, Maumee, Northwood, Oregon, and Sylvania  
Counties of Lucas, Sandusky, Williams, and Wood  
Geauga County Planning Commission  
Miami Conservancy District  
Ohio Department of Natural Resources  
Ohio Water Development Authority  
U.S. Department of the Air Force  
U.S. Department of the Interior, Office of Surface Mining  
Village of Richwood

### **SELECTED REFERENCES**

- Ohio Department of Natural Resources, Division of Water, [no date], Ground-water resources in Ohio: Ohio Department of Natural Resources, 1 plate.
- Ohio Environmental Protection Agency, 1987, Ground Water: Ohio Environmental Protection Agency Public Interest Center, 20 p.
- U.S. Geological Survey, 1984, National Water Summary 1983—Hydrologic events and issues: U.S. Geological Survey Water-Supply Paper 2250, 243 p.
- 1985, National Water Summary 1984—Hydrologic events, selected water-quality trends, and ground-water resources: U.S. Geological Survey Water-Supply Paper 2275, 467 p.
- 1986, Water resources data—Ohio, water year 1986: U.S. Geological Survey Water-Data Report OH86-2, 287 p.
- Vince, C.C., compiler, 1987, Current water resources activities in Ohio, 1987: U.S. Geological Survey Open-File Report 87-102, 61 p.

Information on technical reports and data related to ground water in Ohio can be obtained from:

District Chief  
U.S. Geological Survey  
Water Resources Division  
975 West Third Avenue  
Columbus, Ohio 43212

Director  
The Ohio State University  
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1791 Neil Avenue  
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