



WATER FACT SHEET

U.S. GEOLOGICAL SURVEY, DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY GROUND-WATER STUDIES IN INDIANA

GROUND-WATER ISSUES

Ground-water supplies provide drinking water to about one-third of the people in Indiana. Virtually all water used by industry, excluding the steel and petrochemical withdrawals from Lake Michigan and cooling water for electric power generation, is ground water. Irrigation also is a major use of ground water in the State, withdrawals being roughly equal to the quantity of ground water withdrawn for public supply. Ground water is the source of supply for about 38 percent of the water for rural use, about 45 percent for public supplies, and about 58 percent for irrigation. The major issues related to ground water in Indiana are:

- Contamination by hazardous materials and landfills,
- Increasing demand, and
- Contamination by agricultural chemicals.

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 scientific information on the Nation's water resources. The activities of the Water Resources Division in Indiana are conducted by scientists, technicians, and support staff in Indianapolis.

Hydrologic-data stations at selected locations throughout Indiana constitute a water-resources-data network to record data on stream discharge and stage, reservoir and lake storage, ground-water levels, well and spring discharge, and the quality of surface and ground water. Water-resources data are stored in the USGS National Water Data Storage and Retrieval System data base. These data are used by water planners and others involved in decisions that affect Indiana's water resources.

During 1987, the USGS, in cooperation with Federal, State, and local agencies, maintained a network of about 520 observation wells in Indiana to monitor fluctuations in water levels. Water-level measurements from wells are used to monitor ground-water trends; however, they need to be integrated with other observations and ground-water investigations to be most relevant and useful.

The USGS has conducted more than 100 hydrologic investigations in Indiana. During fiscal year 1987, the USGS entered into cooperative agreements with eight Federal, State, and local agencies involving 14 hydrologic investigations in

Indiana; eight investigations included studies of ground-water quantity and quality. These investigations will provide information needed to answer hydrologic questions that are specific to the State's principal ground-water issues. Also, some of these investigations will provide information on statewide, multistate, and national hydrologic problems. Three examples of ground-water studies by the USGS that address specific ground-water issues in Indiana are discussed in the following sections.

Ground-Water Quality in the Calumet Aquifer

As part of an environmental action plan for northwestern Indiana, the USGS and the Indiana Department of Environmental Management (DEM) entered into a cooperative program to study the Calumet aquifer. The Calumet region of northwestern Indiana, which extends along the southern shoreline of Lake Michigan, is one of the most heavily industrialized urban regions of the world. The Calumet aquifer is a thin surficial water-table aquifer that underlies this region, and is hydraulically connected with Lake Michigan, the Indiana Harbor Canal, the Grand Calumet River, and the Little Calumet River. The International Joint Commission and the U.S. Environmental Protection Agency have recognized this region as one of the principal areas of concern in the Great Lakes basin. The objectives of the study are to understand the ground-water flow system in the region, characterize general ground-water quality for more than 100 priority pollutants, and determine the potential for



migration of pollutants. A digital ground-water flow model for the Calumet aquifer has been prepared by using the information gathered from a network of 50 wells. The major conclusion is that small drains, such as ditches and sewers, control and localize ground-water flow in the region. Water from 35 wells has been sampled for analysis of more than 120 chemical constituents and physical characteristics. Except in areas of known contamination, the major pollutants of concern are limited generally to benzene, toluene, and xylene. The potential for the addition of pollutants from the ground water into surface water is still being evaluated. The results of the study will enable the DEM to devise effective strategies to protect water quality in the region.

Ground-Water Atlas, Statewide

State agencies in Indiana prepared a ground-water-protection strategy that recommended mapping of the principal aquifers of the State to provide consistent definition of the water-bearing units. The USGS, in cooperation with the Indiana Department of Natural Resources and the DEM, is engaged in a study to produce maps and cross-sections of aquifers in Indiana at a scale of 1:500,000. These maps and sections indicate the extent of the aquifers; the recharge, discharge, and conveyance zones; and the general direction of ground-water flow. The USGS' Hydrologic Unit Map of Indiana, and the Indiana Geological Survey's Bedrock Geologic Map of Indiana and Surficial Geologic Map of Indiana are being used as the base maps for this study. For each of the identified 12 management basins in Indiana, 4 to 10 hydrogeologic cross-sections are being prepared. These maps and sections will give the two cooperating agencies a uniform method for addressing statewide and regional problems related to ground water.

Ground-Water Quality Under Sludge Lagoons and Sludge-Amended Landfills, Marion County

The Department of Public Works (DPW) of Indianapolis owns sewage sludge lagoons near their treatment plants and two landfills elsewhere in Marion County. The DPW was concerned with the quality of ground water under and around these sites. The sludge lagoons are above a major aquifer, as is one of the landfills. The second landfill is adjacent to an aquifer. The soil covering at both landfills was amended with sludge (that is, sludge has been worked into the covering soil layer). The lagoons and the landfills are all more than 15 years old and have not received any new wastes, except for the sludge incorporated into the soil covering. The USGS, in cooperation with the DPW, is defining how ground-water quality is affected by leachate derived from the sludge lagoons, how ground-water quality is affected by leachate from a landfill that has had its soil amended by sludge, determining potential leachate migration at each site, and comparing environmental effects at each site. The results of the study will help the DPW to understand the hydrology, chemistry, and potential for contamination at each site.

GROUND-WATER MANAGEMENT

Two agencies in Indiana have primary responsibility for the management and protection of ground water. The Indiana Department of Natural Resources has the responsibility to protect the quantity of ground water by registering facilities capable of withdrawing 100,000 gallons a day or more, assessing the availability of water, and planning for the development, conservation, and beneficial use of water. The Indiana Department of Environmental Management is responsible for monitoring the quality of public-water supplies. The DEM also sets standards specifying maximum permissible concentrations of contaminants. Both agencies use ground-water data and the results of ground-water studies provided by the USGS. During fiscal year 1988, the following Federal, State, and local agencies entered into interagency or cooperative cost-sharing agreements with the USGS to conduct ground-water investigations in Indiana:

City of Carmel
City of Elkhart
Department of Public Works of Indianapolis
Indiana Department of Natural Resources
Indiana Department of Environmental Management
The Agency for Toxic Substances and Disease Registry
U.S. Environmental Protection Agency
U.S. National Park Service

SELECTED REFERENCES

- Bruns, T.M., 1985, Water resource management in Indiana, a strategy for the assessment of water resource availability: Indiana Department of Natural Resources, Report to the Natural Resource Commission, 4 p.
- Indiana Geological Survey, 1987, Bedrock geologic map of Indiana: Indiana Geological Survey, Bloomington, Ind., scale 1:500,000, 1 oversize sheet.
- Indiana Department of Natural Resources, 1987, Indiana's water use: Indiana Department of Natural Resources, Indianapolis, Ind., 1 oversize sheet.
- Rosenshein, J.S., and Hunn, J.D., 1968, Geohydrology and ground-water potential of Lake County, Indiana: Bulletin of the Division of Water, Indiana Department of Natural Resources, 36 p.
- U.S. Environmental Protection Agency, 1985, Master plan for improving water quality in the Grand Calumet River/Indiana Harbor Canal: U.S. Environmental Protection Agency, Chicago, Ill., 149 p.
- U.S. Geological Survey, 1974, Hydrologic unit map—1974, State of Indiana: U.S. Geological Survey, scale 1:500,000, 1 oversize sheet.

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

District Chief
U.S. Geological Survey
Water Resources Division
5957 Lakeside Boulevard
Indianapolis, Indiana 46278

Director
Indiana Water Resources Research Institute
Lilly Hall of Sciences
Purdue University
West Lafayette, Indiana 47907