



WATER FACT SHEET

U.S. GEOLOGICAL SURVEY, DEPARTMENT OF THE INTERIOR

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

GROUND-WATER ISSUES

In Pennsylvania, large water demands generally are met from surface-water sources; small water demands generally are met from ground-water sources. Ground-water sources supply 6 percent of the total water used in Pennsylvania. Of the ground water used in 1984, 55 percent was for industry, 23 percent for public supply, 15 percent for rural domestic supplies, 5 percent for livestock, and 2 percent for irrigation. Public supplies provide ground water to about 2,180,000 people, and rural self-supplied systems provide ground water to about 3,000,000 people. The major issues related to ground water in Pennsylvania are:

- Adequacy of supplies,
- Contamination by hazardous wastes, and
- Effects of coal mining, oil and gas production, and agriculture.

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 Pennsylvania are conducted by scientists, technicians, and support staff in offices in Harrisburg, Malvern, Pittsburgh, and Williamsport.

Hydrologic-data stations are maintained at selected locations throughout Pennsylvania to record data on stream discharge and stage, reservoir storage, ground-water levels, 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 Pennsylvania's water resources.

During 1987, the USGS, in cooperation with Federal, State, and local agencies, maintained a network of 82 observation wells in Pennsylvania to monitor water-level fluctuations. Water-level measurements from wells are used to monitor regional trends and the effects of drought and pumpage on ground-water storage; however, water-level measurements need to be integrated with other observations and ground-water investigations to be most relevant and useful.

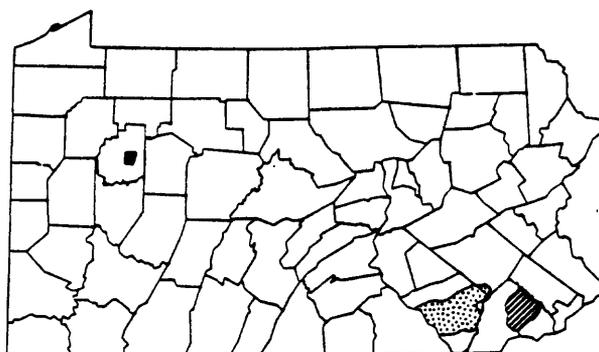
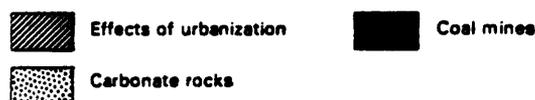
The USGS has conducted more than 280 hydrologic investigations in Pennsylvania. During fiscal year 1987, the USGS entered into agreements with 43 Federal, State, and local

agencies involving 25 hydrologic investigations in Pennsylvania; 14 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 nationwide hydrologic problems. Three examples of studies by the USGS that address specific ground-water issues in Pennsylvania are discussed below.

Effects of Urbanization in Chester County

A large regional sewer system constructed in 1977 in the Valley Forge area has affected the quantity of recharge to ground water. Detrimental changes to the quantity or quality of ground water are a major concern to local government, public water suppliers, and local residents. From 1981 through 1985, the USGS, in cooperation with the Chester County Water Resources Authority, studied the ground-water resources of eastern Chester County to evaluate the effects of the sewer system on ground water. During the study, water-use data were collected from all of the major users, the relation of ground-water levels to runoff into sewers was determined, and water from 70 wells was analyzed for volatile organic compounds. Forty-four wells, previously sampled between 1949 and 1976 for common ions, were sampled during 1982-83 to determine any long-term changes in water chemistry. The effects of public-supply wells

STUDY AREAS



and quarry dewatering on ground-water levels also were studied. The results of this study are used by water managers in Chester County to plan future ground-water development and to mitigate the effect of sewer construction on ground-water quantity and quality.

Ground Water in the Carbonate Rocks of Lancaster County

Population growth in the lower Susquehanna River basin has increased the demand for ground-water use and resulted in the need for improved ground-water management. The use of ground water as a supplemental water supply during droughts is of particular interest. The relations between surface water and ground water therefore needed to be determined. From 1979 through 1983, the USGS, in cooperation with the Susquehanna River Basin Commission (SRBC), studied the ground-water resources of a 626-square-mile area that lies mostly in Lancaster County. This area was selected for study because the carbonate rocks, which underlie 70 percent of the area, form an important aquifer with relatively large current and projected use of ground water. Data on water levels, aquifer characteristics, infiltration rates, and streamflow were collected and compiled, and a computer model was used to simulate ground-water flow. The model also was used to determine the relation of surface water to each aquifer, to quantify the natural sources and discharges for each aquifer, and to estimate the impacts of several different climatic conditions and ground-water withdrawal plans on the ground-water flow system. The results of this study are being used by the SRBC and State and local officials to manage ground-water development.

Effects on Ground-Water Quality of the Application of Sewage Sludge at Surface Coal Mines

Many surface mines in the bituminous coal fields of western Pennsylvania are not reclaimed or are poorly reclaimed. All new mining requires well-planned reclamation. The use of sewage sludge in the reclamation of surface mines may reduce acid-mine drainage, but also may contaminate ground water. In 1985, the Pennsylvania Department of Environmental Resources, Bureau of Mining and Reclamation, and the USGS entered into a cooperative agreement to study the effects of the application of sewage sludge at representative surface coal mines. Weirs, wells, and lysimeters for hydrologic monitoring were installed at two surface mines. One of the mines is not reclaimed with sludge and serves as a control site for background data. The other mine was reclaimed with the application of sewage sludge in summer 1986. Monitoring at both sites began at that time. The processes that control the quantity and quality of seepage through reclaimed coal spoils will be evaluated. Regulatory and management agencies will use the study results to assess the effects of sewage-sludge reclamation on water quality and quantity.

GROUND-WATER MANAGEMENT

The Pennsylvania Department of Environmental Resources primarily is responsible for the protection and management of

ground-water resources. Several bureaus within the department's Office of Environmental Protection and Resources Management implement ground-water programs within the Commonwealth. In addition to State regulatory control, the Susquehanna and Delaware River Basin Commissions have programs regulating withdrawals of ground water throughout their respective basins. The department and the basin commissions 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 Pennsylvania:

City of Philadelphia
Chester County Water Resources Authority
Delaware River Basin Commission
Erie County Department of Health
Indiana County Commissioners
Pennsylvania Department of Environmental Resources
Bureau of Mining and Reclamation
Bureau of Topographic and Geologic Survey
Bureau of Water Quality Management
Bureau of Water Resources Management
Susquehanna River Basin Commission
U.S. Department of Agriculture
U.S. Environmental Protection Agency

SELECTED REFERENCES

- Gerhart, J.M., and Lazorchick, G.J., 1984, Evaluation of the ground-water resources of parts of Lancaster and Berks Counties, Pennsylvania: U.S. Geological Survey Water-Resources Investigations Report 84-4327, 136 p.
- Helm, R.E., compiler, 1987, Water-resources activities of the U.S. Geological Survey in Pennsylvania, 1986-87: U.S. Geological Survey Open-File Report 87-475, 119 p.
- Sloto, R.A., 1987, Effect of urbanization on the water resources of eastern Chester County, Pennsylvania: U.S. Geological Survey Water-Resources Investigations Report 87-4098, 131 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.

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

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