88-145

WATER FACT SHEET

U.S. GEOLOGICAL SURVEY, DEPARTMENT OF THE INTERIOR

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

GROUND-WATER ISSUES

Ground water is an important resource in Tennessee, supplying about 50 percent of the drinking-water needs of the 4.78 million people in the State. In 1985, ground-water use was about 444 million gallons per day (Mgal/d), or about 5 percent of the total water withdrawals in Tennessee. Of the ground water used, 55 percent is for public supplies, 20 percent is for self-supplied industries, 16 percent is for rural domestic supplies, and 9 percent is for agricultural and other uses. Public supplies provide ground water to about 1.3 million people, while another 1.1 million people use ground water from private wells. The metropolitan area of Memphis, the largest urban area in the State with a population of about 800,000 people, uses about 140 Mgal/d of ground water for public supplies. The major issues related to ground water in Tennessee include:

- Contamination by hazardous wastes,
- Effects of land use on water quality, and
- Increased demands for public 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 scientific information on the Nation's water resources. The activities of the Water Resources Division in Tennessee are conducted by scientists, technicians, and support staff in offices in Nashville, Memphis, and Knoxville.

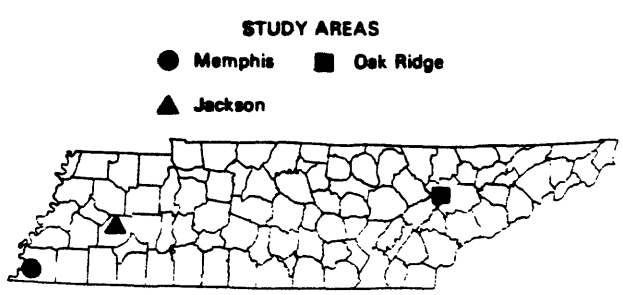
Hydrologic-data stations are maintained at selected locations throughout Tennessee to obtain data on stream discharge and stage, reservoir and lake storage, ground-water levels, well and spring discharge, and the quality of surface and ground water. Water-resources data are stored in the USGS National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

During 1987, the USGS, in cooperation with Federal, State, and local agencies, maintained a network of about 30 continuous-record observation wells in Tennessee to monitor fluctuations in water levels. About 200 additional wells were measured periodically. 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 360 hydrologic investigations in Tennessee. During fiscal year 1987, the USGS entered into agreements with 30 Federal, State, and local agencies involving 28 hydrologic investigations in Tennessee; 17 investigations included studies of ground-water quantity and quality. Three examples of ground-water studies by the USGS that address specific ground-water issues in Tennessee are discussed in the following sections.

Ground Water in the Memphis Area

The metropolitan area of Memphis in Shelby County in western Tennessee is the largest user of ground water in the State. About 196 Mgal/d of water is withdrawn from the Memphis Sand aquifer for public, commercial, and industrial uses. This artesian aquifer underlies the area at depths of from 100 to 1,800 feet. Several major well fields are operated by Memphis Light, Gas and Water. The quality of the water in the Memphis Sand aquifer generally is excellent, but several landfills and hazardous-waste sites in the area are potential sources of contamination. Previous investigations had indicated that an impermeable confining layer separated and protected the Memphis Sand aquifer from shallow ground water; however, a recent (1986) investigation indicates that water from the shallow system is leaking into the deeper system. Potentially, any contaminants leaking from the surface could eventually reach the deeper Memphis Sand aquifer. The USGS, in cooperation with Shelby County and the city of Memphis, is conducting investigations to define current water quality in the deep and shallow aquifers, to identify sources of contamination and potential zones of leakage from the shallow to the deep aquifer, and to maintain a current inventory of water withdrawals and uses in Shelby County. This



project will help officials of the city of Memphis and Shelby County assess the effects of pumpage on the water levels in the aquifer through the development and calibration of a 3-dimensional ground-water flow model.

Wellhead Protection in Jackson

The USGS, in cooperation with the city of Jackson and various State agencies, is conducting a project to delineate wellhead-protection areas. The city of Jackson depends entirely on ground water (about 14.4 Mgal/d) for all public, industrial, and commercial supplies. At least five potential sites of contamination have been identified within the recharge areas of the aquifer. The USGS has delineated the general hydrogeology of the area, and mapped the water table and the direction of ground-water flow. This project, using criteria designed by the U.S. Environmental Protection Agency, will provide officials of the city of Jackson with information necessary to define wellhead-protection areas.

Quality of Ground Water at Oak Ridge

Radioactive wastes have been buried at the Oak Ridge Reservation by the U.S. Department of Energy (DOE) for the last 30 years. Some of the wastes have leached from the burial trenches and migrated to ground- and surface-water bodies. In cooperation with the DOE, the USGS is investigating the principal disposal sites to delineate the direction and amount of contaminated ground-water flow from the burial trenches and to define relations between the ground- and surface-water systems. Information from these studies will be useful to the DOE in formulating strategies for the long-term monitoring, management, and remedial actions in the clean-up of radioactive waste sites.

GROUND-WATER MANAGEMENT

The principal State agency responsible for ground-water management in Tennessee is the Office of Water Management (OWM) of the Tennessee Department of Health and Environment. The Division of Groundwater Protection within the OWM is responsible for the administration of Federal and State regulations pertaining to water. The agency relies significantly on ground-water data and the results of ground-water studies provided by the USGS.

Tennessee has not enacted specific water-law legislation that addresses water use and quality, but the State has recognized the importance of its water resources, particularly ground water. A "Ground Water Dialogue" group appointed by a former Governor recently completed its report on a proposed "Groundwater Protection Strategy for Tennessee." The proposed strategy includes significant elements of legislation designed to protect the quality and to regulate the withdrawals of ground water. In Shelby County and the city of Memphis, the County Commission recently approved the creation of a "Ground Water Quality Control Board." The board will have regulatory authority over all ground-water issues in the county.

During 1987–88, the following Federal, State, and local agencies entered into interagency or cooperative cost-sharing agreements with the USGS to conduct ground-water investigations in Tennessee:

City of Bell Buckle
City of Jackson
City of Memphis
City of Spring Hill
Eastside Utility District
Hixson Utility District
Humphreys County
Lincoln County
Memphis State University
Shelby County
Tennessee Department of Health and Environment
  Division of Construction, Grants, and Loans
  Division of Groundwater Protection
  Division of Solid Waste Management
  Division of Superfund
U.S. Department of Energy
U.S. Environmental Protection Agency
Webb Creek Utility District

SELECTED REFERENCES

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Graham, D.D., and Parks, W.S., 1986, Potential for leakage among principal aquifers in the Memphis area, Tennessee: U.S. Geological Survey Water-Resources Investigations Report 85-4295, 46 p.

Parks, W.S., Graham, D.D., and Lowery, J.F., 1982, Installation and sampling of observation wells and analyses of water from the shallow aquifer at selected waste-disposal sites in the Memphis area, Tennessee: U.S. Geological Survey Open-File Report 82-266, 32 p.

Quinones, Ferdinand, Balthrop, B.H., and Baker, E.G., 1987, Water-resources investigations in Tennessee—Programs and activities of the U.S. Geological Survey, 1986–1987: U.S. Geological Survey Open-File Report 87-231, 47 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 Tennessee may be obtained from:

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Open-File Report 88-145 Ferdinand Quinones, 1988