



# WATER FACT SHEET

U.S. GEOLOGICAL SURVEY, DEPARTMENT OF THE INTERIOR

## TOXIC WASTE—GROUND-WATER CONTAMINATION PROGRAM

### BACKGROUND

Contamination of ground water caused by the infiltration of man-made chemicals from both point (single-source type discharges) and nonpoint sources (areal type discharges) is a major environmental problem facing the Nation. Point-source contamination problems, such as those encountered at Love Canal in New York, are limited in areal extent but, owing to the high concentrations of dangerous chemicals, create significant social disturbances and are very expensive to mitigate. Many point-source contamination problems have been identified throughout the Nation. Nonpoint-source contamination problems, such as those resulting from the infiltration of agricultural chemicals, cause degradation of ground water over broad regions of the Nation. Such contamination generally introduces relatively low concentrations of chemicals which, over time, may limit the use of important water supplies.

Owing to the variability and complexity of ground-water systems, no quick solution is available to prevent or mitigate ground-water contamination problems. Ground water moves relatively slowly, and may remain contaminated for years or decades. Most current drinking-water problems have originated from incidences of contamination that occurred many years earlier. Major technical issues must be addressed in order to provide the Nation with a safe and economically suitable solution to the ground-water contamination problem.

### THE U.S. GEOLOGICAL SURVEY TOXIC WASTE—GROUND-WATER CONTAMI- NATION PROGRAM

The U.S. Geological Survey (USGS), since its inception in 1879, has been involved in the development of earth-science information related to water quality. Many USGS studies in hydrology (the study of the movement of water and its chemical constituents through surface- and ground-water systems) and in geology (the study of the earth and the processes acting on it) provide the scientific information necessary to understand the complex

factors that affect the movement of wastes in the subsurface. In fiscal year 1982, the USGS began an interdisciplinary program, the Toxic Waste—Ground-Water Contamination Program, to provide earth-science information to help solve problems of toxic-waste management and ground-water contamination.

### PURPOSE

The purpose of the Toxic Waste—Ground-Water Contamination Program is to provide other Federal agencies, State and local governments, and industry with information about the earth-science factors affecting the fate and movement of man-made chemicals in the subsurface. Water flowing on or beneath the land dissolves and transports wastes. The natural water circulating in soils and rocks spreads and, in some cases, cleanses contaminated water. The particular processes that come into play depend on many factors, such as the chemical nature and porosity and permeability of the soil and rock, and the prevailing climatic condition. Geochemical and microbiological processes that affect the waste also need to be understood. Such knowledge will help water planners and managers determine the most effective and efficient prevention or mitigation strategies to protect or improve ground-water quality throughout the Nation.

### ACTIVITIES

Scientists working in the Toxic Waste—Ground-Water Contamination Program are conducting studies throughout the Nation. The program activities will:

- Bring together Geological Survey scientists representing a variety of disciplines, such as hydrology, geology, geochemistry, and microbiology, to study the behavior and fate of major types of contaminants in the subsurface environment. Contaminants under study (see map) include crude oil; volatile organic compounds, such as trichloroethylene; sewage; wood-preserving chemicals, such as creosote and pentachlorophenol; acids and metals; and agricultural chemicals, such as nitrates and pesticides;

- Develop technical guidelines for application of earth-science principles to the safe disposal of toxic wastes and the management of contamination problems;
- Develop methods to assess the general condition and trends of ground-water quality across the Nation;
- Improve monitoring, sampling, and "exploration" procedures that can be used to define and analyze the potential for or extent of ground-water contamination;
- Develop predictive models and assess their reliability and value for determining the potential for or extent of ground-water contamination from disposal sites; and

- Provide hydrologic, geochemical, and other earth-science information to assist Federal, State, and local agencies and industry in managing toxic-waste and mitigating ground-water contamination.

For information about the USGS Toxic Waste—Ground-Water Contamination Program, contact:

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