



# WATER FACT SHEET

U.S. GEOLOGICAL SURVEY, DEPARTMENT OF THE INTERIOR

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

### GROUND-WATER ISSUES

Ground water is available in nearly every part of Montana. Although ground water constitutes less than 2 percent of total water withdrawals, 424,000 people, or more than 50 percent of the State's population, rely on ground water for domestic water supplies. About one-half of the fresh ground-water withdrawn in the State is for domestic, livestock, and industrial use; the other half is for irrigation. Overall, the quality of ground water in Montana is suitable for many uses and is not thought to be threatened by contamination. Ground-water supplies at several locations in the State, however, have been degraded. The major issues related to ground water in Montana are:

- Effects of land use on ground-water quality;
- Contamination of ground water from hazardous materials;
- Designation of selected aquifers as sole sources for domestic supplies; and
- Development of ground-water resources.

### 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 Montana are conducted by scientists, technicians, and support staff in offices in Helena, Billings, Kalispell, and Fort Peck.

Hydrologic-data stations are maintained at selected locations throughout Montana to record 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 making decisions that affect Montana's water resources.

During 1987, the USGS, in cooperation with Federal, State, and local agencies, maintained a network of about 300 observation wells in Montana to measure fluctuations in water levels. These water-level measurements are used to monitor ground-water trends; however, they need to be integrated with ground-water investigations to be the most relevant and useful.

Since 1890, the USGS has conducted more than 100 hydrologic investigations in Montana. During fiscal year 1988, the USGS entered into cooperative agreements with 21 Federal,

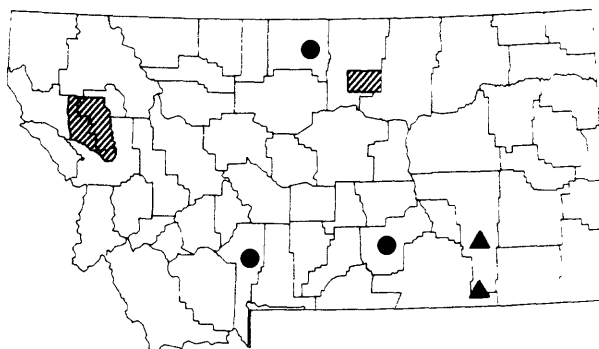
State, and local agencies, involving 15 hydrologic investigations in Montana. Nine of these investigations address the quantity and quality of ground water. These investigations provide information needed to answer questions that are specific to the State's principal ground-water issues. Three examples of current (1988) ground-water studies in Montana are discussed in the following sections.

### Geochemistry of Coal-Mine Spoils in Southeastern Montana

Surface mining of coal, which involves the removal and replacement of overburden, affects the quality of ground water. A 1984 study showed that the dissolved-solids concentrations in water in mine spoils increased by about 50 percent, or about 1,000 milligrams per liter (mg/L), over premining concentrations. A later study showed that dissolved-solids concentrations may decrease by several hundred mg/L as ground water from upgradient spoils moves back through a coal aquifer. Federal and State agencies responsible for leasing coal and regulating mining activities have relied on the results of these studies to protect ground-water resources in coal areas of southeastern Montana. The USGS, in cooperation with the Montana Department of State Lands (MDSL) and the U.S. Bureau of Land Management (BLM), is conducting further studies to determine and assess the quality of ground water at two existing mines in Montana. The studies will provide field verification of laboratory results and theoretically-predicted processes, and will provide regional data bases needed for

#### STUDY AREAS

- ▲ Geochemistry of coal-mine spoils
- Pesticides in ground water
- ▨ Flathead and Fort Belknap Indian Reservations



assessment of cumulative hydrologic impacts expected from proposed mines. The BLM uses the information in the Federal coal-leasing program, the MDSL uses the information in reviewing and approving mine plans, and the U.S. Office of Surface Mining uses the information in assessing cumulative hydrologic impacts of proposed mines.

### Pesticides in Ground Water

Pesticides have been found in ground water in many areas of the Nation. Studies in more temperate climates have shown that pesticides migrate down through the soil zone and contaminate ground water. Little research has been conducted in semiarid cold regions, however, or in areas where alkaline soils are common. Reconnaissance-level sampling by the Montana Department of Agriculture has shown the presence of pesticides in shallow aquifers at several locations in Montana. A cooperative research project between the USGS, the Montana Bureau of Mines and Geology, and Montana State University is being conducted to determine the occurrence and mobility of pesticides in three agricultural environments typical of the northern Great Plains. Information from the study will be used to document the persistence and mobility of pesticides in the hydrologic system, and will assist Federal and State agencies and the agricultural community in developing strategies to minimize the threat from pesticides to ground-water resources.

### Ground-Water Development on Indian Reservations

The U.S. Bureau of Indian Affairs and tribes on several reservations in Montana are evaluating the potential for developing ground-water resources for irrigation. The USGS has conducted ground-water assessments on the Flathead Indian Reservation in northwestern Montana and on the Fort Belknap Indian Reservation in north-central Montana, which indicate that ground-water supplies are available. Further study on the Flathead Indian Reservation has identified areas where high-capacity wells could be developed. Presently (1988), studies on the Fort Belknap Indian Reservation are underway to expand knowledge of water availability from alluvial and bedrock aquifers. More than 100 test holes have been completed in alluvial aquifers on the Fort Belknap Indian Reservation and 67 observation wells have been installed. Aquifer tests have been conducted to assess aquifer characteristics and potential well yields. Information from the studies is used by the tribes and the U.S. Bureau of Indian Affairs to evaluate the availability of ground water on the reservations, to plan future ground-water development, and to negotiate with officials of the State of Montana on Federal reserved water rights.

### GROUND-WATER MANAGEMENT

The principal State agencies responsible for ground-water management in Montana are the Department of Natural Resources and Conservation, the Department of Health and Environmental Sciences, and the Department of State Lands. The Department of Natural Resources and Conservation administers water-resources and water-rights programs. The Department of Health and Environmental Sciences administers programs related to the quality of the State's surface- and ground-water resources. The Department of State Lands applies for and claims water for use on school-trust lands, maintains records of water rights attached to the school-trust lands, and has water-resource responsibilities through various mining-reclamation acts.

Two other State agencies also have management responsibilities. The Montana Universities Joint Water Resources Research Center conducts and coordinates water research programs. The Montana Bureau of Mines and Geology conducts applied research projects on all aspects of the State's ground-water resources, maintains a statewide ground-water information center and data base, and assists governmental organizations and private citizens with water-related problems. During 1987 and 1988, the following Federal, State, and local agencies or organizations entered into interagency and (or) cooperative cost-sharing agreements with the USGS to conduct ground-water investigations in Montana:

Confederated Salish and Kootenai Tribes  
Daniels County Conservation District  
Montana Bureau of Mines and Geology  
Montana Department of State Lands  
Montana Department of Health and Environmental Sciences  
Montana Department of Natural Resources and Conservation  
Montana State University  
University of Montana  
U.S. Bureau of Indian Affairs  
U.S. Bureau of Land Management  
U.S. Bureau of Reclamation  
U.S. Environmental Protection Agency  
U.S. Fish and Wildlife Service

### SELECTED REFERENCES

- Boettcher, A.J., 1982, Ground-water resources in the central part of the Flathead Indian Reservation, northwestern Montana: Montana Bureau of Mines and Geology Memoir 48, 28 p.
- Davis, R.E., 1984, Geochemistry and geohydrology of the West Decker and Big Sky coal-mining areas, southeastern Montana: U.S. Geological Survey Water-Resources Investigations Report 83-4225, 109 p.
- Davis, R.E., and Dodge, K.A., 1986, Results of experiments related to contact of mine-spoils water with coal, West Decker and Big Sky Mines, southeastern Montana: U.S. Geological Survey Water-Resources Investigations Report 86-4002, 16 p.
- Feltis, R.D., 1983, Ground-water resources of the Fort Belknap Indian Reservation, north-central Montana: Montana Bureau of Mines and Geology Memoir 53, 36 p.
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- Roberts, R.S., compiler, 1986, Water-resources activities of the U.S. Geological Survey in Montana, October 1985 through September 1986: U.S. Geological Survey Open-File Report 86-421W, 81 p.
- Solley, W.B., Chase, E.B., and Mann, W.B., IV, 1983, Estimated use of water in the United States in 1980: U.S. Geological Survey Circular 1001, 56 p.
- U.S. Geological Survey, 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 Montana can be obtained from:

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U.S. Geological Survey  
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Helena, Montana 59626-0076

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