



# WATER FACT SHEET

U.S. GEOLOGICAL SURVEY, DEPARTMENT OF THE INTERIOR

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

### GROUND-WATER ISSUES

Ground water historically has been vital to the development of Wyoming. In many parts of the State, surface water either is fully appropriated or is not present in large quantities. Although less than 10 percent of all water used is ground water, 62 percent of the State's population is served by ground water. Of the total amount of ground water used, 60 percent is used for irrigation, 30 percent for industrial supplies, 7 percent for public water supplies, and 3 percent for rural supplies. Depending on the location in the State, the most important issues related to ground water in Wyoming are:

- Availability of ground water,
- Impaired water quality, and
- Hydrologic effects of energy-resource development.

### 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 information on the Nation's water resources. The activities of the Water Resources Division in Wyoming are carried out by scientists, technicians, and support staff in Cheyenne, Casper, and Riverton.

Hydrologic-data stations are maintained at selected locations in Wyoming for obtaining records of stream stage and discharge, reservoir and lake storage, ground-water levels, well and spring discharge, and the quality of surface and ground water. These data are used by water planners and managers involved in making decisions that affect Wyoming's water resources.

During 1987, the USGS maintained a network of 89 observation wells in Wyoming for monitoring fluctuations in water levels, of which 83 were operated in cooperation with the Wyoming State Engineer. Water-level measurements from wells are used to monitor ground-water trends; however, these data must be integrated with other observations and investigations to have the most relevance and usefulness.

During fiscal year 1987, the USGS entered into agreements with 18 Federal, State, and local agencies involving 20 hydrologic investigations in Wyoming; 11 investigations included studies of ground-water quantity and quality. These investigations will provide information that is specific to the State's

principal ground-water issues. Some of these investigations will provide information on statewide, multistate, and national hydrologic problems.

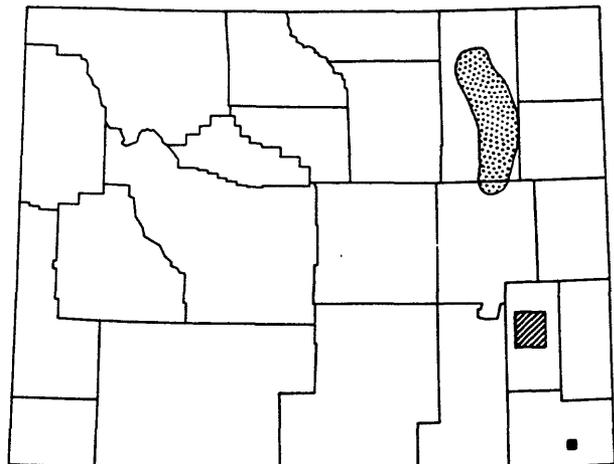
The USGS, in cooperation with the Wyoming State Engineer, completed a series of studies in 1976 that provides a statewide framework for future, more detailed, ground-water studies. The results of the studies, published in eight USGS Hydrologic Investigations Atlases, comprise a general assessment of Wyoming's ground-water resources. Three examples of ground-water studies by the USGS that were designed to address specific ground-water issues in Wyoming are discussed in the following sections.

### Ground Water in the Wheatland Area

The USGS, in cooperation with the Wyoming State Engineer, has conducted seven detailed ground-water studies in the Wheatland area of Platte County since the 1960's. Shallow ground water is an important source of water for irrigation. In the late 1970's, a coal-fired electric generating station near the Laramie River created a demand for ground water during periods of insufficient surface-water supplies. The USGS collected ground-water data and developed digital ground-water flow

#### STUDY AREAS

-  Wheatland area
-  F. E. Warren Air Force Base
-  Effects of surface mining



models to predict the long-term effects of irrigation and proposed industrial pumping from the unconfined aquifer in the Wheatland area. Water-level declines were calculated and depletions in streamflow were estimated for two nearby rivers. The State Engineer and State Board of Control are using the results of the studies to manage the orderly development of ground water in the Wheatland area.

#### **Contaminants in the Shallow Aquifer at F.E. Warren Air Force Base**

In 1987, the USGS and the U.S. Air Force began a study of the potential for contamination of the shallow ground water at F.E. Warren Air Force Base near Cheyenne. The USGS compiled ground-water data and drilled test holes to obtain comprehensive information on shallow ground-water conditions at the base. Water samples were collected from wells and test holes for analysis of organic and other compounds. The information gathered by the USGS was used to determine aquifer characteristics, the extent of contamination of the aquifer, and the direction of the movement of contaminants. The Air Force is using the results of the study in the clean-up of waste sites at the base and to determine the appropriate action to be taken at sites identified as having potential for ground-water contamination.

#### **Hydrologic Effects of Surface Mining in the Powder River Basin**

The Wyoming Department of Environmental Quality (DEQ), in conjunction with the U.S. Office of Surface Mining (OSM), is required by Federal and State laws to assess the hydrologic impacts of surface mining for coal. Previous investigations of the water resources in the eastern Powder River basin of northeastern Wyoming were insufficient to make such an assessment. In 1986, the USGS, the DEQ, and the OSM began a comprehensive study of the hydrologic effects of mining and reclamation at 16 active mines and 6 planned mines in Campbell County and northern Converse County. The USGS is evaluating changes in ground-water levels caused by the mining activities, and the changes in ground-water quality in the spoil-material aquifers which replace the overburden and coal aquifers.

#### **GROUND-WATER MANAGEMENT**

The principal State agencies responsible for ground-water management are the Wyoming State Engineer and the Wyoming Department of Environmental Quality. The State Engineer is charged with providing for the orderly development of ground water and its protection from wastes. The Water Quality Division of the Department of Environmental Quality is the agency primarily responsible for the protection of ground-water quality.

Both State agencies use ground-water data and the results of ground-water studies provided by the USGS. 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 Wyoming:

City of Cheyenne  
U.S. Air Force  
U.S. Bureau of Land Management  
Wyoming Department of Agriculture  
Wyoming Department of Environmental Quality  
Water Quality Division  
Land Quality Division  
Wyoming State Engineer

#### **SELECTED REFERENCES**

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- Green, S.L., and Schuetz, J.R., compilers, 1987, Water-resources activities of the U.S. Geological Survey in Wyoming, fiscal years 1986 and 1987: U.S. Geological Survey Open-File Report 87-532, 118 p.
- Hoxie, D.T., 1977, Digital model of the Arikaree aquifer near Wheatland, southeastern Wyoming: U.S. Geological Survey Open-File Report 77-676, 54 p.
- Kennedy, H.I., and Oberender, C.B., 1987, Ground-water levels in Wyoming, 1976 through 1985: U.S. Geological Survey Open-File Report 87-456, 122 p.
- Larson, L.R., 1984, Ground-water quality in Wyoming: U.S. Geological Survey Water-Resources Investigations Report 84-4034, 71 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.
- Weider, G.E., 1968, Ground-water reconnaissance of the Green River basin, southwestern Wyoming: U.S. Geological Survey Hydrologic Investigations Atlas Map HA-290.

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

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U.S. Geological Survey  
Water Resources Division  
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Open-File Report 88-121

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