MISSISSIPPI
Ground-Water Quality

Ground water constitutes 54 percent of all the freshwater used in Mississippi and serves the water-supply needs of 93 percent of the population (fig. 1). Wells capable of producing 200 gal/min (gallons per minute) of water with quality suitable for most uses can be obtained in all but a few areas of the State. Wells producing more than 2,000 gal/min are common in northwestern Mississippi and are not unusual in the coastal area. The nearly exclusive use of ground water for public and industrial water supplies is the result of the statewide availability of aquifers (fig. 2) that are capable of supplying large yields of water containing dissolved-solids concentrations generally less than 400 mg/L (milligrams per liter). The ground-water quality in most of the aquifers does not exceed the national drinking-water standards established by the U.S. Environmental Protection Agency (1986a,b); however, wells in some aquifers in some localities produce water that contains objectionable concentrations of iron or has natural properties, such as excessive hardness, low pH, or color, that may limit its use for some purposes.

The largest use of ground water in the State is for irrigation of crops in the Mississippi River alluvial plain of northwestern Mississippi. Public-water supply constitutes the second largest use of ground water, and pumping for public supplies is concentrated in the more intensely populated areas. The public water-supply systems in Jackson (Hinds County), Meridian (Lauderdale County), and Columbus (Lowndes County) use ground water and surface water conjunctively and are the only systems in the State that use surface water.

Because Mississippi, in general, is a sparsely populated agricultural State and is not intensely industrialized, ground-water contamination is not a major problem at this time. However, ground-water contamination has been documented in some areas (fig. 3). Localized saltwater contamination of freshwater aquifers by oilfield-brine disposal has been documented at several sites, primarily in the central and southern parts of the State. Two hazardous-material National Priorities List (NPL) sites are being studied under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, and ground water is being monitored at 23 hazardous-waste sites under the Federal Resources Conservation and Recovery Act (RCRA) of 1976. Contamination of shallow ground water has been detected at 1 of the NPL sites and at 13 of the RCRA sites. In addition, the U.S. Department of Defense (DOD) has identified one site at one facility where contamination has warranted remedial action.

Although ground-water-quality contamination has been documented at only a few sites, the combination of very permeable soils, shallow ground water, and large annual rainfall makes the State's ground water susceptible to contamination. Consequently, ground-water monitoring is important to early detection of contamination.

The U.S. Geological Survey, in cooperation with the Mississippi Department of Natural Resources, and other local, State, and Federal agencies, has collected a significant amount of ground-water-quality information. Even though effective monitoring programs have been implemented for public water supplies and for sites of known and potential contamination, much of the water-quality information for other areas of the State has been limited to a small number of inorganic and organic constituents. This information is inadequate to assess the nature and occurrence of many of the hazardous organic compounds and agricultural chemicals that may affect the ground-water quality of the principal aquifers in Mississippi.

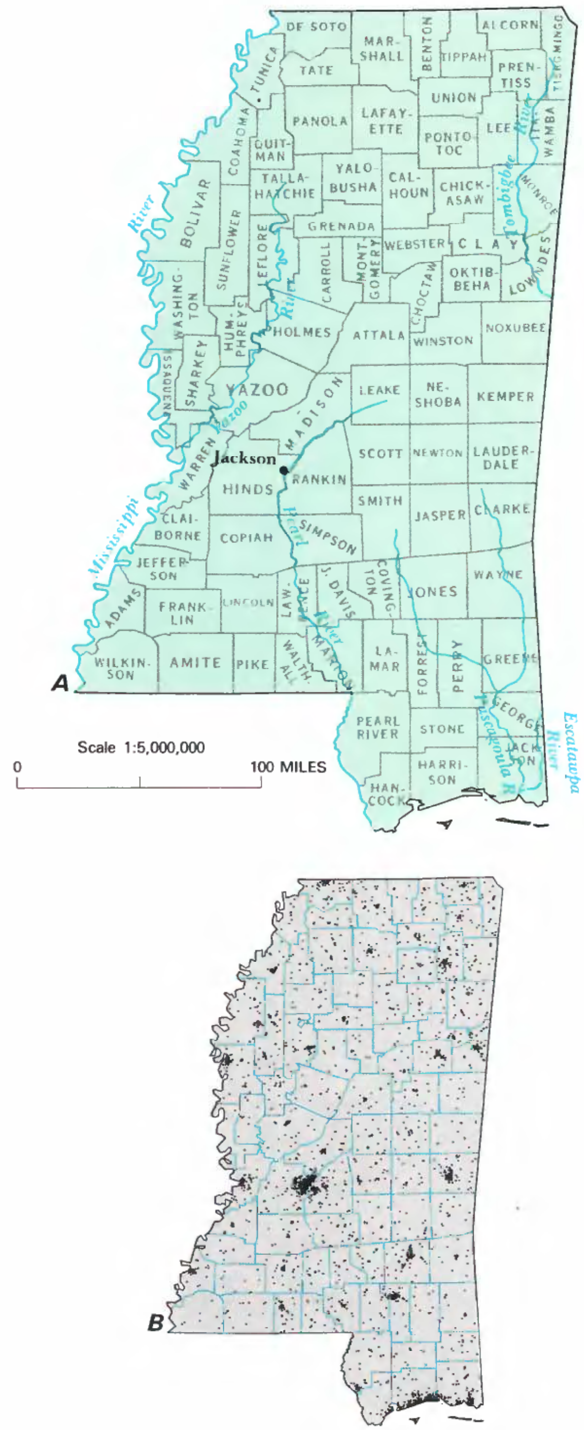

Figure 1. Selected geographic features and 1985 population distribution in Mississippi. *A*, Counties, selected cities, and major drainages. *B*, Population distribution, 1985; each dot on the map represents 1,000 people. (Source: *B*, Data from U.S. Bureau of the Census 1980 decennial census files, adjusted to the 1985 U.S. Bureau of the Census data for county populations.)

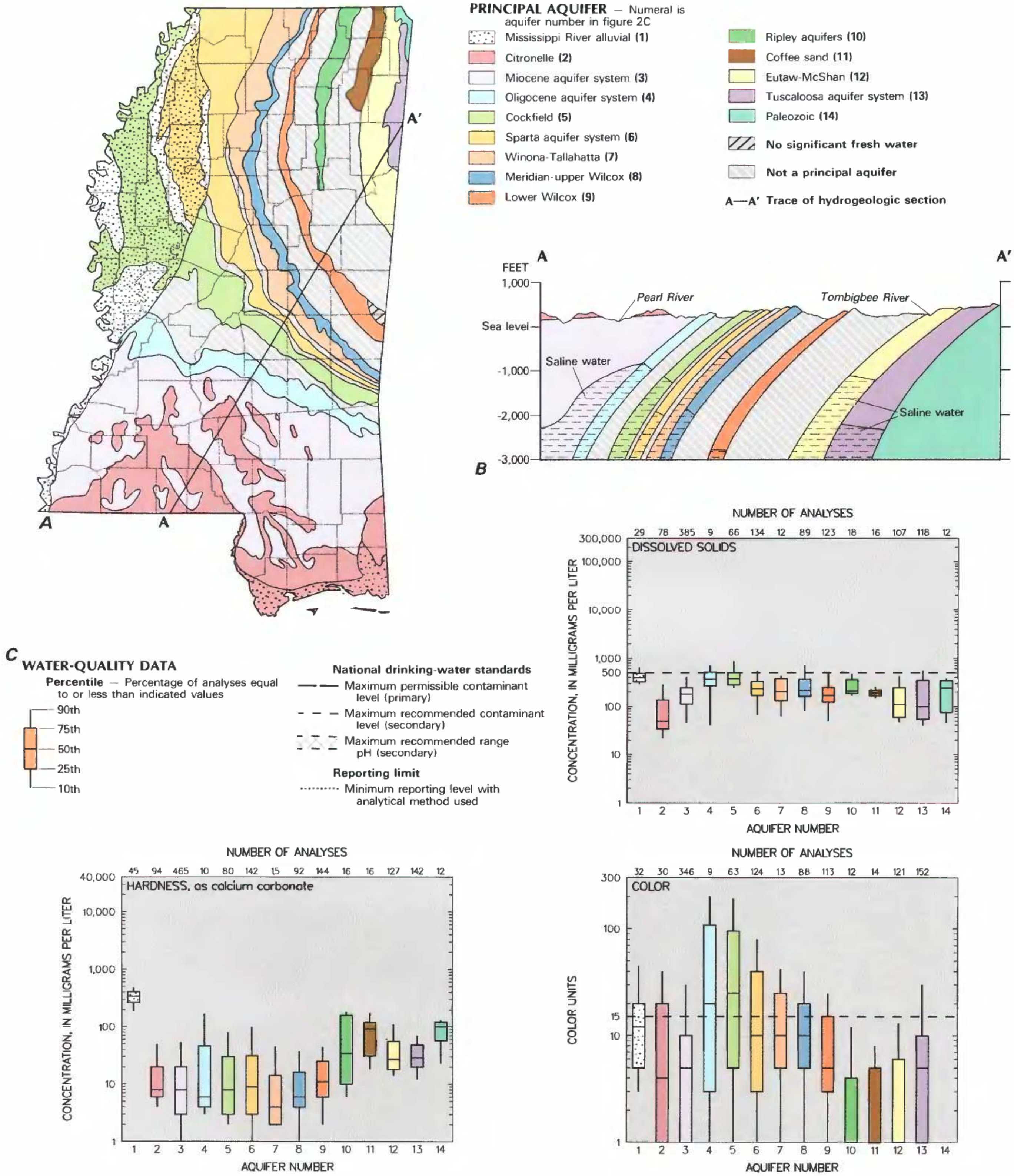

Figure 2. **Principal aquifers and related water-quality data in Mississippi.** *A*, Principal aquifers. *B*, Generalized hydrogeologic section. *C*, Selected water-quality constituents and properties, as of 1970–85. (Sources: *A*, Modified from Bicker, 1969. *B*, Compiled by E.H. Boswell from U.S. Geological Survey files. *C*, Analyses compiled from U.S. Geological Survey files; national drinking-water standards from U.S. Environmental Protection Agency, 1986a,b.)

WATER QUALITY IN PRINCIPAL AQUIFERS

Almost all water wells in Mississippi obtain water from 1 or more of the 14 principal aquifers. The principal aquifers that crop out in the State are shown in figure 2*A*. Much of the water that reaches the water table moves downdip to the west-southwest into confined aquifers (fig. 2*B*). Although most of the State is underlain by one or more excellent freshwater aquifers, water-level declines are locally large as the result of large withdrawals. Slightly-saline water (dissolved-solids concentrations between 1,000 and 3,000 mg/L), which is plentiful in most confined aquifers beyond the downdip limit of freshwater, is an important resource for future use. Geohydrologic data indicate that most of the principal aquifers at one time were filled with saline water. Later, the saline water was displaced, at least partly, by freshwater (Wasson, 1980, p. 15).

In 1980, 74 percent or about 1,140 Mgal/d (million gallons per day) of all ground water used was from wells completed in the Mississippi River alluvial aquifer (U.S. Geological Survey, 1985, p. 274). About 70 percent of the water from the alluvial aquifer was used, without treatment, for aquaculture and agricultural purposes. Pumpage from the Tuscaloosa, Meridian-upper Wilcox, Sparta, Cockfield, and Miocene aquifers or aquifer systems represented 22 percent (330 Mgal/d) of the total ground water used whereas freshwater from the other eight aquifers represented 4 percent (65 Mgal/d). About 13 percent of all fresh ground water used in 1980 was for public and domestic water supplies. Water withdrawn from most deeper confined aquifers for public supplies generally needs little or no treatment, but water from the Mississippi River alluvial aquifer generally needs treatment for the removal of hardness and iron. About 14 percent of all ground water used is for industrial purposes. Most (11 percent) of the water is withdrawn from the Miocene and Tuscaloosa aquifer systems for self-supplied industrial use.

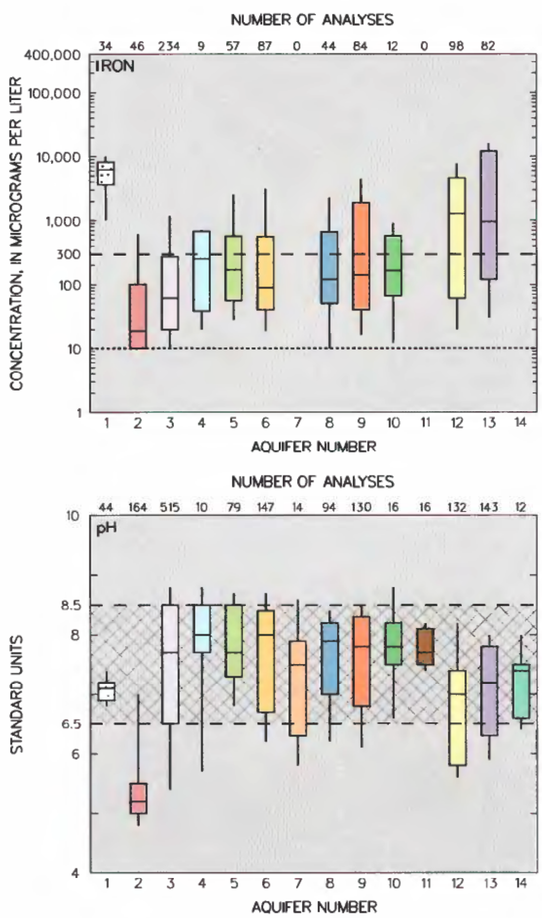

Figure 2. Principal aquifers and related water-quality data in Mississippi—Continued.

The chemical characteristics of water in the shallow (less than 200 feet below land surface) Mississippi River alluvial aquifer are fairly uniform throughout the aquifer. The base of freshwater in the confined aquifers ranges from about 200 to 3,000 feet in depth. A chemical-quality change occurs gradually with depth as the result of ion exchange and other natural geochemical processes. Dissolved-solids concentrations and pH values of water at depths of about 100 feet or less in recharge areas may be much smaller than 100 mg/L and 7 standard units, respectively. The dissolved-solids concentration and pH of water increase as water moves downdip. Ground water that is generally soft to moderately hard and a calcium-magnesium-bicarbonate type at shallow depths changes to a sodium-bicarbonate type deeper in the aquifer and eventually becomes a sodium-chloride-bicarbonate type. At greater depths, the water becomes very saline and dissolved-solids concentrations are larger than 10,000 mg/L. Local conditions, such as hydrologic connection between aquifers and streams, geologic structures and anomalies in aquifers, and recharge from estuaries and tidal marshes, also will affect ground-water quality.

BACKGROUND WATER QUALITY

A graphic summary of selected water-quality variables compiled from the U.S. Geological Survey's National Water Data Storage and Retrieval System (WATSTORE) is presented in figure 2*C*. The summary is based on dissolved-solids, hardness, color, iron, and pH analyses of water samples collected from 1970 to 1985 from the principal aquifers in Mississippi. Percentiles of these variables are compared to national standards that specify the maximum concentration or level of a contaminant permissible in a drinking-water supply as established by the U.S. Environmental Protection Agency (1986a,b). The primary maximum contaminant level standards are health related and are legally enforceable. The secondary maximum contaminant level standards apply to esthetic qualities and are recommended guidelines. The secondary drinking-water standards include maximum concentrations of 500 mg/L dissolved solids, 15 units color, 300 μg/L (micrograms per liter) iron, and 6.5–8.5 units pH.

Where more than one analysis from a site was available, the median concentration for the site was used. The data were interpreted without regard to sample depth within the aquifer. Dissolved-solids concentrations of water at depths in the principal aquifers are described on maps by Wasson (1980, p. 23–107).

Dissolved Solids

The concentration of dissolved solids describes the total mineral content of water and characterizes the general ground-water quality of an aquifer. The median dissolved-solids concentration of water from wells in all aquifers was 400 mg/L or less, which does not exceed the 500-mg/L drinking-water standard. Median values for dissolved-solids concentrations are largest (393 mg/L) for water in the Mississippi River alluvial aquifer and smallest (50 mg/L) for water in the Citronelle aquifer. The differences in the amounts of dissolved solids in the water in these two shallow aquifers reflect the differences in weathering and mineralogy of the sediments that constitute the two aquifers. Also, the alluvial aquifer is recharged primarily by the Mississippi River (Sumner and Wasson, 1984, p. 47), whereas the Citronelle aquifer is recharged by rainfall. The confined aquifers contain naturally occurring saline water at depth, and wells screened near or below the base of freshwater or downdip from the freshwater-saltwater interface can produce water with much larger dissolved-solids concentrations than those shown in figure 2*C*.

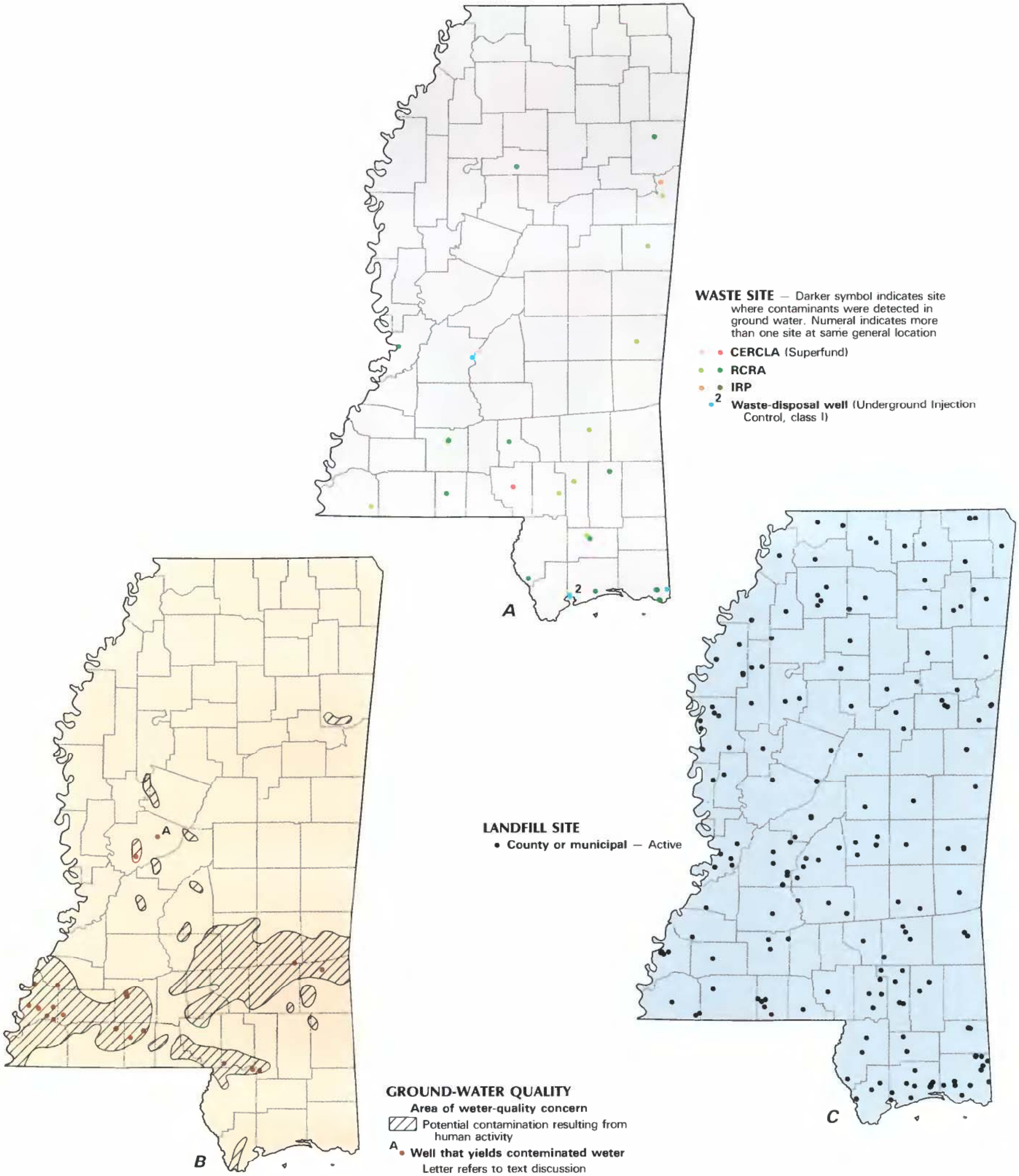

Figure 3. Selected waste sites and ground-water-quality information in Mississippi. *A*, Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) sites, as of 1986; Resource Conservation and Recovery Act (RCRA) sites, as of 1986; Department of Defense Installation Restoration Program (IRP) sites, as of 1985; and other selected waste sites, as of 1986. *B*, Areas of potential contamination, and distribution of wells that yield contaminated water, as of 1986. *C*, County and municipal landfills, as of 1984. (Sources: *A*, Mississippi Department of Natural Resources files; U.S. Department of Defense, 1986; U.S. Geological Survey files. *B*, Modified from Gandl, 1982, p. 6; Mississippi Department of Natural Resources, and U.S. Geological Survey files. *C*, Mississippi Department of Natural Resources and U.S. Geological Survey files.)

Hardness

Calcium and magnesium, which contribute to the hardness of water, are among the principal constituents in the water of the Mississippi River alluvial aquifer and water at shallow depths in the other aquifers. Water in the alluvial aquifer generally is very hard, with values larger than 340 mg/L. Median hardness values for water from the Coffee Sand and Paleozoic aquifers are 92 and 100 mg/L, respectively. The water in the other aquifers is soft and rarely exceeds a hardness of 60 mg/L.

Color

Color of water in most aquifers increases as the water contacts and dissolves color-producing organic materials. The color of water in the principal aquifers rarely exceeds 40 color units but locally may exceed 100 units. Median color values exceed the standard for drinking-water supplies (15 units) only in the Oligocene aquifer system and the Cockfield aquifer, where median color values are 20 and 25 units, respectively. Color is visible in this range but generally does not limit its use for most purposes.

Iron

Iron occurs least commonly in water from the Citronelle aquifer and the Miocene aquifer system and most commonly in the water from the Mississippi River alluvial aquifer, Eutaw-McShan aquifer, and Tuscaloosa aquifer system. Iron concentrations commonly are largest in water in the Mississippi River alluvial aquifer, where iron concentrations seldom are smaller than 4,000 μg/L and generally are larger than 6,000 μg/L. In the confined aquifers, iron concentrations tend to be larger in and near the outcrop areas. Median iron concentrations exceed the standard for drinking water in the Mississippi River alluval aquifer, Eutaw-McShan aquifer, and Tuscaloosa aquifer system. Data for the Eutaw-McShan aquifer may be biased toward larger iron concentrations, owing to the predominance of water samples obtained at shallow depths in the outcrop area. Iron concentrations are not shown for some of the aquifers (fig. 2*C*) because of the limited amount of data.

pH

Except for the Citronelle aquifer, median pH values for water in the principal aquifers do not exceed the drinking-water standards. The pH of water in the Citronelle aquifer generally is acidic and rarely exceeds 5.5 units. In the Mississippi River alluvial aquifer, the pH of water generally ranges from 6.9 to 7.2 units. In other aquifers, the pH of the water generally has a greater range with depth and commonly is larger than 7.5 units.

EFFECTS OF LAND USE ON WATER QUALITY

Current ground-water-quality concerns include the effects of mining, urbanization, surface and underground waste disposal, saltwater intrusion, and agricultural activites. Many of these land-use factors are under investigation, and others are to be investigated soon.

Mining

Mining has had little known effect on ground-water quality. Sand and gravel quarries are common, and economically important minerals, such as lime, clay, sulfur, and some trace metals have been mined for several years. Extensive mining of large lignite deposits in the State is not economically feasible (1986). Surface mining of lignite in the future may affect the ground-water quality of some aquifers in the northern and east-central parts of the State.

Urbanization

Considerable urban development has occurred since 1970 in areas along the Gulf Coast and in the Jackson metropolitan area. With this urban growth and development, there is potential for ground-water contamination from runoff from streets during excessive rains and from fertilizers, pesticides, and other chemicals applied to lawns.

There also are concerns about possible shallow ground-water contamination related to septic-tank systems in rural communities and some urban areas. These concerns are focused on bacterial and nitrate contamination, and more recently on synthetic organic chemicals used for septic-tank cleaners. Many systems are operated for periods that exceed their design life and leakage of hazardous substances is a possibility.

Waste Disposal

Hazardous wastes are treated, stored, or disposed at 23 RCRA sites that constitute a known or potential hazard to the quality of ground water (fig. 3*A*). The shallow ground water has been contaminated to some degree at 13 of the RCRA sites. The detected contamination is attributed to wood-treatment preservatives, such as pentachlorophenol or creosote, at nine of the RCRA sites; to organic chemicals, such as nitrobenzene, dinitrobutyl phenol, and phenolic compounds, at three sites; and nickel at one site.

Shallow ground water has been contaminated at an inactive waste site located near the Centreville RCRA site in Wilkinson County. The primary source of the contamination appears to be rubber-product wastes placed on a 35-acre tract of land since the 1970's. Carbon tetrachloride, chloroform, and acetone were detected in ground water at depths of less than 15 feet. The site may be designated a CERCLA site after assessments are completed.

An assessment also is being conducted to determine the source of organic compounds that have contaminated several public and private water-supply wells at Benton in Yazoo County (fig. 3*B*, site A). The suspected cause of the contamination is leakage from an underground storage tank (Seal, 1986, p. 1–4). Some of the compounds detected in the shallow wells included benzene, acetone, toluene, methylethylketone, and isopropylether.

Disposal of hazardous materials at Columbia (Marion County) and Flowood (Rankin County) has met requirements for inclusion of those sites on the NPL. Toxic volatile organic compounds (benzene, toluene, and xylene) have been detected in the water from two shallow wells (103 and 142 feet deep) in the Columbia water-supply system. Although ground-water contamination has been detected at Columbia NPL site (fig. 3*A*), studies now indicate that the source of the contaminants may have been from leaking gasoline storage tanks and not from waste materials at the NPL site (Jim McDonald, Mississippi Board of Health, oral commun., 1986). After the storage tanks were removed, the ground-water quality improved; the public-supply wells currently (1986) meet drinking-water standards (U.S. Environmental Protection Agency, 1986b). Analyses of water samples collected during April 1986 detected only benzene (1 μg/L) in one of the public-supply wells. Contamination of shallow ground water at the Flowood NPL site has not been detected.

Military installations generally have underground storage tanks and a variety of waste-disposal areas that include surface impoundments, evaporation ponds, chemical disposal pits, active and buried landfills, and beds for drying sludge from wastewater treatment. The types of potential contaminants are many and include oils, organic solvents, degreasing agents, defoliants, and trace metals. As of September 1985, 31 hazardous-waste sites at 3 facilities in Mississippi had been identified by the DOD as part of their Installation Restoration Program (IRP) as having potential for contamination (U.S. Department of Defense, 1986). The IRP, established in 1976, parallels the U.S. Environmental Protection Agency (EPA) Superfund program under the CERCLA. The EPA presently ranks these sites under a hazard ranking system and may include them in the NPL. One site at one facilitiy (fig. 3*A*) was considered to present a hazard significant enough to warrant response action in accordance with CERCLA. The remaining sites are scheduled for confirmation studies to determine if remedial action is required.

There are three facilities in the State with a total of six active industrial Class-I injection wells permitted under the Underground Injection Control (UIC) program (fig. 3*A*). These wells were all drilled within the past decade and are used to dispose of wastewater generated within these facilities (U.S. Environmental Protection Agency, 1984b). The facility near Pascagoula (Jackson County) injects waste that is composed primarily of polysulfide compounds and is classified as hazardous. The other two facilities at DeLisle (Harrison County) and Jackson (Hinds County) inject waste that is considered to be nonhazardous. Although each Class-I well is designed to inject the maximum waste generated at each plant, only one well at each of the three facilities is needed to dispose of the approximately 500,000 gal (gallons) of waste per day. Ground-water contamination has not been detected in any freshwater sections of aquifers in areas of Class-I waste-injection well operation. Commercial hazardous-waste underground injection wells designed or intended to dispose of wastes from sources other than the owner of the well are prohibited in the State of Mississippi.

There are 179 active county and municipal landfill sites (fig. 3*C*) and 125 unlicensed landfills (not shown) that are potential sources of contamination (U.S. Environmental Protection Agency, 1984a). Only a few data are available to evaluate the effects of landfills on the environment in Mississippi. An assessment of the effects of these landfills on ground-water quality is expected to be a major part of the ground-water protection program currently (1986) being developed by the Bureau of Pollution Control of the Department of Natural Resources. The U.S. Geological Survey is assisting the Bureau of Pollution Control in the identification of shallow public-supply wells that may be susceptible to contamination.

Since the discovery of oil in Mississippi in 1939, thousands of oil and gas exploration and production wells have been drilled. Most producing areas are in the southern part of the State. Petroleum production is accompanied by brine production that commonly ranges from 1 to about 20 barrels of brine per barrel of oil produced (Kalkhoff, 1986, p. 3). Although the injection of brine and drilling-fluid wastes into freshwater aquifers is prohibited by State and Federal law, the past use of leaky disposal pits and improper waste-injection methods has resulted in local contamination of several freshwater aquifers.

The aquifers most susceptible to surface contamination are the shallow aquifers that are not separated from the surface by layers of clay. The largest areas of oil and gas production and the location of 20 areas where water wells are known to be contaminated by oil-field brine are shown in figure 3*B*. The contaminated wells contain water with chloride concentrations that exceed the secondary drinking-water standard (250 mg/L). Chloride concentrations in many other wells are significantly larger than the background concentrations (20 mg/L) typical of uncontaminated water in shallow aquifers.

Saltwater contamination from surface disposal of oil-field brine usually is confined to shallow aquifers; however, contamination of water wells in deeper aquifers has been documented. Gandl (1982, p. 46) and Bicker (1972, p. 25) describe one instance of improper injection of oil-field wastes that contaminated the water in the lower Wilcox aquifer. Although numerous shallow wells have been abandoned because of saltwater contamination, only a few of the deeper public-supply wells have been affected. For example, wells in a confined aquifer owned by a rural water association in the Natchez (Adams County) area are no longer used because of saltwater contamination (Boswell and Bednar, 1985, p. 45).

Ground-Water Withdrawals

The aquifers along the Mississippi Gulf Coast are composed of interbedded layers of sand and clay. Saltwater intrusion near the coast is evident in a small area (not shown) in Jackson County, which extends southeastward from Pascagoula. The shallowest aquifer has a saltwater-freshwater interface along the coast and inland along the tidal reaches of the Pascagoula and Escatawpa Rivers. The "400-foot," "600-foot," and "800-foot" sands at Pascagoula contain freshwater, but there is evidence that freshwater-saltwater interfaces occur in all of these aquifers within short distances southeastward from Pascagoula. The deeper aquifers at Pascagoula contain saltwater.

Although there is some evidence of saltwater intrusion into the "400-foot," "600-foot," and "800-foot" aquifers at Pascagoula, the source of the saltwater has not been identified. Hydraulic-head differences could cause saltwater to move upward into the "800-foot" aquifer. Potentiometric surfaces in the three aquifers indicate that saltwater could be moving updip from the south toward the pumping centers at Pascagoula. The "400-foot" sand is vulnerable to leakage of saltwater from the overlying shallow aquifers that are hydraulically connected to the saltwater bays and estuaries.

Agricultural Practices

Agricultural chemicals are used extensively on about 6.6 million acres of cropland in the State. A 7,000-mi^2 (square mile) area of fertile farmland in the alluvial plain of northwestern Mississippi, commonly referred to as the "Delta", is the most intensively cultivated region in the State. The Delta comprises more than 50 percent of cropland acreage and accounts for most of the agricultural chemicals used. The Mississippi River alluvial aquifer, which averages between 80 and 200 feet in thickness, underlies the Delta and normally is saturated to within about 25 feet of the land surface. The shallow depth to water, the intensive use of agricultural chemicals, and the abundant rainfall are conditions in the Delta that make the shallow ground water susceptible to contamination.

The annual areal recharge of the alluvial aquifer by direct infiltration of rainfall is about 0.5 inch, or 180 Mgal/d (Sumner and Wasson, 1984, p. 46). However, recharge along streams and oxbow lakes in the Delta offers a greater potential for the transport of contaminants into the alluvial aquifer because the streams and lakes often penetrate the more than 20 feet of surficial clay that confines the aquifer in most places.

During 1983, about 8,000 tons of pesticides were applied to 2 million acres of crops in the Delta, primarily cotton, soybeans, and rice (R. Morgan, Mississippi Cooperative Extension Service, oral commun., 1986). During previous years, the application of agricultural chemicals was even more intensive; for example, during 1978, almost 10,000 tons of 55 kinds of pesticides and 500 tons of sodium chlorate were applied to crops. Other agricultural chemicals, such as fungicides, defoliants, emulsifiers, pesticide solvents, and many tons of lime and fertilizers, are applied annually to crops and soils.

Data collected by the U.S. Geological Survey indicate that some of the more persistent pesticides, such as DDT, endrin, and toxaphene, are present in the water and bottom sediments of the Yazoo River. The Mississippi Department of Wildlife Conservation (1980) reported significant quantities of DDT, DDD, DDE, and toxaphene in surface water and in fish tissue. The lakes and streams in the Delta are hydraulically connected in varying degrees with the alluvial aquifer. Where recharge occurs, the pesticides may be transported into the aquifer. However, data are not available to evaluate any suspected widespread deterioration of ground-water quality caused by agricultural chemicals in the Delta or in any of the other agricultural areas of the State.

POTENTIAL FOR WATER-QUALITY CHANGES

Localized contamination of freshwater aquifers by saltwater from oil and gas operations has been documented at many sites in the State. The extent of this problem may be greater than presently known and may not be fully realized for many years. Contamination from old brine-disposal pits eventually may be discharged horizontally to streams in some areas, but may continue to move downward into deeper aquifers in other areas. Regulation of the brine-disposal practices within the oil and gas industry has decreased, but not eliminated, the potential of ground-water contamination from brine. At present, brine-injection wells are being permitted and monitored where possible, but failure of these wells, improper well construction, and other factors could still threaten ground-water resources. Future ground-water contamination may be expected when some of the older, abandoned wells begin to fail. In intensely pumped areas, hydraulic-head differences could force saltwater into freshwater aquifers.

Because much of the State is underlain by shallow aquifers that are susceptible to contamination, leaking underground storage tanks, surface-disposal sites, and improperly operated septic-tank systems are a potential threat to ground-water quality. Recharge areas of the major aquifers are the most vulnerable to contamination, and the effect on ground-water quality is dependent on the aquifer characteristics and the quantity, solubility, and persistence of the contaminants.

The continued use of agricultural chemicals in the Mississippi River alluvial plain eventually may lead to ground-water contamination in the Delta. The extent of present and potential contamination of water in the alluvial aquifer will require further study and may take many years to define.

GROUND-WATER-QUALITY MANAGEMENT

In recent years, water-quality management has increased rapidly and has undergone substantial change. Legislative action in 1978 restructured State offices into various departments with clearly defined water-quality management and regulatory responsibilities. The Mississippi Air and Water Pollution Control Act in 1966 first established a regulatory program to protect "waters of the State", both surface and ground water. Primary pollution control efforts at that time were affected by Federal legislation predominantly directed toward surface-water protection. Little or no effort was made to develop specific regulatory programs for ground-water protection until 1970, when the Mississippi Oil and Gas Board adopted specific rules and regulations for saltwater disposal pits and began to issue permits for underground injection wells operated by the oil and gas industry. The Mississippi Air and Water Pollution Control Commission, which became the Bureau of Pollution Control of the Department of Natural Resources in 1978, retained regulatory authority for all aspects of stream and aquifer contamination.

State programs pertaining to the underground injection of wastes have been implemented as part of the UIC program of the Safe Drinking Water Act (SDWA) of 1974. The Bureau of Pollution Control has responsibility for these programs except for Class-II UIC wells. Primacy for permitting Class-II UIC wells has not been delegated by the EPA. The application of the Mississippi Oil and Gas Board for this authority is pending. The Bureau of Pollution Control also has full authority to administer regulatory controls for RCRA surface impoundments and landfills. As amended in 1984, RCRA increased ground-water protection by placing additional regulatory controls on existing hazardous-waste facilities and addressed program needs for small-quantity waste generators and underground storage tanks.

To continue an effective monitoring program for public water supplies and to enforce regulations required under the SDWA of 1974, the Mississippi Legislature passed the Mississippi Safe Drinking Water Act in 1976 and also designated the State Board of Health as the regulatory agency. The State Board of Health systematically monitors public water-supply systems that serve at least 25 people or have at least 15 service connections to comply with the primary drinking-water regulations (U.S. Environmental Protection Agency, 1986a) as amended. In addition to the 25 contaminants currently with standards, the SDWA, as amended in 1986, requires 83 additional primary drinking-water standards by 1991. A program to monitor the estimated 4,000 wells in 1,400 community public water-supply systems is under study and will be initiated under the statutory mandates. The State Board of Health and the Bureau of Pollution Control coordinate efforts to locate and eliminate the source in the event that contamination of a public water supply is detected. Where sewers are not feasible and soils meet acceptable percolation standards, septic tanks are approved by the Board of Health upon request. Engineering studies of 20 or more lots are reviewed by the Bureau of Pollution Control.

The Mississippi Department of Agriculture and Commerce, Division of Plant Industry, was created in 1972 to protect State agricultural and horticultural interests. The Division is responsible for a program to register pesticides, to license dealers and aerial applicators, and to regulate the application of restricted pesticides.

The Mississippi Water Management Council, created by State Legislature in 1983, reexamined completely all State laws pertaining to surface and subsurface water and reported recommended amendments to the 1985 legislative session. As the result of this action, legislation was passed in 1985 and signed into law by the Governor. Included was House Bill 762, which gives the State powers "to effectively and efficiently manage, protect, and utilize the water resources of Mississippi" and to require permits for the beneficial use of all water resources of the State. House Bill 149 authorized the creation of joint local government water-management districts.

In 1985, the Governor designated the Department of Natural Resources as the lead agency responsible for ground-water protection. Within the Department, the Bureau of Geology and the Bureau of Land and Water Resources have vital ground-water roles. The Bureau of Geology provides data for geologic and ground-water resources and serves as advisor during investigation of possible ground-water contamination. The Bureau of Land and Water Resources ensures that surface water and ground water are managed to the greatest benefit and also conducts ground-water quantity and quality investigations in cooperation with the U.S. Geological Survey. The Ground-Water Division of the Bureau of Pollution Control was created in 1985 to strengthen and develop an overall ground-water protection strategy. The Division also assumed responsibility for all ground-water activities within the Bureau of Pollution Control.

Nonregulatory support for ground-water programs are provided by other State agencies. The Mississippi State University Chemical Laboratory conducts ground-water related research in addition to a cooperative water-analysis program with the Department of Natural Resources. The Mississippi Water Resources Research Institute was designated as a State research institute by the State Legislature in 1983. The Institute receives support from the State and the U.S. Department of the Interior for water-resources research projects.

The current ground-water-quality management issues of most concern are the extent of aquifer contamination caused by disposal of oil-field brine and the sparsity of chemical-quality data, particularly concerning toxic substances and organic compounds in unmonitored aquifers. Other problems or potential problems that have been identified include aquifer contamination from agricultural chemical use, leaking storage tanks, industrial and municipal landfills and lagoons, septic tanks, and radioactive wastes.

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