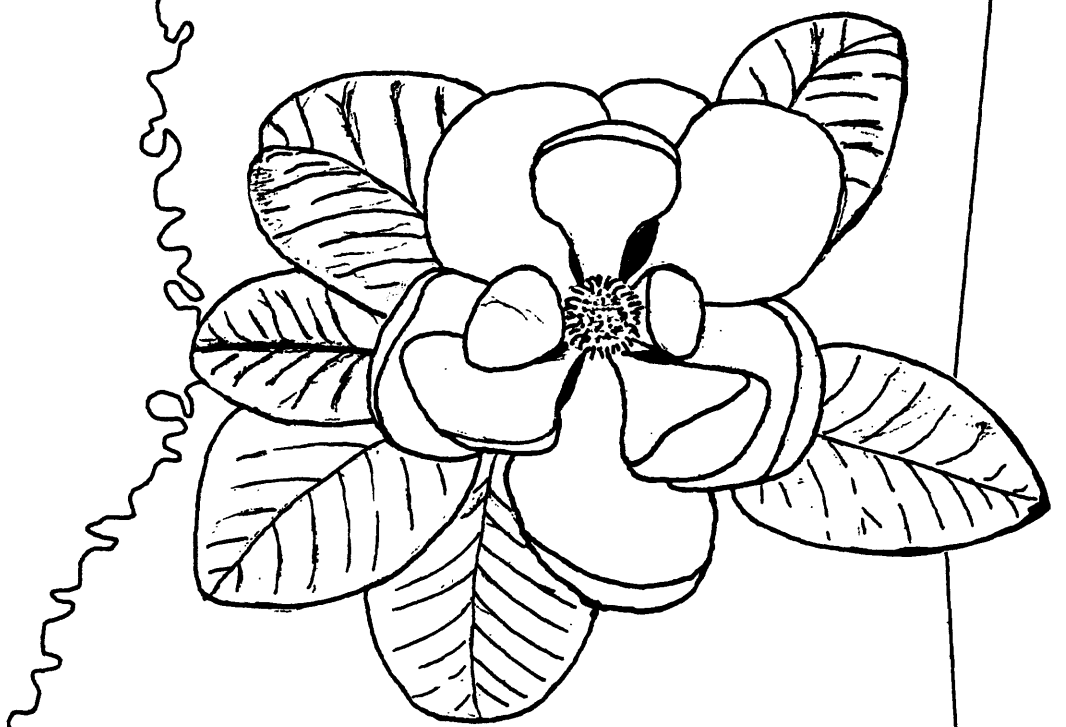
WATER RESOURCES INVESTIGATIONS IN MISSISSIPPI

1984-85



U.S. Geological Survey
Open-File Report 84-444

Jackson, Mississippi
1984

Compiled and illustrated by Andrew G. Lamonds and Carol Moss

UNITED STATES DEPARTMENT OF THE INTERIOR

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Water-Resources Investigations by the U. S. Geological Survey in Mississippi in cooperation with:

MISSISSIPPI DEPARTMENT OF NATURAL RESOURCES
- Bureau of Land and Water Resources
- Bureau of Pollution Control
- Bureau of Geology

MISSISSIPPI STATE HIGHWAY DEPARTMENT
PEARL RIVER VALLEY WATER SUPPLY DISTRICT
JACKSON COUNTY BOARD OF SUPERVISORS
JACKSON COUNTY PORT AUTHORITY
HARRISON COUNTY DEVELOPMENT COMMISSION
HARRISON COUNTY BOARD OF SUPERVISORS
PAT HARRISON WATERWAY DISTRICT
CITY OF JACKSON
CITY OF LAUREL
CITY OF NATCHEZ
U.S. DEPARTMENT OF AGRICULTURE
- Soil Conservation Service

U.S. DEPARTMENT OF THE ARMY
- Corps of Engineers

U.S. DEPARTMENT OF ENERGY
U.S. DEPARTMENT OF TRANSPORTATION
- Federal Highway Administration

FEDERAL EMERGENCY MANAGEMENT AGENCY

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INTRODUCTION

U. S. GEOLOGICAL SURVEY

The start of fiscal year 1984 saw the U.S. Geological Survey continuing to perform its basic historical missions of collecting, analyzing, and disseminating information about the earth, its processes, and its water and mineral resources. The U.S. Geological Survey was established March 3, 1879, and charged with the responsibility for "classification of the public lands and examination of the geological structure, mineral resources, and products of the national domain." In 1894, a small appropriation was obtained for the specific purpose of "gauging streams and determining the water supply of the United States." Subsequently, the role of the Geological Survey in water resources gradually expanded and the Survey now has the principal responsibility for appraising the source, quantity, quality, and movement of the Nation's water resources. In addition, it is the lead agency for coordinating the activities of all Federal agencies in the acquisition of water data on streams, lakes, reservoirs, estuaries, and ground waters.

WATER RESOURCES DIVISION

The mission of the Water Resources Division is to provide the hydrologic information and understanding needed for the optimum utilization and management of the Nation's water resources for the overall benefit of the people of the United States.

This is accomplished, in large part, through cooperation with other Federal and non-Federal agencies, by:

1. Collecting, on a systematic basis, data needed for the continuing determination and evaluation of the quantity, quality, and use of the Nation's water resources.

2. Conducting analytical and interpretive water-resource appraisals describing the occurrence, availability, and physical, chemical, and biological characteristics of surface and ground water.

3. Conducting supportive basic and problem-oriented research in hydraulics, hydrology, and related fields of science to improve the scientific basis for investigations and measurement techniques and to understand hydrologic systems sufficiently well to quantitatively predict their response to stress, either natural or manmade.

4. Disseminating the water data and the results of investigations and research through reports, maps, computerized information services, and other forms of public releases.

5. Coordinating the activities of Federal agencies in the acquisition of water data for streams, lakes, reservoirs, estuaries, and ground waters.

6. Providing scientific and technical assistance in hydrologic fields to other Federal, State, and local agencies, to licensees of the Federal Energy Regulatory Commission, and to international agencies on behalf of the Department of State.

This report describes the activities of the Water Resources Division in Mississippi. It summarizes progress made in water-resources investigations and related activities in the current fiscal year ending September 30, 1984, and outlines the work to be accomplished during the fiscal year ending September 30, 1985. Its specific purpose is to inform cooperating State, local, and other Federal agencies about all activities of this Division in water investigations in Mississippi and to give those cooperators a better understanding of how their participation fits into the total USGS program of water-resources investigations.

Two offices of the Water Resources Division are located in Mississippi. The Mississippi District office is in the Federal Building at Jackson. The Gulf Coast Hydroscience Center is at the National Space Technology Laboratory near Bay St. Louis.

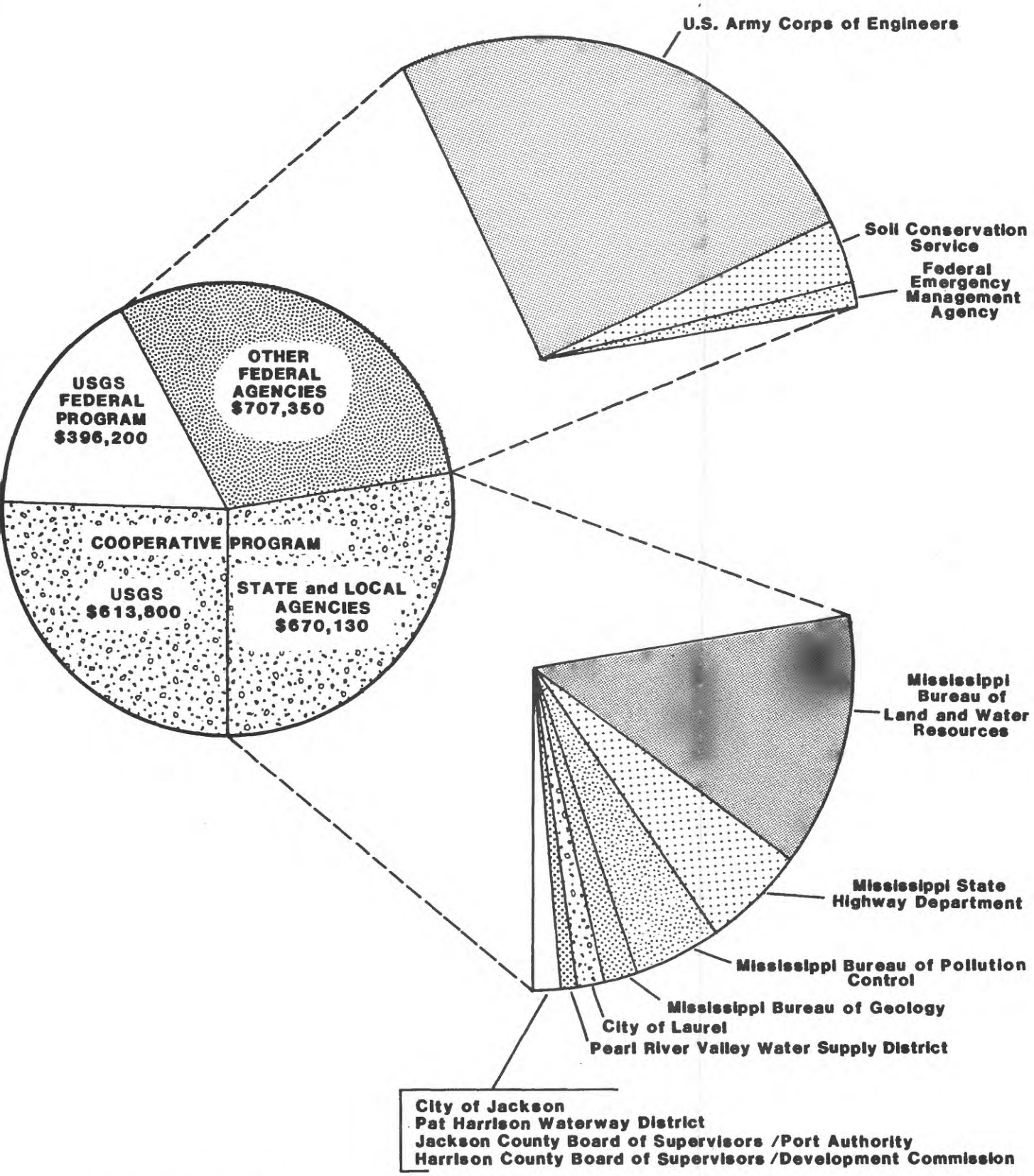
MISSISSIPPI DISTRICT

The work of the Mississippi District is accomplished, in large part, through cooperation with State, local, and other Federal agencies who share in the planning and financial support of the program. Funding for cooperative programs with State and local agencies is commonly shared on a 50-50 basis. Programs with other Federal agencies are funded entirely by the agency requesting the work.

In fiscal year 1984 the budget for water-resources investigations in the Mississippi District amounts to about $2,388,000. The breakdown of funding for this work (opposite page) shows that 58 percent of the total FY 1984 funding comes from State, local, and other Federal agencies. The remaining 42 percent of the program funds is made up of the USGS share of cooperative programs with State and local agencies, and funds for programs wholly funded by the Survey.

A little more than one-fourth of the total FY 1984 program funds comes from State and local agencies. Work funded by other Federal agencies constitutes 30 percent of the FY 1984 program.

In fiscal year 1984 the Mississippi District is working on 22 projects ranging from resource appraisals to problem-oriented research. The project areas range in size from only a few square miles to the entire State.



SOURCES OF FUNDING FOR MISSISSIPPI DISTRICT PROGRAMS IN FISCAL YEAR 1984.

The Mississippi District of the Water Resources Division employees about 50 professional, technical, and support personnel in its Jackson office and two technical employees in its field office in Tupelo. The District is organized into two operational-support sections and two technical sections. The four sections in the Mississippi District are (1) Hydrologic Projects and Reports Section, (2) Hydrologic Data Section, (3) Computer Applications Section, and (4) Administrative Services Section.

HYDROLOGIC PROJECTS AND REPORTS SECTION

This section develops, conducts, and prepares interpretive and data-summary reports on investigations related to the problems of water-resources management and development. Investigations presently underway include studies of surface-water hydraulics and hydrology, ground-water contamination, definition and analysis of multi-state aquifer systems, ground-water quality variations, and miscellaneous investigations to assist State and local agencies in making management decisions. Investigations are usually carried out by a project team under the immediate direction of a senior project leader. Investigations generally require from 1 to 3 years to complete. Results of investigations are published in technical reports that are furnished to the cooperating agencies and made available to the public.

HYDROLOGIC DATA SECTION

This section develops the programs and networks and conducts all operations involved in the collection, analyses, and publication of hydrologic data in the District. This includes the operation of statewide networks of continuous-record streamflow stations, ground-water observation wells, and water-quality sampling sites. Included in the functions of this section are the planning and review of the statewide networks, and the installation, establishment, and operation of new stations and the operations required to support areal or special studies.

COMPUTER APPLICATIONS SECTION

This section functions as the automatic data-processing and analysis-services support group for professional, technical, and administrative personnel in the District. This section oversees the storage and retrieval of data in both the national and local data bases and writes programs to meet the special analysis data-processing needs of District personnel. The section is responsible for the efficient utilization, operation, and maintenance of the in-house mini-computer and related data-processing hardware and advises management on the procurement of data-processing equipment.

ADMINISTRATIVE SERVICES SECTION

This section provides administrative support to the Mississippi District Office in the areas of budget formulation and execution, preparation of financial summaries, personnel management, procurement, vehicle control, and maintenance of all administrative files and property records.

Employees of the Mississippi District, U.S. Geological Survey, December 1983.

GULF COAST HYDROSCIENCE CENTER

The Gulf Coast Hydroscience Center was established by the Water Resources Division as one of its major sites for research in water resources. The Center is located at NASA's National Space Technology Laboratories (NSTL) near Bay St. Louis, Mississippi, and about 50 miles northeast of New Orleans, Louisiana. The Center was estabished at NSTL in order to take advantage of hydraulic research facilities, on-site technical expertise, and office space and equipment made available to Federal, State, and university elements involved in the development of environmental science and technology.

The experimental facilities at NSTL make this Center unique among the Survey's research activities. Research facilities of principal interest to the Water Resources Division at the Gulf Coast Hydroscience Center are: an indooor hydraulics laboratory housed in a 35,000 square foot area, an outdoor flood-plain simulation facility covering about 30 acres, and analog and digital computer facilities. The Hydrologic Instrumentation Facility provides a range of services from research to instrument repair.

RESEARCH FACILITY

Research activities at the Gulf Coast Hydroscience Center are an important element in fulfilling the Water Resources Division's responsibility for appraisal of quantity and quality of our Nation's water resources, for interpretive studies in areas of existing or potential water problems, and for research in the field of hydrology and related sciences. This responsibility for planning and financing water-resources investigations is shared with State and local water agencies.

An important aspect of the work of the Water Resources Division is related to the description of water flow in open channels. Various topics of interest include measurement of flow, computation of stage profiles for identification of flood plains, transport of suspended and dissolved matter, backwater from channel obstructions, flow patterns through bridge constrictions, channel formation and stability, and the build-up and dissipation of nonconservation parameters, such as heat, oxygen, and biochemical oxygen demand.

The program at the Center includes both applied and basic research. A staff of about 60 scientists and support personnel work on a wide variety of projects described individually later in this publication. The projects attempt to meet specific operational needs of the Water Resources Division and also advance the state of the science. The staff possesses competence in many areas related to water-resources research and often provides technical support to District programs.

HYDROLOGIC INSTRUMENTATION FACILITY

The Hydrologic Instrumentation Facility has nationwide responsiblity for all aspects of hydrologic instrumentation in support of U.S. Geological Survey programs. This facility, located at the National Space Technology Laboratories near Bay St. Louis, Mississippi, has a staff of about 50 professional, technical, and clerical personnel organized into six sections: Instrument Development Laboratory, Test and Evaluation, Field Service and Supply, Repair and Calibration, Technical Services, and Administrative Services.

The Instrument Development Laboratory is the principal research and development resource of the Water Resources Division in the area of instrumentation. It is responsible for updating and modifying existing instrumentation and research and design of totally new instruments. Research and development is conducted both in-house and by contract with public and quasi-public research groups and private enterprise. The staff includes personnel with field experience in the areas of surface water, ground water, water quality, and hydrometeorological data collection as well as electronic, electrical and mechanical engineers and technicians. The Instrument Development Laboratory is conducting design and development studies for about 40 projects and subprojects, and assists numerous field and headquarters personnel with special instrumentation needs.

The Test and Evalulation Section establishes minimum performance standards for instrumentation to insure that WRD data-collection requirements are met and that legal and scientific credibility continues. The section writes acceptance standards, develops quality control procedures and test methods that are included in procurement documents, and works closely with other Federal agencies so that its evaluation criteria are in compliance with all applicable legal and operational requirements. This section also designs and conducts engineering testing and analysis of both USGS-developed and commercial hydrologic instrumentation and is preparing a Qualified Produces List which will serve as a guide to the procurement of commercial products meeting USGS requirements.

The Field Service and Supply Section operates the warehouse, initiates procurement actions to purchase equipment, monitors contracts, and fills field equipment orders. In most cases, warehouse equipment is sold to field offices, but the Hydrologic Instrumentation Facility also maintains a rental program for some of the most common and frequently used hydrologic instruments such as analog digital water-level recorders and water-quality monitors. The equipment rental program offers flexibility to field offices and maximizes use of the Survey's resources. The processing of field orders is supported by an interactive computerized support system.

The Repair and Calibration Section is responsible for providing service, calibration, and technical repair procedures and consultation to the WRD field programs. Capabilities exist, either in-house or by contract, to repair and calibrate all types of WRD-owned equipment. This section also fabricates and modifies some unique and specialized pieces of equipment which are sold through the Field Service and Supply Section, and is responsible for building prototype devices developed by the Instrument Development Laboratory.

The Technical Services Section provides in-house technical support including preparation, maintenance, and revision of engineering documentation; operation of a computer management data base; monitors contracts for electronics supply items; and provides advice and training on computer operations.

The Administrative Services Section is responsible for the formulation and execution of the budget, accounting, personnel, procurement, and office management necessary to support the operating needs of the Hydrologic Instrumentation Facility. It provides procurement services and maintains information on GSA supplies, open-market supplies, industrial specifications, Federal specifications, and military specifications.

SUMMARIES OF INVESTIGATIONS

MISSISSIPPI DISTRICT

Active investigations in the Mississippi District in 1984 are summarized on the following pages. A list of reports published or released in 1983-84 follows.

SURFACE-WATER DATA COLLECTION
(MS 00-001)

Project Chief: E. J. Tharpe
Location: Mississippi - Statewide
Duration: Ongoing since October 1931

Surface-water information is needed for surveillance, planning, design, hazard warning, and operation and management in water-related fields such as water supply, hydroelectric power, flood control, irrigation, bridge and culvert design, wildlife management, pollution abatement, flood-plain management, water-resources development, and waste disposal.

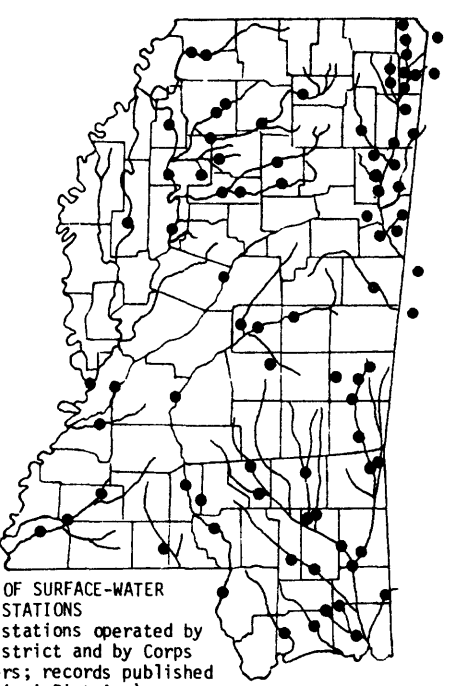
The objective of this continuing project is to provide this surface-water information through collection, analysis and publication of records for gaging stations and selected sites along streams, lakes, and reservoirs throughout Mississippi.

In fiscal year 1984 stage and discharge data are being collected at about 70 continuous-record gaging stations. Stage and discharge data are also being collected periodically at an additional 60 crest-stage and project sites. The annual data report "Water Resources Data for Mississippi," was published for the 1982 water year. Analysis of data collected in the 1983 water year is underway and preparation of the 1983 data report has begun. Calibration of recently installed discharge instrumentation at Columbus Lock and Dam on the Tennessee-Tombigbee Waterway is continuing.

In fiscal year 1985 the collection, analysis, and publication of surface-water data at continuous and partial record gaging stations and miscellaneous sites throughout Mississippi will continue. Data collected in fiscal years 1983 and 1984 will be published in the "Water Resources Data for Mississippi," series.

Agencies funding project:

U.S. Geological Survey
U.S. Soil Conservation Service
Corps of Engineers, Vicksburg
Corps of Engineers, Mobile
City of Jackson
Mississippi Department of Natural Resources
  Bureau of Land and Water Resources
  Bureau of Pollution Control
Mississippi State Highway Department
Pearl River Valley Water Supply District
Jackson County Board of Supervisors
Jackson County Port Authority
Pat Harrison Waterway District



LOCATIONS OF SURFACE-WATER DATA STATIONS
(Includes stations operated by Alabama District and by Corps of Engineers; records published by Mississippi District)

GROUND-WATER DATA COLLECTION
(MS 00-002)

Project Chief: W. T. Oakley
Location: Mississippi - Statewide
Duration: Ongoing since July 1953

The objectives of the project are (1) to collect long-term water-level records which are needed to evaluate the effects of natural climatic variations and induced stresses on the ground-water systems so that potential problems can be defined early enough to allow proper planning and management, (2) to provide a data base from which to measure the effects of the development of the water resource, and (3) to provide a data base against which short-term records acquired in areal studies can be analyzed.

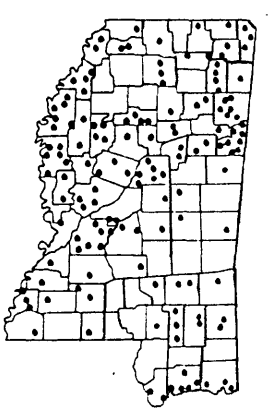
To accomplish these objectives, water levels are measured in a statewide network of about 220 observation wells to monitor long-term changes in water levels. Representative wells are equipped with water-level recorders to monitor short-term changes in water levels. Selected wells are sampled for chemical analyses each year.

In fiscal year 1984 collection and analysis of water-level data at about 220 observation wells in the statewide network is continuing. Ground-water data collected in 1982 was published in the annual publication "Water Resources Data for Mississippi, Water Year 1982" in April 1984. Preparation of ground-water data for the 1983 annual report is underway. Data on new water wells are being added to the "Ground Water Site Inventory" computerized data base at the rate of about 1,500 wells per year. Geophysical logs received from the Mississippi Department of Natural Resources, Bureau of Geology, are being added to the District files at the rate of about 150 logs per year. About 10 wells have been selected for the collection of water samples for chemical analysis. Several aquifer tests have been analyzed. Requests for information on well yields, depth to water, ground-water quality and water levels are received and answered at a rate of about 50 per month.

In fiscal year 1985 the collection and analyses of ground-water levels in the statewide network of observation wells will continue. Entry of geophysical logs and water-well data into the files and computerized databases will also continue as will the publication of ground-water data in the annual report "Water Resources Data for Mississippi." As in the past, water samples from selected wells will be chemically analyzed and aquifer tests will be analyzed as test data become available.

Agencies funding project:

U.S. Geological Survey
Mississippi Department of Natural Resources
  Bureau of Land and Water Resources
  Bureau of Geology
  Bureau of Pollution Control
City of Jackson
Jackson County Board of Supervisors
Jackson County Port Authority
Harrison County Development Commission
Harrison County Board of Supervisors



LOCATIONS OF GROUND-WATER OBSERVATIONS WELLS
(SOME DOTS REPRESENT MULTIPLE WELL SITES)

WATER-QUALITY DATA COLLECTION
(MS 00-003)

Project Chief: G. A. Bednar
Location: Mississippi - Statewide
Duration: Ongoing since October 1966

Water-resource planning and water-quality assessment require a nationwide base of relatively standardized information. For intelligent planning and realistic assessment of water resources, the chemical and physical quality of surface and ground waters must be defined and monitored. The purpose of this study is to collect, store, and publish water-quality data from a network of surface- and ground-water sites sufficient to describe the quality of water in Mississippi and identify seasonal and areal variations and long-term trends in water quality.

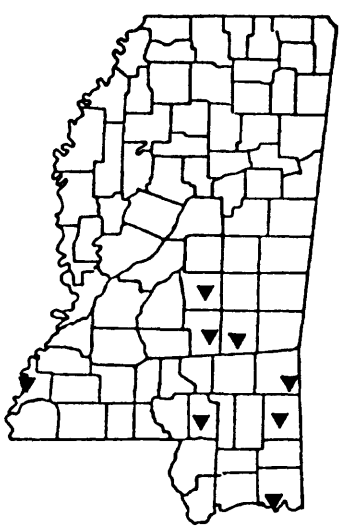
To achieve this objective, water-quality data are collected at a network of surface- and ground-water stations. The data collected include concentrations of chemical constituents from which loads and time trends can be determined.

In fiscal year 1984 the collection and analysis of water-quality data at about 20 surface-water sites and about 15 ground-water sites is continuing. A short-term water-quality study will be conducted over a tide cycle in the Pascagoula River estuary in the summer of 1984. Water-quality data collected in 1982 was published in the annual publication "Water Resources Data for Mississippi, Water Year 1982." Preparation of water-quality data for the 1983 annual report is underway.

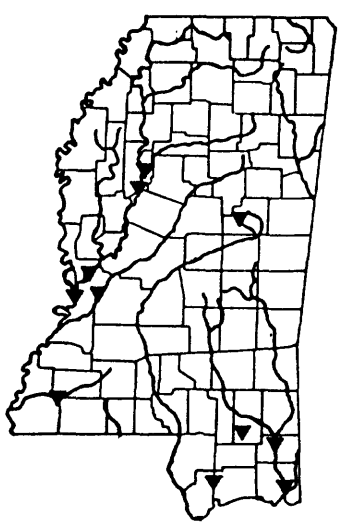
In fiscal year 1985 the collection of water-quality data will continue at about 15 of the surface-water sites. Water-quality data will be collected at 15 to 20 ground-water sites as sampling opportunities arise. Several surface-water sampling sites in east-central Mississippi will be discontinued at the end of fiscal year 1984. The estuary study is expected to continue in fiscal year 1985. Water-quality data collected in fiscal years 1983 and 1984 will be compiled and published.

Agencies funding project:

U.S. Geological Survey
U.S. Soil Conservation Service
Jackson County Port Authority
Jackson County Board of Supervisors



LOCATIONS OF GROUND-WATER SAMPLING STATIONS



LOCATIONS OF SURFACE-WATER SAMPLING STATIONS

SEDIMENT-DATA COLLECTION
(MS 00-004)

Project Chief: G. A. Bednar
Location: Mississippi - Statewide
Duration: Ongoing since April 1981

Water-resources planning and water-quality assessment require a nationwide base level of relatively standardized information. Sediment concentrations and discharges in Mississippi's rivers and streams are needed to assess the quality of the State's waters and to monitor soil erosion.

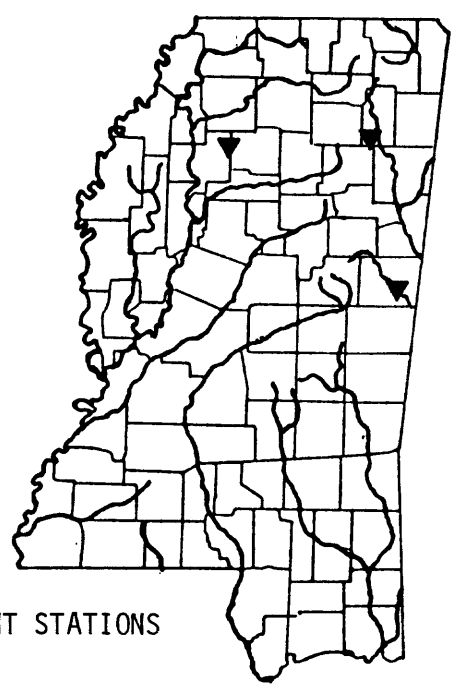
To provide these needs, sediment concentration and particle size data are being collected at several sediment stations on selected streams in north Mississippi. Although there are only a few stations being sampled, the sediment data collected at those sites should provide useful information on sediment yield, loads transported, and seasonal and long-term variations in sediment concentration.

Samples are being collected periodically and during selected storm events at three stations in 1984. The sediment data collected in fiscal year 1982 were published in the report "Water Resources Data for Mississippi, 1982." Preparation of sediment data for the 1983 annual report is underway.

In fiscal year 1985 the collection, analysis, and compilation of sediment data will continue. All sediment data will be published in the annual data report.

Agency funding project:

Corps of Engineers, Mobile
U.S. Soil Conservation Service



LOCATIONS OF SEDIMENT STATIONS

PRECIPITATION-QUALITY DATA COLLECTION
MS 82-005

Project Chief: P. E. Grantham
Location: Mississippi - Statewide
Duration: March 1982 to September 1985

The chemistry of atmospheric precipitation has recently become of concern in Mississippi with the realization that acidic precipitation can seriously affect plants, soils, lakes, and streams. The acidification of the aquatic ecosystems observed in Europe, and more recently in Canada and the northeastern United States, has been linked to acid rain.

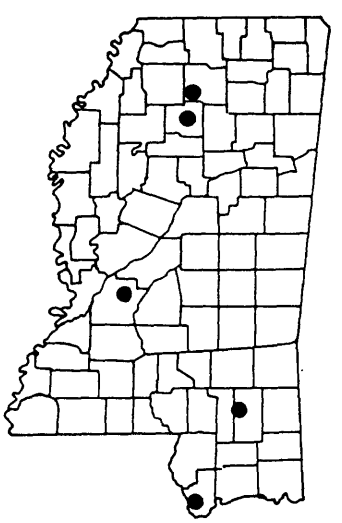
The objectives of this project are to monitor and analyze atmospheric precipitation quality at selected sites in Mississippi and to document the atmospheric precipitation quality at each site. Seven-day composite samples of rainfall are collected and analyzed at each site.

In fiscal year 1984 precipitation-quality data are being collected at sites near Janice and Bay St. Louis in south Mississippi and at a site near Oxford in north-central Mississippi. Two additional sites, one in the Jackson area and one near Coffeeville in north-central Mississippi, will be installed within in a few months. Precipitation-quality data collected in fiscal year 1982 was published in the annual report "Water Resources Data for Mississippi, Water Year 1982." Precipitation-quality data collected in fiscal year 1983 is now being prepared for publication.

Collection of precipitation-quality data will continue at all five sites in fiscal year 1985. These data will be published in the annual report.

Agencies funding project:

U.S. Geological Survey
Mississippi Department of Natural Resources
Bureau of Pollution Control



LOCATIONS OF PRECIPITATION QUALITY STATIONS

WATER USE IN MISSISSIPPI
(MS 73-007)

Project Chief: J. A. Callahan
Location: Mississippi - Statewide
Duration: Ongoing since July 1972

Expanding public, industrial, and irrigation use of water in Mississippi has outstripped the information necessary to wisely manage the water resources. The wise management of the State's water resources will require the development of a Water Use Plan which will match the water requirements with the available resources.

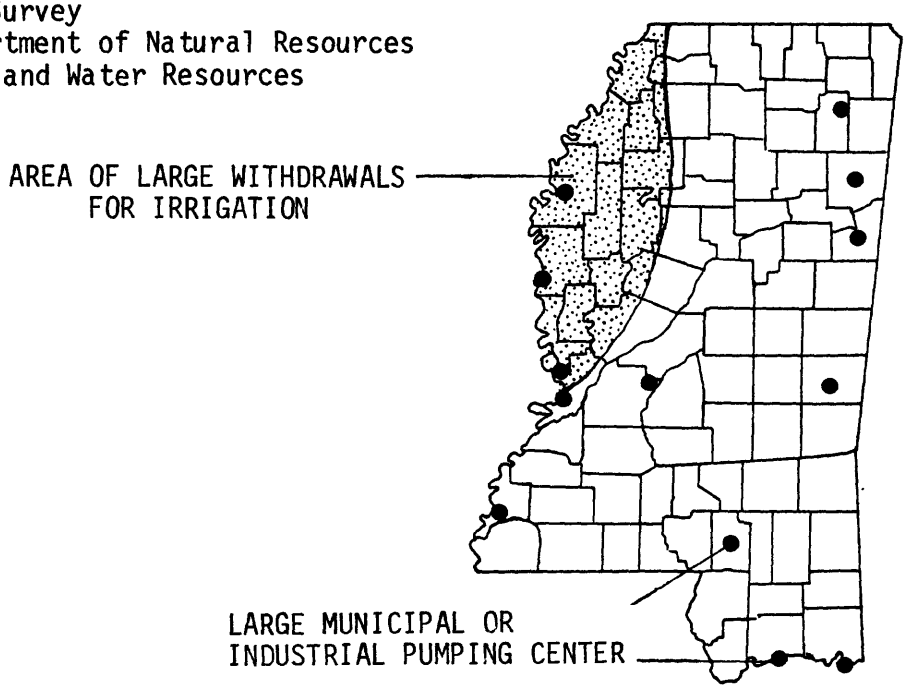
The objective of this investigation is to provide State and local officials with water-use data for planning, developing, and managing the water resources of Mississippi. This information is gathered by a thorough and continuing inventory of major water users. The water-use data collected in this investigation are entered in both the national and local computerized databases. The databases are then used to prepare various water-use reports.

In fiscal year 1984 the inventory of major water users is continuing. Pumps on about 30 irrigation and fish-farming wells are being monitored to help improve the accuracy of water use estimates for these categories. Preparation of a report documenting agricultural water use in the Mississippi Delta is underway.

The statewide water-use inventory will continue in fiscal year 1985. A report describing water use along the Mississippi Gulf Coast is planned.

Agencies funding project:

U.S. Geological Survey
Mississippi Department of Natural Resources
Bureau of Land and Water Resources



FLOOD STUDIES
(MS 51-011)

Project Chief: J. W. Hudson
Location: Mississippi - Statewide
Duration: Ongoing since July 1950

The Mississippi State Highway Department annually spends several million dollars in bridge construction. Streamflow records, hydrologic analyses of basins, and hydraulic analyses of the flooding potential at proposed crossings are necessary for properly planning bridges.

The objectives of the studies are two-fold: (1) to evaluate and analyze the flooding potential at selected high-interest highway crossings on streams throughout Mississippi using existing hydrologic and hydraulic data and, (2) to systematically analyze flood data and prepare a variety of reports describing flood hydraulics.

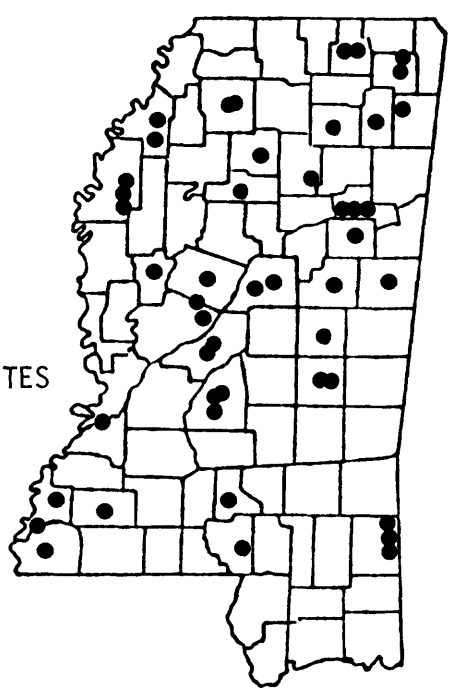
Flood frequency characteristics and hydraulic characteristics at a typical crossing are determined from historical flood elevations recovered by the U.S. Geological Survey, cross-section data, and correlations with nearby gaged stations. This information is then summarized in a brief report. The flood information collected in this investigation not only provides the basis for the design of highways and bridges, but is widely used by local agencies and the general public as a guide in real estate development.

In fiscal year 1984 the preparation of informal reports summarizing hydrologic and hydraulic information at highway crossings on streams in Mississippi is continuing. About 40 such reports representing more than 80 bridge sites will be prepared this year. Requests for flood information are also handled at a rate of about 50 per year.

This investigation is expected to continue in fiscal year 1985 at about the same level.

Agencies funding project:

U.S. Geological Survey
Mississippi State Highway Department



FLOOD-STUDY SITES
1984

HYDROLOGY OF TENNESSEE-TOMBIGBEE WATERWAY (MS 71-031)

Project Chief: Fred Morris, III
Location: Northeastern Mississippi
Duration: Continuous since May 1971

Construction and operation of the Tennessee-Tombigbee Waterway may cause changes in the hydrologic environment of the region through (1) the diversion of surface water from the Tennessee River Basin into the Tombigbee River Basin (2) modification of the Tombigbee River system (3) changes in the ground-water recharge-discharge relation (4) changes in the chemical and physical characteristics of water (5) changes in the ecology of the region.

The objective of this project is to assist the Corps of Engineers by determining preconstruction conditions, describing the existing hydrologic system, and monitoring the changes in that system during the construction and operation phases. To meet this objective, ground-water levels are monitored in a network of observation wells and streamflow data are collected at a number of sites on the mainstem and principal tributaries of the Tombigbee River. Water samples are collected for chemical analysis at selected surface- and ground-water sites.

In fiscal year 1984 ground-water levels are being monitored in about 140 observation wells and streamflow data are being collected at 10 sites. Water samples are being collected at about 30 ground-water and surface-water sites. Data collected in fiscal year 1983 are being compiled into a data report. A preliminary statistical analysis of hydrologic data collected in this project is underway and will be completed this year.

In fiscal year 1985 construction of the Tennessee-Tombigbee Waterway will be nearing completion but monitoring of hydrologic conditions in the area is expected to continue into the first few years of operation of the Waterway.

Agency funding project:

Corps of Engineers, Mobile

LOCATION OF STUDY AREA ON TENNESSEE-TOMBIGBEE WATERWAY

WATER-QUALITY MONITORING IN THE VICINITY OF THE TENNESSEE-TOMBIGBEE DIVIDE CUT (MS 78-052)

Project Chief: Fred Morris, III
Location: Northeast Mississippi
Duration: Ongoing since 1978

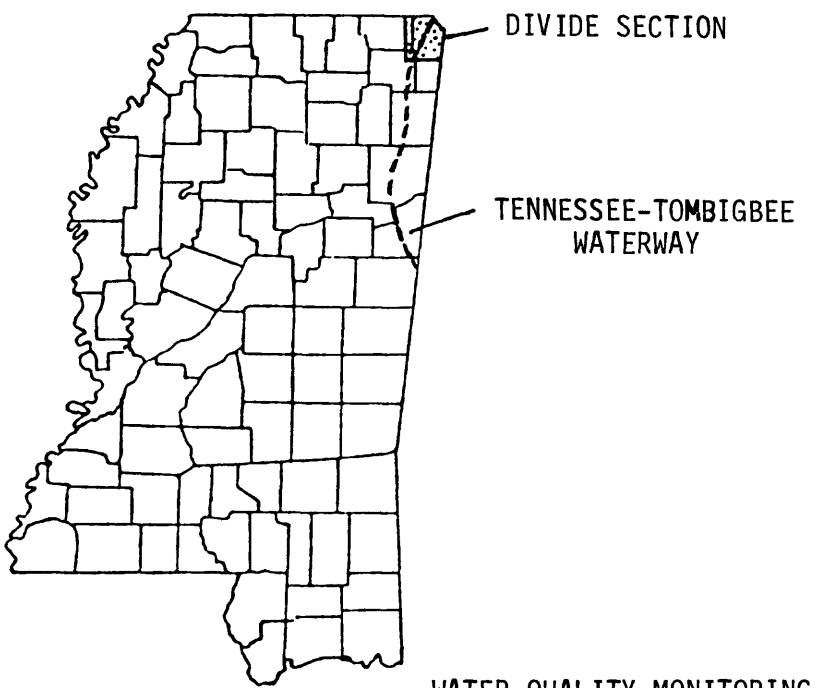
Continuous water quality and discharge data are needed to monitor the environmental effects of construction of the Tennessee-Tombigbee Waterway. These data are obtained from continuous streamgaging stations, water level and stream stage recorders, multi-parameter water-quality monitors, and automatic suspended-sediment samplers. Water samples for chemical analysis are collected and on-site measurements are made at selected stream sites and observation wells.

In fiscal year 1984 water-quality monitors are being operated at sites near each end of the Divide Section of the Waterway. These monitors record specific conductance, temperature, dissolved oxygen, pH, and turbidity. An automatic suspended sediment sampler is also operated at the site near the northern end of the Section. Streamflow data are being collected at one of the monitor-sites and on one of the tributaries. Three raingages are being operated and water samples are being collected for chemical analysis at 16 observation wells. Data collected in this investigation are being compiled in a data report.

Collection of hydrologic data in the Divide Section of the Waterway is expected to continue in fiscal year 1985 but the number of sites may be reduced as the Waterway nears completion.

Agency funding project:

Corps of Engineers, Nashville



WATER-QUALITY MONITORING IN THE DIVIDE SECTION

POTENTIOMETRIC MAPPING OF AQUIFERS IN MISSISSIPPI (MS 78-053)

Project Chief: Daphne Darden
Location: Mississippi - Statewide
Duration: Continuous since July 1978

Potentiometric maps depicting ground-water levels in the major aquifers in Mississippi are needed for evaluating water-level changes, managing the ground-water resource, and for aquifer modeling.

The objective of this investigation is to provide potentiometric maps for each major aquifer in the State. The maps will be revised at about 5-year intervals with one or more maps prepared each year. These maps are based on measurements of water levels in a network of wells in each aquifer.

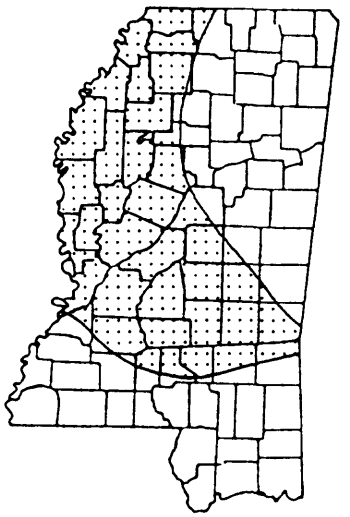
To date, potentiometric maps have been published for the following aquifers: Paleozoic (1978, 1982), Gordo (1978), Eutaw-McShan (1978), Coffee Sand (1978), Ripley (1978), lower Wilcox (1979), Meridian-upper Wilcox (1979), Winona-Tallahatta (1979), Sparta (1980), Cockfield (1980), and Mississipppi River alluvium (1980, 1981, 1982).

In fiscal year 1984 potentiometric maps have been prepared for the Meridian-upper Wilcox and the Winona-Tallahatta aquifers and are now in review. Potentiometric maps for the Eutaw-McShan, Coffee Sand, Ripley, and lower Wilcox aquifers, which were prepared in fiscal year 1983, will be published this year.

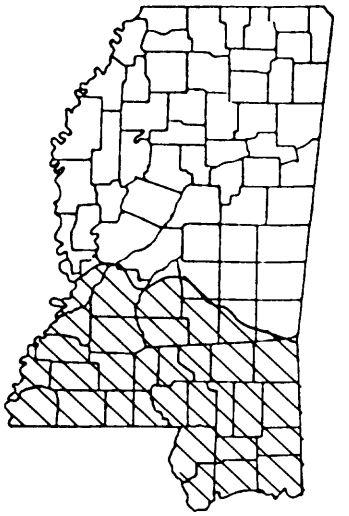
In fiscal year 1985 one or more potentiometric maps will be prepared for the Miocene aquifers in southern Mississippi. The second set of potentiometric maps for the Sparta and Cockfield aquifers will also be prepared in fiscal year 1985.

Agencies funding project:

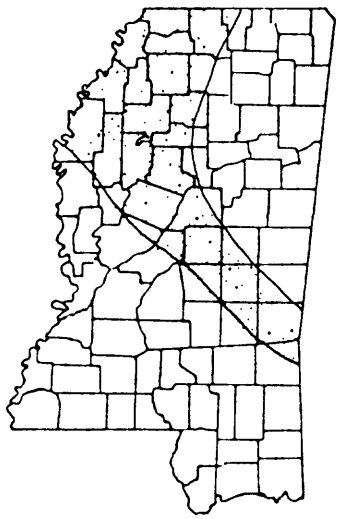
U.S. Geological Survey
Mississippi Department of Natural Resources
Bureau of Land and Water Resources



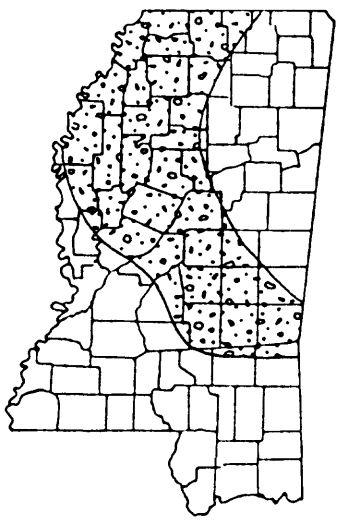
Sparta Aquifer System



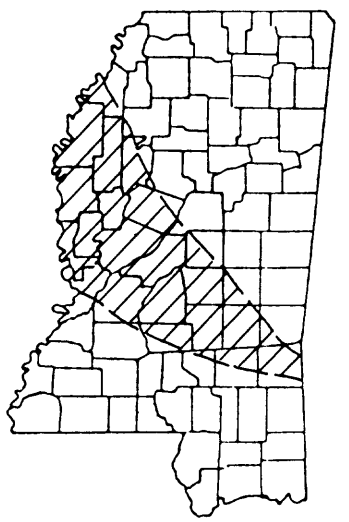
Miocene Aquifers



Winona–Tallahatta Aquifer



Meridian–Upper Wilcox Aquifer



Cockfield Formation

AREAS OF ACTIVE POTENTIOMETRIC MAPPING

HYDROLOGIC IMPACT OF DEEP SURFACE MINING FOR LIGNITE IN THE ALLUVIAL PLAIN IN NORTHWESTERN MISSISSIPPI (MS 80-057)

Project Chief: S. J. Kalkhoff
Location: Quitman, Tunica, and Panola Counties, Mississippi
Duration: April 1980 to October 1984

Lignite is present in some locations in Mississippi in quantities large enough to make mining economically feasible. One such location is in the Sparta Sand formation beneath the highly productive Mississippi River valley alluvial aquifer. One plan for mining would require hydraulically sealing the pit area from the surrounding aquifer, and then dewatering and removing a large amount of material--both overburden and lignite. This mining process in such a prolific aquifer may have a substantial impact on the hydrology of the area.

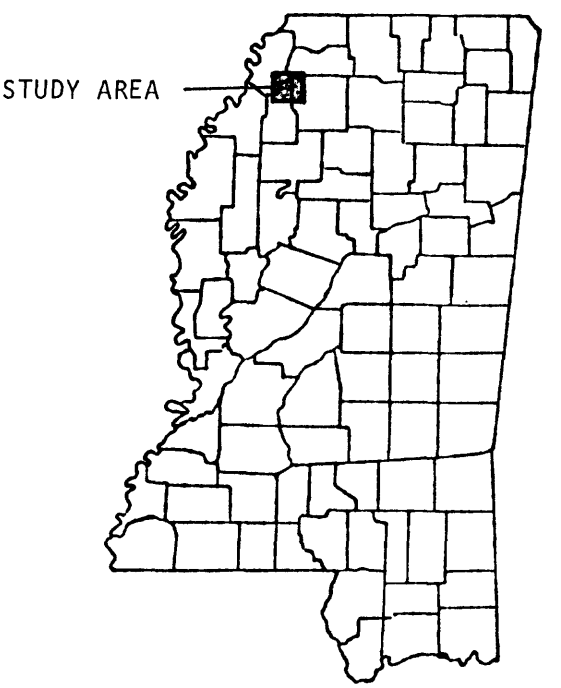
The objective of this project is to document hydrologic conditions prior to mining so that the effects of possible future strip-mining operation on ground-water levels, stream-flow characteristics, and water quality can be evaluated.

To meet this objective, hydrologic data were collected from a network of observation wells and two surface-water sites from mid 1980 to mid 1983. Data collected during this period included streamflow at two sites, rainfall at one site, semiannual measurements of ground-water levels in about 50 wells and water-quality data on two streams and at selected observation wells.

In fiscal year 1984 economic conditions are such that lignite mining in this area in the near future appears less likely and this project is being suspended. Data collected during this investigation are being edited and stored in the computerized data base. These data adequately document premining conditions and will be very useful background data when the project is reactivated to study future lignite mining.

Agency funding project:

U.S. Geological Survey



SOUTHEASTERN GULF COASTAL PLAIN SAND AQUIFER STUDY (MS 80-058)

Project Chief: M. J. Mallory
Location: Eastern Mississippi and Western Alabama
Duration: October 1979 to September 1985

The southeast sand aquifers are the major source of ground-water supplies in Mississippi, Alabama, and South Carolina, and are the second largest source of ground water in Georgia. About 300 million gallons of water are pumped daily from the aquifers. The regional effects of industrial, municipal, and irrigation pumpage require study and evaluation to assure adequate water supplies of suitable quality from this important aquifer system.

The objective of the study is to describe the regional aquifer flow system in sufficient detail so that computer models can be designed to accurately simulate flow in the system. The models will be used to evaluate the long-term effects of increased pumpage, deep well waste injection, and other proposed uses of the aquifers and thus provide alternative solutions for ground-water management.

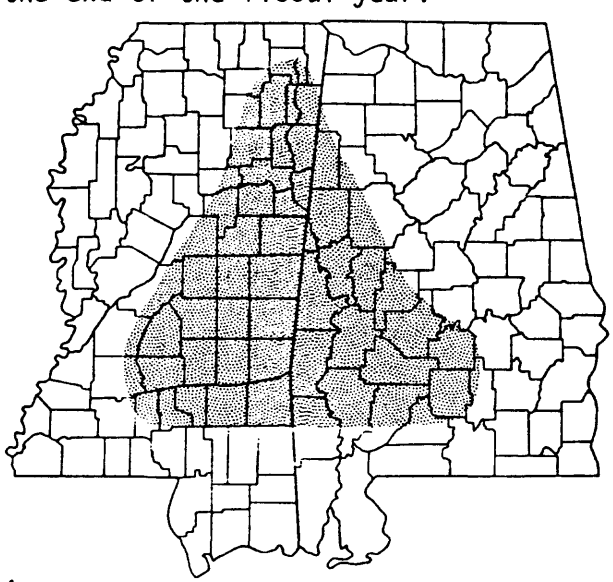
The regional approach for investigating the aquifer system includes: (1) synthesis of all existing data and presentation on a series of regional hydrogeologic and geochemical maps; (2) obtaining new hydrogeologic data to fill voids--particularly where ongoing State and Federal programs are not likely to generate such data; and (3) design and calibration of a regional digital model of the aquifer system as well as detailed models of problem areas or areas which can be used to assess water-management alternatives. The Mississippi District will study that part of the area that is in western Alabama and eastern Mississippi.

In fiscal year 1984 compilation of existing structural, hydrologic and hydraulic data for the three major Cretaceous aquifers has been completed and model input matrices have been generated. Calibration and refinement of the model is underway and work on the final report has started.

In fiscal year 1985 the final report will be completed and published. The project will be terminated at the end of the fiscal year.

Agencies funding project:

U.S. Geological Survey



STUDY AREA OF GULF COASTAL PLAIN AQUIFER MODELING PROJECT

COLLECTION OF BACKGROUND HYDROLOGIC DATA IN POTENTIAL LIGNITE MINING AREAS IN MISSISSIPPI (MS 80-061)

Project Chief: S. J. Kalkhoff
Location: East-Central Mississippi
Duration: July 1980 to September 1986

Deposits of lignite occur near the surface in an area stretching from north-central to east-central Mississippi. These deposits are not being mined at present but are likely to be mined in the future as energy costs increase. Open-pit mining of lignite in this part of the State will require the removal of up to 200 feet of overburden and will expose large amounts of unweathered material. It is expected to have a significant impact on the hydrologic system.

The objective of this project is to collect a small amount of background data on the water quality and channel characteristics of many of the small streams draining the areas of potential lignite mining in order to document premined conditions.

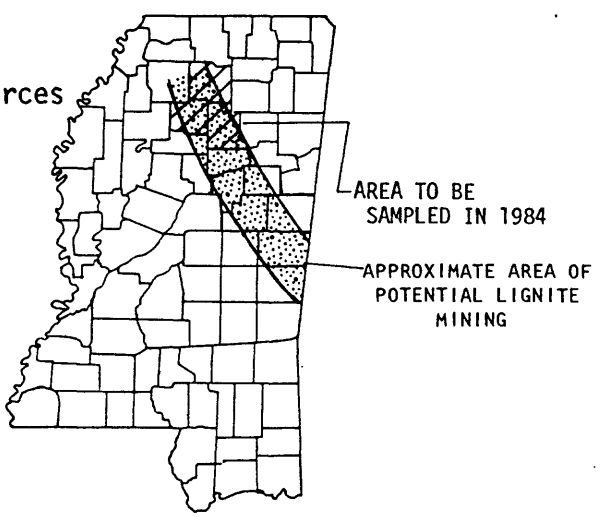
To meet this objective, water-quality and channel-geometry data are being collected at about 15 surface-water sites each year. All sites are sampled during the low-flow season, usually in September or October. Discharge measurements and stream cross sections are made at the time of sampling. Sites are photographed and any unusual conditions noted. To date, data have been collected on about 60 sites on small streams in the project area.

In fiscal year 1984 data collected at 16 sites in Montgomery, Webster, and Calhoun Counties in fiscal year 1983 are being compiled in a data report. Late this year an additional 15 sites will be sampled in Calhoun, Yalobusha, and Lafayette Counties.

This investigation to gather premining data is expected to continue in fiscal year 1985 at about the same level.

Agency funding project:

U.S. Geological Survey
Mississippi Department of Natural Resources
Bureau of Geology



STUDY AREA OF PROJECT TO COLLECT BACKGROUND HYDROLOGIC DATA IN POTENTIAL LIGNITE MINING AREAS.

APPARENT BRINE CONTAMINATION OF AQUIFERS AND STREAMS IN SOUTHERN MISSISSIPPI (MS 81-065)

Project Chief: S. J. Kalkhoff
Location: Southern Mississippi
Duration: March 1981 to September 1985

Petroleum production in southern Mississippi is accompanied by production of large quantities of saltwater. In the past, disposal has been through pits which often leaked saltwater into the underlying unconfined aquifers. From these aquifers the saltwater can move into area streams. Contamination of shallow aquifers and streams is known to have occurred in some areas but there are insufficient data to determine the magnitude and extent of the problem.

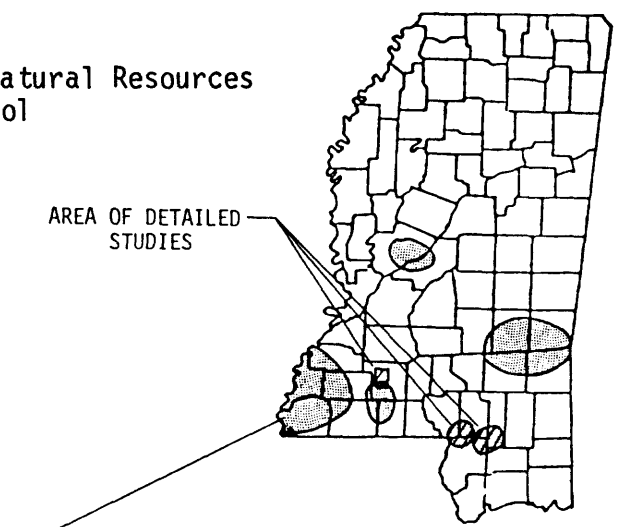
The objectives of this study are to make a reconnaissance study of surface and ground waters in the major oil-producing areas of southern Mississippi in order to identify areas of apparent brine contamination and to conduct detailed water-quality investigations in problem areas in order to assess and document the nature and extent of the contamination.

In order to meet these objectives, specific conductance and chloride concentration data were collected at more than 400 sites in the reconnaissance study during the first 2 years of this investigation. Three areas of apparent brine contamination were identified. These findings along with recommendations for further studies were contained in a reconnaissance report prepared in the third year of the investigation and now in review. A detailed study of one of the areas of apparent brine contamination was started in the third year of the investigation.

In fiscal year 1984 the detailed study of the one area of apparent contamination will be completed and studies of the two remaining areas will begin. Data collection in fiscal year 1984 is expected to include the collection of more than 100 water samples for chemical analysis from surface and ground waters in the area.

Agencies funding project:

U.S. Geological Survey
Mississippi Department of Natural Resources
Bureau of Pollution Control



PETROLEUM PRODUCING AREAS WHERE WATER-QUALITY RECONNAISSANCE STUDIES WERE CONDUCTED.

GROUND-WATER RESOURCES IN THE NATCHEZ AREA (MS 82-066)

Project Chief: E.H. Boswell
Location: Southwestern Mississippi
Duration: October 1981 to March 1983

The growing demand for water for municipal and industrial use in the are of Natchez, Mississippi, has resulted in the need for additional ground-water supplies. However, the water-bearing sands in the area are known to be lenticular and irregular in occurrence. Drilling additional wells without a better understanding of the subsurface geology and hydrologic characteristics of the aquifers is risky and often costly.

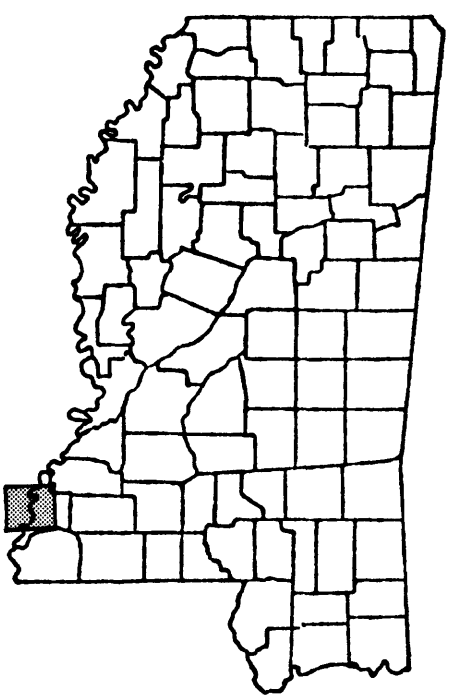
The objective of this investigation was to collect and analyze the geologic and hydrologic data needed to better define the ground-water system and to delineate the most promising areas for ground-water development.

In order to meet this objective, a large number of driller's logs and geophysical logs were interpreted to help describe the subsurface geology; ground-water data, including water-level and water-quality data, were used to help describe the aquifer characteristics.

In fiscal year 1984 the final report describing the subsurface geology and the aquifer systems in the Natchez area has been completed. The final report will be published later this year.

Agencies funding project:

U.S. Geological Survey
City of Natchez



LOCATION OF NATCHEZ AREA GROUND-WATER STUDY

SYNOPTIC STUDY OF THE MISSISSIPPI RIVER VALLEY ALLUVIAL AQUIFER IN THE YAZOO BASIN, MISSISSIPPI (MS 82-067)

Project Chief: B.E. Wasson
Location: Northwestern Mississippi
Duration: October 1981 to September 1984

Although the Mississippi River valley alluvial aquifer is the most productive aquifer in the state, the very large amount of water withdrawn from this aquifer for row crop irrigation, rice farming, and catfish farming may be exceeding recharge to the aquifer in some areas. A better understanding of the availability and quantity of water that may be withdrawn from the aquifer, the relationship between surface and ground water, water use, and the suitability of the water in the area for various uses, is needed.

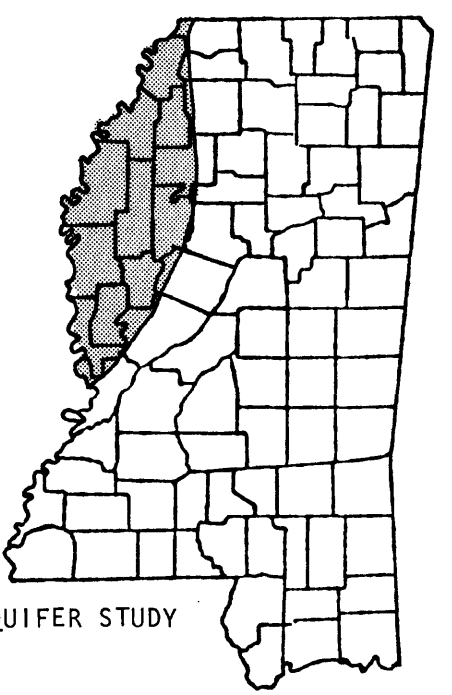
The objective of this study is to develop a digital model of the hydrologic system which will lead to a better understanding of the relationships between recharge to the aquifer and ground-water withdrawals. The model will also make it possible to anticipate the impacts of future increases in the rate of withdrawals on water levels in the area.

To accomplish this objective, available data on aquifer characteristics, well yields, water use, water quality, and streamflow in the area were compiled and analyzed during the first 2 years of the investigation. Semi-annual water-level measurements in about 500 wells were also made during this period. These data were then used to develop a ditigal model of the hydrologic system.

In fiscal year 1984 much of the effort in this investigation has been devoted to calibration and refinement of the digital model. The final report documenting the results of this investigation is in preparation and is expected to be completed by the end of the fiscal year.

Agencies funding project:

U.S. Geological Survey
Mississippi Department of Natural Resources
Bureau of Land and Water Resources
Mississippi Research and Development Center



AREA OF MISSISSIPPI
RIVER VALLEY ALLUVIAL AQUIFER STUDY

GROUND-WATER RESOURCES IN THE BARNETT RESERVOIR AREA (MS 82-068)

Project Chief: W.T. Oakley
Location: West-central Mississippi
Duration: October 1981 to March 1984

Ground water in some wells in the vicinity of Ross Barnett Reservoir is highly colored and often contains high concentrations of iron. The demand for water has increased markedly in this rapidly developing area but some of the wells drilled to supply additional water have encountered highly colored water unsuitable for use. The community water supply system in the vicinity of the reservoir is within the area of influence of ground-water withdrawals for the Jackson area and the competition for water is expected to increase.

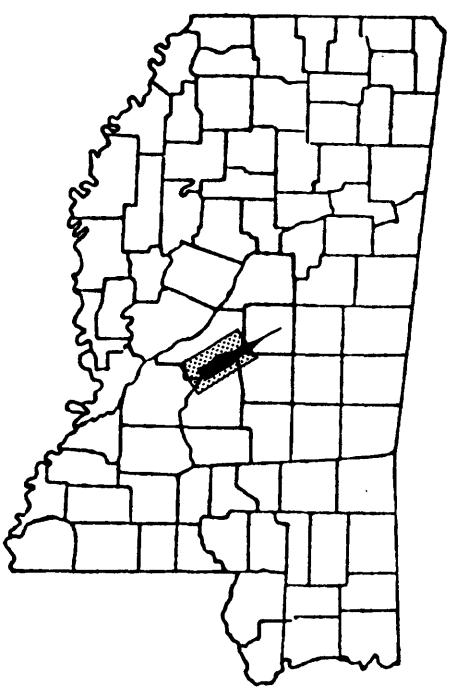
The objectives of this study are to describe in greater detail the depth and thickness of the principal water bearing units in the area; to define the variations in the color and iron content of ground water in the area; and to delineate, to the extent possible, favorable areas for additional ground-water development.

To meet these objectives, water-quality data, water-level data, and pumping data for wells in the area were collected and analyzed during the first 2 years of the project. Geophysical data from well logs were used to map the extent and thickness of the aquifers, and water-level measurements were used to construct potentiometric maps. Variations in water quality within the water-bearing units were mapped to the extent possible.

The final report documenting the findings of this investigation was prepared during the first half of fiscal year 1984. Publication of the report late this fiscal year will conclude this investigation.

Agencies funding project:

U.S. Geological Survey
Pearl River Valley Water Supply District



LOCATION OF BARNETT RESERVOIR AREA GROUND WATER STUDY

MISSISSIPPI EMBAYMENT-WEST GULF COAST REGIONAL AQUIFER STUDY (MS 82-070)

Project Chief: J.K. Arthur
Location: Central and northwestern Mississippi
Duration: January 1982 to September 1986

The Mississippi Embayment Aquifers are a major source of ground water for industrial, agricultural, and municipal demands in Mississippi. Withdrawals are expected to increase with the expansion of energy-related industry, increased rice and catfish production, and continued urban growth. To make realistic projections of the regional effects of increased ground-water withdrawals requires study and systematic evaluation of the ground-water flow regime.

The objectives of this study are to assemble, verify, and interpret geohydrologic information from Mississippi for integration with data from other states into a computer model designed to accurately simulate flow in the system. This regional model will result in a better understanding of the ground-water flow regime for the west Gulf Coast Regional aquifer system and will be a valuable aid in ground-water management.

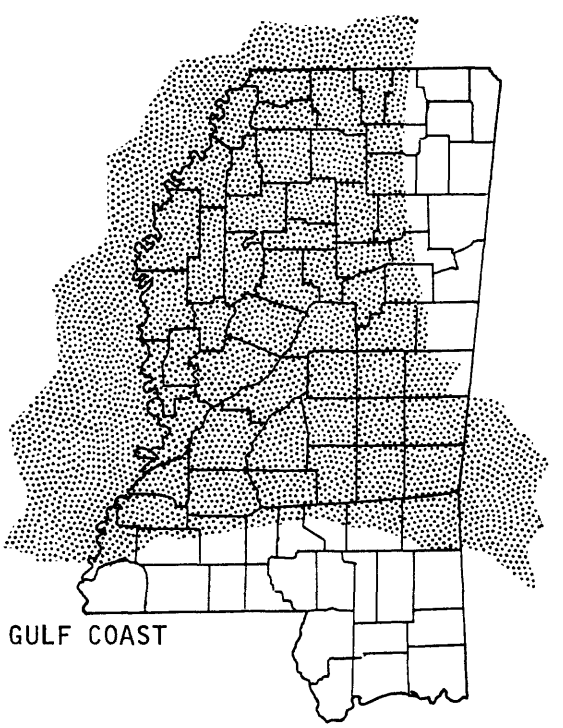
Much of the first 2 years of this investigation were devoted to compiling geologic, water-level, and aquifer characteristics data into a form suitable for input to the multi-layered model. This required an extensive analysis of available geophysical logs, aquifer tests, and water-level data for a large part of the State.

In fiscal year 1984 the initial assignment of input parameters for the model has been completed. Preliminary model runs for purposes of calibration will begin late this fiscal year.

In fiscal year 1985 the multi-layered model will be refined and calibrated. Preparation of the final report will begin next year.

Agency funding project:

U.S. Geological Survey



LOCATION OF MISSISSIPPI EMBAYMENT-WEST GULF COAST REGIONAL AQUIFER STUDY

AN INVESTIGATION OF GROUND-WATER RESOURCE IN THE JONES COUNTY AREA, MISSISSIPPI (MS 84-071)

Project Chief: E. H. Boswell
Location: Southeastern Mississippi
Duration: October 1983 to September 1985

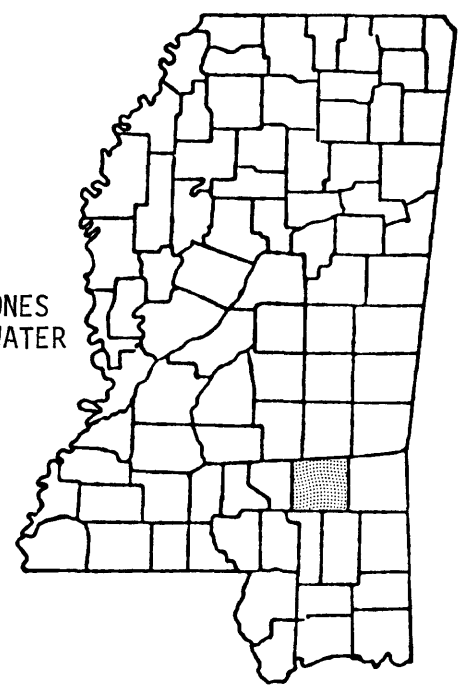
Local overdevelopment of ground water from lenticular and irregular sand beds in the Catahoula Sandstone is a serious problem in the vicinity of Laurel, Mississippi. Location and design of additional ground-water supplies for municipal and industrial use are dependent on an accurate description of sub-surface geology, aquifer characteristics, and hydrologic properties of aquifers in the area.

The objective of this investigation is to collect and analyze the geologic and hydrologic data needed to conduct a comprehensive study of aquifers in the Jones County area. Data to be collected in this investigation will include well data, water levels, water use, water-quality data, and aquifer characteristics. Geophysical logs and driller's logs will provide subsurface data.

In fiscal year 1984 available data have been compiled and analyzed. Additional water-level and water-quality data will be collected late this year. Preparation of the final report summarizing the findings of this investigation will begin this year and will be completed in fiscal year 1985.

Agencies funding project:

U.S. Geological Survey
City of Laurel



LOCATION OF THE JONES COUNTY AREA GROUND-WATER STUDY

MISSISSIPPI COASTAL AREA GROUND-WATER INVESTIGATION (MS 84-072)

Project Chief: B. E. Wasson
Location: Mississippi Gulf Coast
Duration: April 1984 to March 1988

Municipal and industrial growth along the Mississippi Gulf Coast has been accompanied by large increases in the use of ground water and declining ground-water levels. Water levels in some areas of large ground-water withdrawals have declined more than 120 feet in the last 40 years and now stand more than 100 feet below sea level. The ability of the ground-water system to sustain present and possibly increased yields in the future without inducing saltwater encroachment is unknown.

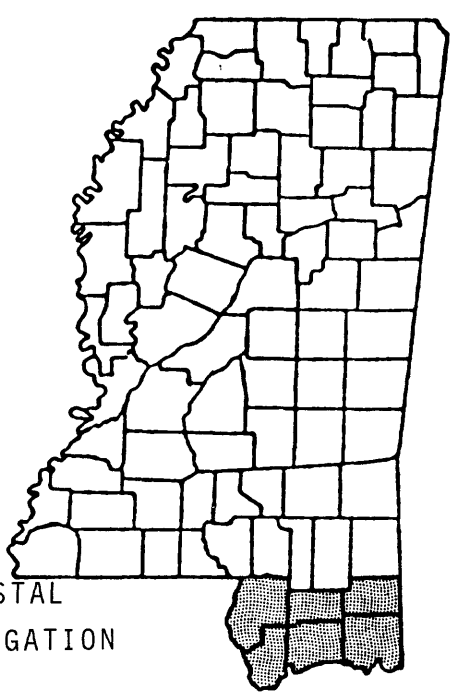
The purpose of this investigation is to collect sufficient hydrologic data to refine the definition and understanding of the aquifer system in the area and to develop a digital model of the ground-water system. This model will be used to confirm the hydraulic and hydrologic characteristics of the aquifer system and to test the response of the system to present and future pumping and to identify areas of potential saltwater encroachment.

This investigation will get underway in mid 1984. Effort during the remainder of the fiscal year will consist largely of literature review, compilation of available hydrologic and geologic data, and development of an initial coarse-grid model. An inventory of wells in the area and collection of water-level data for input to the model will begin late in the fiscal year.

In fiscal year 1985 data collection will continue and the model will be refined and calibrated. Data collection may include test drilling and geophysical logging in areas where the existing data are sparce.

Agencies funding project.

U.S. Geological Survey
Mississippi Department of Natural Resources
Bureau of Land and Water Resources



AREA COVERED BY COASTAL GROUND-WATER INVESTIGATION

GROUND-WATER CONTAMINATION IN SHALLOW AQUIFERS IN THE GULF COASTAL PLAIN OF LOUISIANA AND MISSISSIPPI (MS 84-073)

Project Chief: G. A. Bednar
Location: Mississippi Gulf Coast--Harrison County
Duration: July 1984 to September 1985

The shallow aquifers in the Gulf Coastal Plain of southern Louisiana and Mississippi are relatively permeable and are recharged locally by precipitation. They are also susceptible to contamination from industrial, agricultural, and municipal wastes.

The purpose of this project is to examine the quality of ground water in two hydrologically similar areas and relate the quality of ground water to land use. The study will focus on potential or existing contamination of shallow ground water by organic compounds and trace elements characteristic of many industrial wastes. One of the areas is near Baton Rouge, Louisiana, and is known to be contaminated by land disposal of hazardous industrial wastes. That area is being investigated by the Louisiana District of the Geological Survey.

The other area which is located in Harrison County on the Mississippi Gulf Coast, is largely undeveloped. Ground water in this area is believed to be relatively unpolluted but there is potential for contamination of the shallow aquifer in the Gulfport area. This area is being studied by the Mississippi District of the Geological Survey.

In fiscal year 1984 work on this investigation in Mississippi will consist largely of compilation of available hydrogeologic, water-quality and land-use data in the Harrison County area.

In fiscal year 1985 a field reconnaissance of ground-water quality in the area will be conducted. A report summarizing the available data and documenting the findings of the reconnaissance will be prepared by July 1985. If the initial reconnaissance indicates that the area warrants further, more detailed study, a second phase study proposal will be developed.

Agency funding project.

U.S. Geological Survey

AREAS INCLUDED IN GROUND-WATER CONTAMINATION STUDY

REPORTS PUBLISHED OR RELEASED IN 1983-84

by the

MISSISSIPPI DISTRICT

Bentley, C. B., 1983, Preliminary report of the geohydrology near Cypress Creek and Richton salt domes, Perry County, Mississippi: U.S. Geological Survey Water-Resources Investigations Report 83-4169, 40 p.

Callahan, J. A., 1983, Water use in Mississippi, 1980: U.S. Geological Survey Open-File Report 83-224, map, 1 sheet.

Carlson, Darrell D., and Firda, Gary D., 1983, Floods of April 1983 in southern Mississippi and southeastern Louisiana: U.S. Geological Survey Open-File Report 83-685, 32 p.

Colson, B. E., and Schneider, Verne R., 1983, Backwater and discharge at highway crossings with multiple bridges in Louisiana and Mississippi: U.S. Geological Survey Water-Resources Investigations Report 83-4065, 39 p.

Darden, Daphne, 1983, Water-level maps of the alluvial aquifer, northwestern Mississippi, September 1982: U.S. Geological Survey Water-Resources Investigations Report 83-4133, 1 sheet.

Darden, Daphne, 1984, Potentiometric map of the Gordo aquifer in northeastern Mississippi, November and December 1982: U.S. Geological Survey Water-Resources Investigations Report 83-4254, 1 sheet. (in press)

Darden, Daphne, 1984, Potentiometric map of the Paleozoic aquifer in northeastern Mississippi, November and December 1982: U.S. Geological Survey Water-Resources Investigations Report 83-4243, 1 sheet.

Kalkhoff, Stephen J., 1983, Background hydrologic information in potential lignite mining areas in Mississippi, July 1982: U.S. Geological Survey Open-File Report 83-257, 21 p.

Lamonds, A. G., and Kernodle, John Michael, 1984, Potential ground-water level changes in the Mississippi River alluvial aquifer in response to proposed navigation improvements on the Yazoo River in Mississippi: U.S. Geological Survey Water-Resources Investigations Report 84-4039, 65 p.

Morris, Fred, III, 1983, Hydrologic monitoring in the area of the Tennessee-Tombigbee Waterway, Mississippi-Alabama, Fiscal Year 1982: U.S. Geological Survey Open-File Report 83-764, 189 p.

Parker, G. G., Jr., Walker, Debbe, and Moss, Carol, 1984, A selected bibliography of water resources publications for Mississippi: U.S. Geological Survey Open-File Report 84-062, 78 p.

Sumner, David M., 1984, Water-level maps of the alluvial aquifer, northwestern Mississippi, April 1983: U.S. Geological Survey Water-Resources Investigations Report 83-4285, 1 sheet.

GULF COAST HYDROSCIENCE CENTER

Summaries of active investigations at the Gulf Coast Hydroscience Center in 1984 are given on the following pages, followed by a list of reports published or released in 1983-84.

WILCOX WASTE STORAGE APPRAISAL

Project Chief: R. H. Wallace, Jr.
Location: Texas Gulf Coastal Plain
Duration: Ongoing since 1971

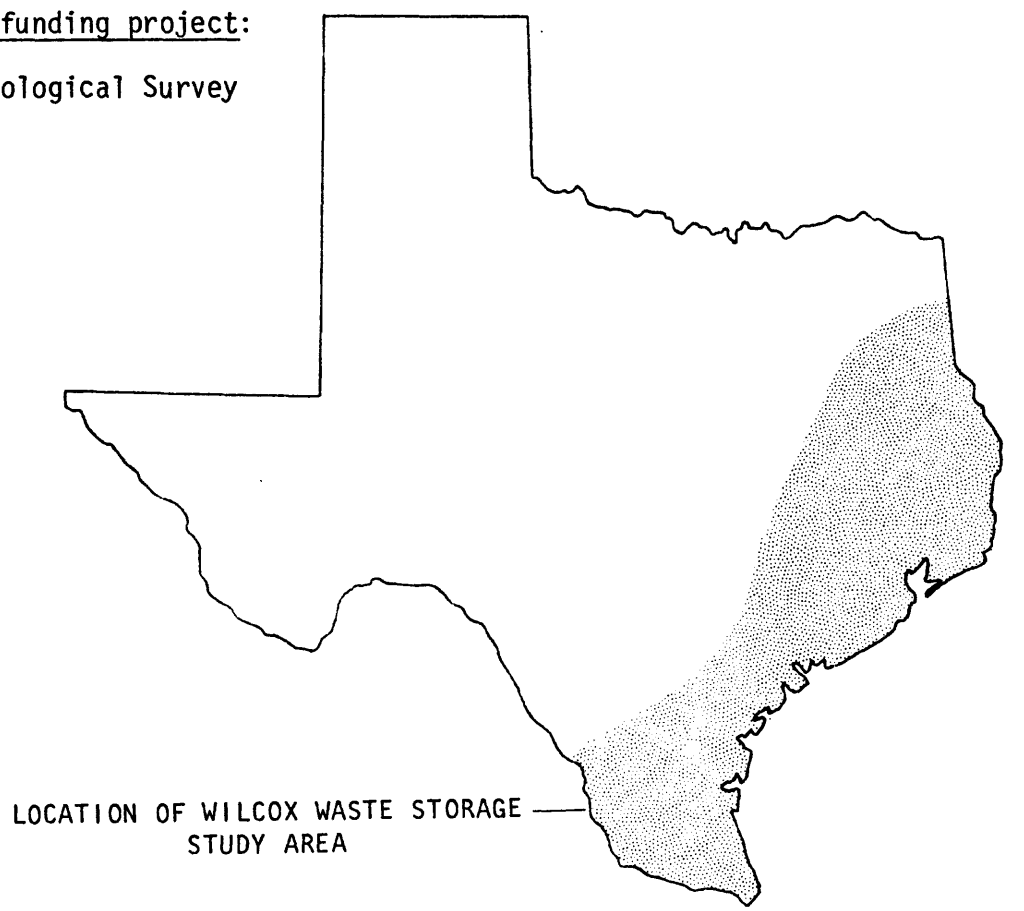
The objectives of the project are to develop an understanding of the hydrogeology of deep sedimentary basin deposits; to map and describe the Wilcox Group beneath a broad segment of the Gulf Coastal Plain of Texas; to explain and characterize the depositional environments (facies), geologic structure, temperature, pressure, and salinity of water; and to define a part of the Wilcox Group in terms that will enable decisions to be made regarding suitability for storage of liquid wastes.

These objectives are attained by mapping the confining boundaries of the potential disposal zone (top and bottom of Wilcox Group, base of 10,000 milligrams per liter (mg/L) of water, and top of geopressured zone), by collecting and analyzing well data to describe the chemical and physical properties of the rocks and their contained fluids, and by delineating the geologic framework. Anticipated consequences of waste injection are then predicted.

In fiscal year 1984 the report, "Structure, temperature, pressure, and salinity of Cenozoic aquifers of south Texas," by J.B. Wesselman was published as Hydrologic Atlas 654 and distributed. The project has been suspended.

Agency funding project:

U.S. Geological Survey



THERMAL DIFFERENTIALS IN GROUND-WATER SYSTEMS

Project Chief: R. H. Wallace, Jr.
Location: United States - Particularly onshore and offshore, Texas and Louisiana Gulf Coast
Duration: Ongoing since July 1972

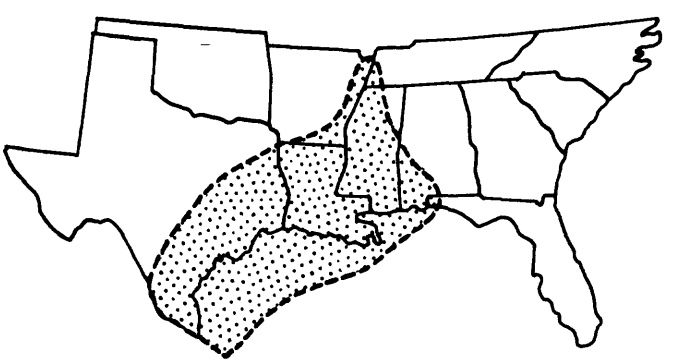
The objectives of the project are to locate, define, and describe variations in temperature and geothermal gradient within the Gulf Coast, both regionally and site-specific; to demonstrate the use of thermal signatures in detecting, tracting and quantifying fluid movement in selected ground-water systems; to characterize up to six type-area geopressured-geothermal reservoirs based upon results of Department of Energy sponsored long-term well tests; to estimate recoverable geopressured-geothermal energy from the results of reservoir simulation modeling; and to assist Department of Energy in management and contract review meetings, conferences, and technical evaluation of well test and research results.

These objectives are attained by using data from DOE sponsored well-tests, existing data bases and information from ground-water files for computerized evaluation, including calculation of heat flow, and geothermal gradients and temperatures by depth-interval/depth for the major Gulf Coast aquifer systems. Gradient-temperature will be mapped and hydrogeologic cross sections will be prepared to define thermal conditions 3-dimensionally and locate anomalies. Focusing on thermal influx near faults and down-dip limits of fresh ground water, identified anomalies will be analyzed and correlated with changes in formation geometry, system dynamics, and physical and chemical properties of rocks and fluids. An attempt will be made to quantify fluid volumes contributed to shallow, freshwater aquifer systems form deep sources, and to determine directions and sources.

In fiscal year 1984 calculation of average temperatures and well depths in several major aquifers in Mississippi and Louisiana was completed. These data were made available to the ongoing modeling effort on the Mississippi Embayment West Gulf Coast Regional Aquifer System study. Work on this project has been suspended due to the transfer of the project chief.

Agencies funding project:

U.S. Geological Survey
U.S. Department of Energy



STUDY AREA: THERMAL DIFFERENTIALS IN GROUND-WATER SYSTEMS

SURFACE-WATER DETERMINISTIC MODELING

Project Chief: Marshall E. Jennings
Location: Gulf Coast Hydroscience Center - Surface Water Branch, Office of Surface Water Deterministic Modeling
Duration: Continuous since July 1972

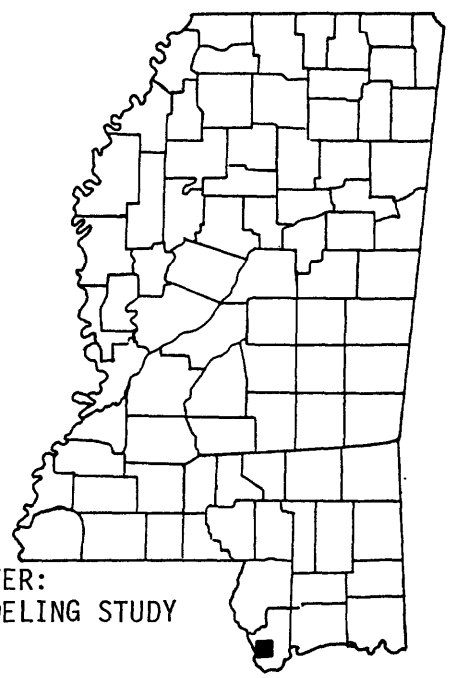
The objectives of the project are to develop and modify deterministic models of surface-water systems, document these models to facilitate their use in field situations, and to assist field personnel in the application of these models to hydraulic problems.

In fiscal year 1984 development, testing, and application of surface-water models is continuing. Studies of the application of the BRANCH unsteady flow model to streamflow gaging have been completed. Testing and documentation of the distributed routing rainfall-runoff model and the distributed runoff quality model have been completed. A program entitled CONROUT for routing daily flows through river systems has been developed and assistance is being provided to several Districts in the use of this program in an analysis of streamgaging networks.

In fiscal year 1985 modeling support to offices using the BRANCH model, the CONROUT program and other surface-water models will continue. Training and technical assistance in the use and application of these models will be provided to field offices as needed. The conversion of the BRANCH and other models and data management systems to run on Prime minicomputers in the District offices will be completed. Development of a new watershed modeling system will continue next year.

Agency funding project:

U.S. Geological Survey



LOCATION OF GULF COAST HYDROSCIENCE CENTER:
SITE OF SURFACE-WATER DETERMINISTICS MODELING STUDY

DEVELOPMENT AND VALIDATION OF COMPUTATIONAL TECHNIQUES IN SURFACE-WATER HYDRAULICS

Project Chief: Lewis L. DeLong
Location: Gulf Coast Hydroscience Center
Duration: Ongoing since October 1983

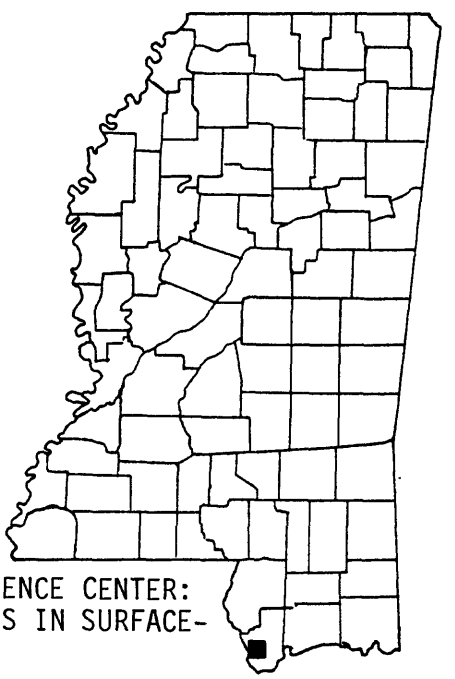
The objectives of the project are to develop solutions for problems of flow in open channels that involve a combination of mathematical models using hydraulic theory to the maximum extent possible and hydraulic experiments to define unknown coefficients in the models. The project uses a large outdoor flood plain simulation facility and an indoor hydraulics laboratory, including a tow tank, submerged jet tank, several tilting flumes and other supporting facilities. These facilities are used to test and validate models used nationwide in water-resources investigations.

In fiscal year 1984 development of two-dimensional finite element flow models is continuing. Flow distributions derived from these models are being compared to flow distribution estimated using conformal mapping procedures. Measurements in the laboratory flume will be made to evaluate a two-dimensional turbulence model.

Development and testing of two-dimensional flow models will continue in fiscal year 1985. An analysis of one-dimensional flow and transport models for use in dam break studies will also be continued.

Agencies funding project:

U.S. Geological Survey
Federal Highway Administration



LOCATION OF GULF COAST HYDROSCIENCE CENTER: SITE OF COMPUTATIONAL TECHNIQUES IN SURFACE-WATER HYDRAULICS STUDY

TRANSPORT AND DEGRADATION OF ORGANIC SUBSTANCES IN STREAMS

Project Chief: R. E. Rathbun
Location: Gulf Coast Hydroscience Center
Duration: Continuous since October 1977

The objectives of the project are to determine the fundamentals of volatilization, dispersion, adsorption, other physical processes and microbial degradation that affect the concentration of organic substances in streams, and to develop sub-models of these processes and integrate these sub-models into an overall model describing the transport and degradation of organic substances in streams.

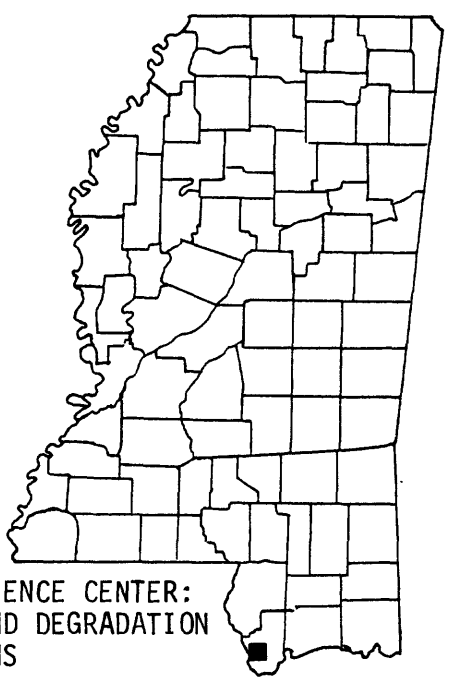
In order to meet these objectives, studies of the volatilization, adsorption, transport, and degradation of specific organic compounds and mixtures of organic compounds are conducted in the laboratory and in physical river models. The results of these studies are then used to develop digital models describing the transport and degradation of organic substances in streams.

In fiscal year 1984 laboratory studies of the volatilization characteristics of a number of ketones have been completed and studies of several monoalkyl substituted benzene compounds are underway. Two procedures for calculating volatilization coefficients from experimental concentration-versus-time data have been evaluated. Experimental studies of the photodecomposition of organic compounds in water will begin this year.

In fiscal year 1985 experimental studies of volatilization and photodecomposition of organic substances in water will continue. These physical processes of degradation of organic compounds will be incorporated into transport models. Reports and articles documenting the findings will be prepared.

Agency funding project:

U.S. Geological Survey



LOCATION OF GULF COAST HYDROSCIENCE CENTER: SITE OF PROJECT ON TRANSPORT AND DEGRADATION OF ORGANIC SUBSTANCES IN STREAMS

HEAT TRANSFER IN WATER SYSTEMS

Project Chief: Harvey E. Jobson
Location: Gulf Coast Hydroscience Center
Duration: Ongoing since April 1972

The objectives of the project are to improve the current methods of predicting the water temperature and the transport of thermal energy in water systems.

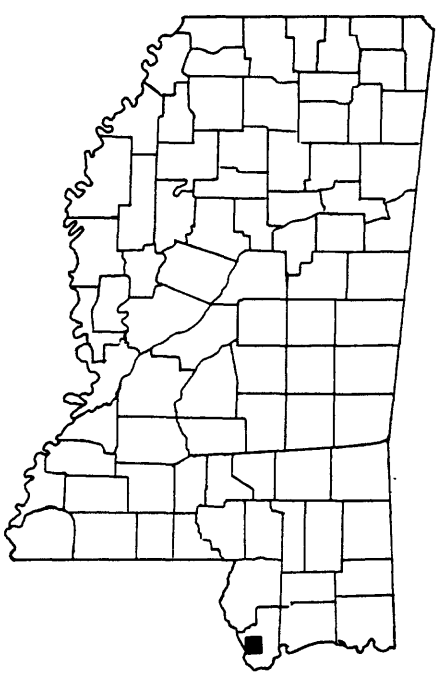
The objectives are achieved by models being developed and verified for temperature prediction in the following categories: (1) reservoirs where vertical temperature stratification is an important factor, (2) reservoirs which are well mixed vertically, and (3) river systems. In developing these models, studies will be conducted on energy transfer processes at the air-water interface as well as mixing processes occurring in reservoir inflows and outflows. Once a thermal model has been developed and verified for a particular category of problems, models of more complex constituents in that system will be developed.

In fiscal year 1984 reports documenting heat and nutrient transport models developed for the Chattahoochee River in Georgia and the Trinity River in Texas have been completed. A one-dimensional transport model has been generalized for use in esturine studies.

In fiscal year 1985 a heat and water-quality transport model of the Peace River in Florida will be developed.

Agency funding project:

U.S. Geological Survey



LOCATION OF GULF COAST HYDROSCIENCE CENTER:
SITE OF HEAT TRANSFER IN WATER SYSTEMS STUDY

TECHNIQUES OF FLOOD PLAIN MAPPING

Project Chief: Russell H. Brown
Location: Nationwide
Duration: Ongoing since August 1971

The objectives of the project are to develop an airborne instrument system for real-time precise (±0.5 ft vertically; ±2 ft horizontally) three-coordinate positioning.

The objectives are being met by sole-source contract arrangements between the USGS and the Charles Stark Draper Laboratory (CSDL) in Cambridge, Massachusetts.

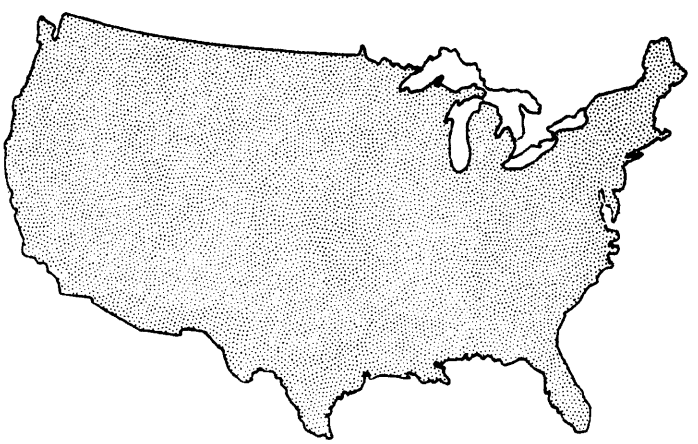
The work has progressed through several distinct contract phases and is now in the final stage of phase 6--proof-of-concept test flights. The instrumentation has been developed, laboratory tested, and installed in the aircraft.

In fiscal year 1984 the instrument system is being flight tested in accordance with the contract. Testing and refinement of the instrument system is expected to continue through the remainder of the year.

Field operation of the instrument system will begin late in fiscal year 1984 and continue into fiscal year 1985.

Agency funding project:

U.S. Geological Survey



TECHNIQUES OF FLOOD-PLAIN MAPPING ARE STUDIED NATIONWIDE

FLUVIAL PROCESSES AND RIVER MECHANICS

Project Chief: Cheng-lung Chen
Location: Nationwide
Duration: Ongoing since October 1982

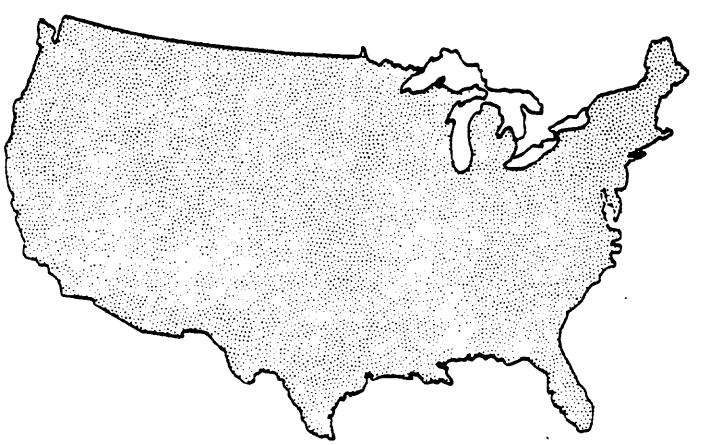
The objectives of the project are to define more fully the various fluvial processes on hillslopes and/or in river channels and then evaluate the rate of river-form change in response to the hydrologic disturbances caused by torrential rainstorms, earthquakes, or volcano eruptions. Existing mathematical relationships (models) are modified or generalized to describe more accurately the process-response relationships. Rheological relationships are formulated for various soils and highly-concentrated sediment-water mixtures involved in such models. Using such relationships in conjunction with available field and laboratory data, mathematical models for flash floods, dam breaks, and mudflows are formulated, calibrated, verified, and applied. Ultimately, these models will be used to evaluate potential hazards that may result from such catastrophic events.

In fiscal year 1984 equations for evaluating mudflow mechanics have been evaluated and a generalized model for mudlfow in a wide channel has been developed. A viscometer and/or a flume for evaluating the rheological parameters of a mudflow will be designed and built this year.

The investigation into mudflow mechanics, including the estimation of resistance to mudflow based on various rheological parameters, will continue in fiscal year 1985.

Agency funding project:

U.S. Geological Survey



FLUVIAL PROCESSES AND RIVER MECHANICS ARE STUDIED NATIONWIDE

RADIOISOTOPES IN GROUND WATER

Project Chief: Thomas F. Kraemer
Location: Gulf Coast Hydroscience Center
Duration: October 1982 to September 1986

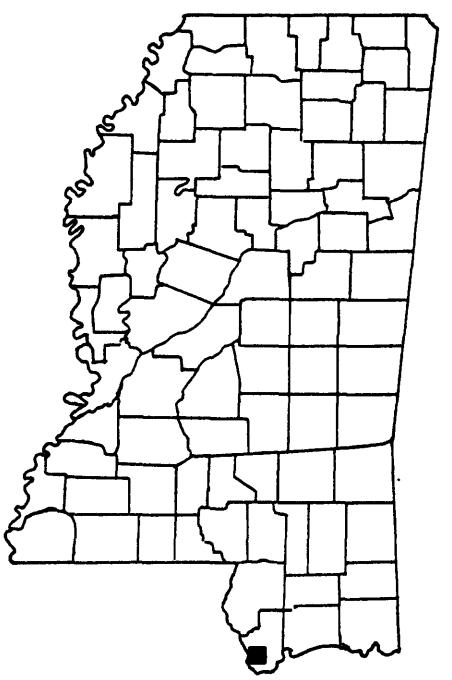
The objectives of this project are to examine the behavior of naturally occurring uranium and thorium isotopes and their decay products in ground waters of the U.S. Gulf Coast, and to develop an understanding of their behavior in ground-water systems. A wide range of ground-water types will be examined, including freshwater from near-surface aquifers and high-salinity brines from deep, hot formations producing oil and gas. Laboratory studies will also be conducted to examine the behavior of isotopes under various simulated subsurface conditions. Results of such investigations may lead to the use of several of these isotopes as natural ground-water tracers which can be used to reveal aquifer properties and behavior.

In fiscal year 1984 laboratory facilities for analysis of radiosotopes have been expanded to increase analytical capabilities. Brine samples from deep wells in the vicinity of Laurel, Mississippi, will be collected for radioisotope analysis late this year. A summary report presenting the results of this sampling effort will be started this year.

In fiscal year 1985 work on the report will be completed and additional areas will be sampled for radioisotope analysis.

Agency funding project:

U.S. Geological Survey



LOCATION OF GULF COAST HYDROSCIENCE CENTER:
SITE OF RADIOISOTOPES IN GROUND-WATER STUDY

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GULF COAST HYDROSCIENCE CENTER

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