WATER-RESOURCES INVESTIGATIONS OF THE U.S. GEOLOGICAL SURVEY IN MISSOURI

FISCAL YEAR 1983

Compiled by Wanietia M. Kratzer

U.S. GEOLOGICAL SURVEY

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Rolla, Missouri

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UNITED STATES DEPARTMENT OF THE INTERIOR

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WATER RESOURCES DIVISION BASIC MISSION AND PROGRAM

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

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

-Systematically collecting data needed for the continuing determination and evaluation of the quantity, quality, and use of the Nation's water resources.

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

-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 to predict their response to stress, either natural or manmade.

-Distributing the water data and the results of these investigations and research through reports, maps, computerized services, and other forms of public release.

-Coordinating the activities of federal agencies in the acquisition of water data for streams, lakes, reservoirs, estuaries, and ground water.

-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.

WATER-RESOURCES INVESTIGATIONS OF THE U.S. GEOLOGICAL SURVEY IN MISSOURI FISCAL YEAR 1983

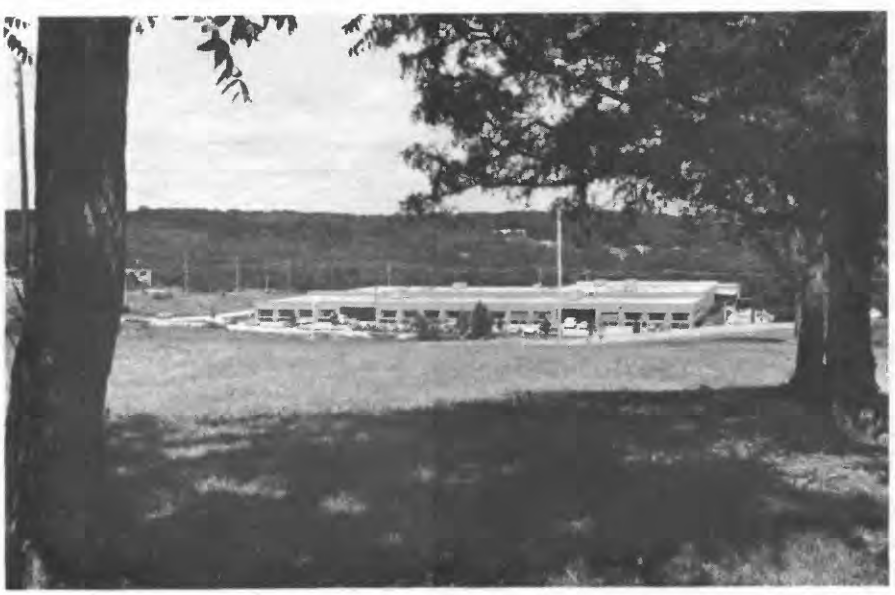
ABSTRACT

Water-resources investigations of the U.S. Geological Survey in Missouri consist of collecting hydrologic data and making interpretative investigations. These data and the results of the investigations are published or released by either the U.S. Geological Survey or by cooperating agencies. This report describes the data-collection activities and investigations in Missouri for the 1983 fiscal year and provides an extensive list of water-resources references for the State of Missouri.

INTRODUCTION

The United States Geological Survey was established on March 3, 1879, in the closing hours of the final session of the 45th Congress; during 1894, a small appropriation was obtained for the specific purpose of "gauging streams and determining the water supply of the United States."

A district office of the U.S. Geological Survey was established in Rolla, Mo., during 1921, when a cooperative program was begun with the Missouri Bureau of Geology and Mines (now the Department of Natural Resources, Division of Geology and Land Survey). In cooperation with other federal and state agencies, the office assesses the quantity and quality of Missouri's water supply, helps coordinate federal water-data acquisition activities, and collects and distributes information about floods and droughts. The current organization of the Missouri district is shown in figure 1, and locations of Water Resources Division offices in Missouri are shown in figure 2.



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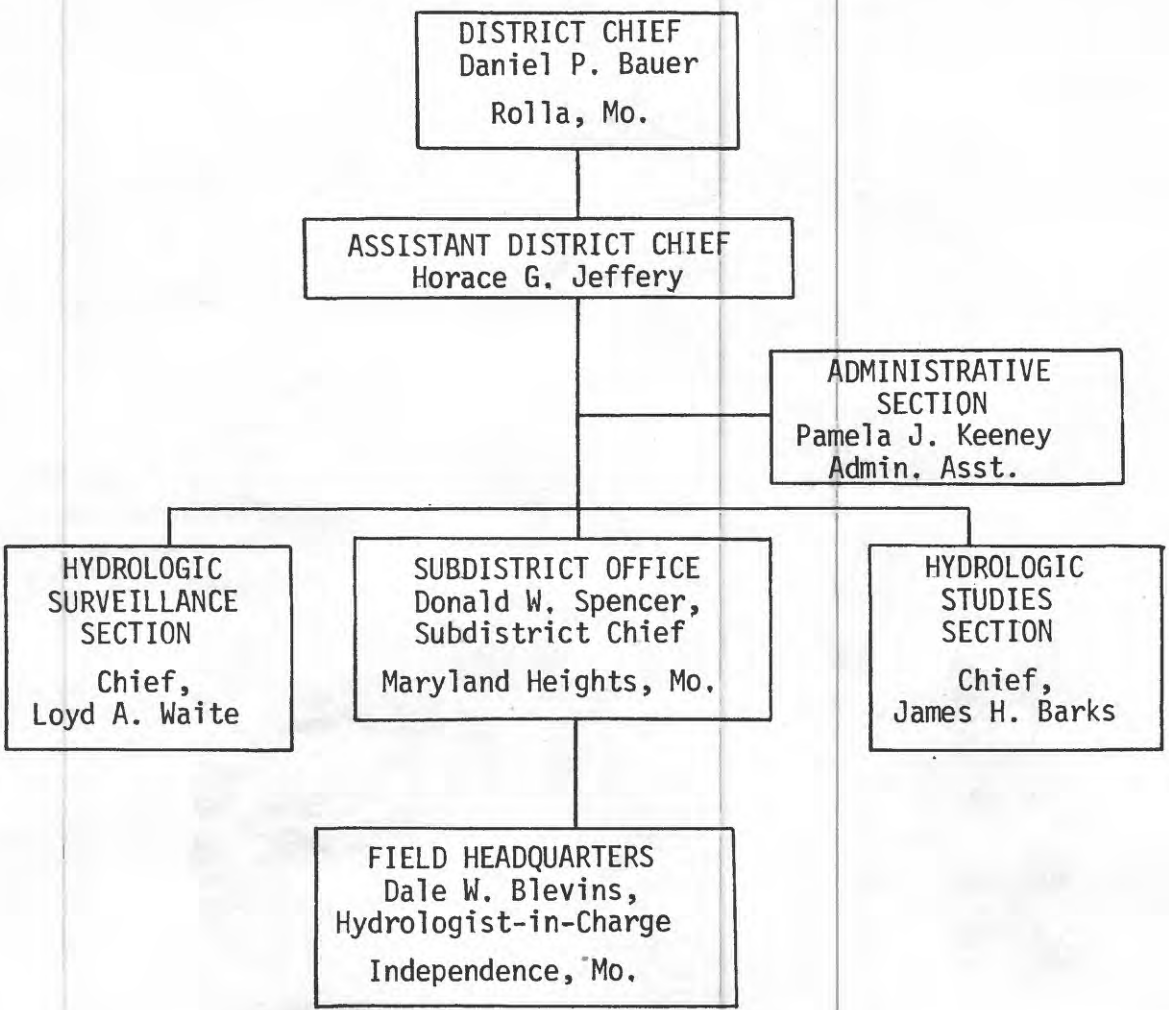


Figure 1.--Organization of the Missouri district.

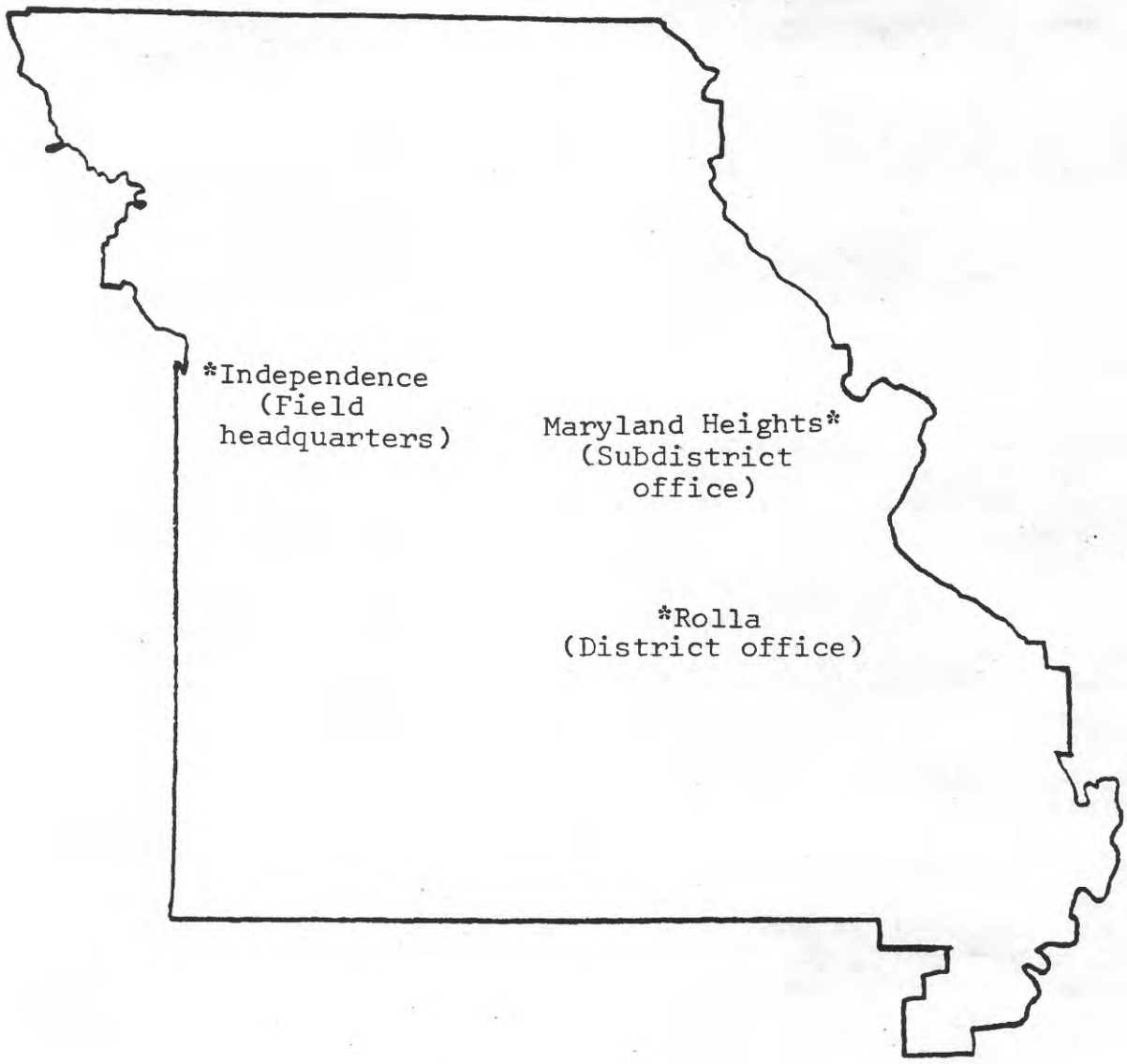


Figure 2.--Locations of Water Resources Division offices in Missouri.

COOPERATION

The Missouri District and agencies of the State of Missouri have had cooperative agreements for the systematic collection of streamflow records since 1921; about 80 percent of the hydrologic data collected by the U.S. Geological Survey in Missouri is in cooperation with local, state, or federal agencies.

The Department of Natural Resources is the principal state cooperator. Monies and services contributed by state agencies are matched by the U.S. Geological Survey with funds authorized specifically for the cooperative program.

The collection of surface-water data by the U.S. Geological Survey began during 1903 in Missouri. These and continuing data are the basis for analytical studies that define streamflow characteristics and are ultimately used in water management, planning, and design.

The collection of ground-water data in cooperation with the Missouri Division of Geology and Land Survey has been continuous since it began during October 1963. Many of the published ground-water reports for Missouri are the result of the cooperative program.

A network of water-quality stations is operated to provide water-quality data for planning and action programs. This project has been continuous since it was begun during 1962, in cooperation with the Missouri Water Pollution Board (now the Department of Natural Resources, Division of Environmental Quality). The Division of Environmental Quality Laboratory analyzes samples collected in the cooperative program. As part of their quality assurance, the Division of Environmental Quality Laboratory routinely analyzes standard reference samples and split samples furnished by the U.S. Geological Survey.

State and local organizations that assist in collecting hydrologic data through joint-funding agreements are:

City of Springfield
    City Utilities

Department of Conservation

Department of Natural Resources
    Division of Environmental Quality
    Division of Geology and Land Survey
    Land Reclamation Commission

Highway and Transportation Commission

Little River Drainage District

St. Louis County, Missouri

Federal agencies that assist in collection of records by furnishing funds or services are:

Environmental Protection Agency

Federal Energy Regulatory Commission (Union Electric Co. of Missouri)

National Park Service

National Weather Service

Soil Conservation Service

U.S. Department of the Army, Corps of Engineers

Kansas City District
Little Rock District
Rock Island District
St. Louis District
Tulsa District

HYDROLOGIC-DATA PROGRAM

Hydrologic-data stations are maintained by the U.S. Geological Survey throughout Missouri to obtain records on stream discharge or stage, reservoir and lake storage, spring discharge, and the quality of surface and ground water. Drainage basins in Missouri and the approximate area in square miles are shown in figure 3[1]. All hydrologic-data stations are listed in downstream order in the following table, which also includes the cooperating agency and the type of data collected. Abbreviations shown in the table are:

Cooperators

CE KC	Corps of Engineers, Kansas City
CE LR	Corps of Engineers, Little Rock
CE RI	Corps of Engineers, Rock Island
CE STL	Corps of Engineers, St. Louis
CE TU	Corps of Engineers, Tulsa
CU	City Utilities, Springfield
DOC	Department of Conservation
DEQ	Division of Environmental Quality
DGLS	Division of Geology and Land Survey

[1]Missouri Department of Natural Resources, 1982, Missouri water atlas: Missouri Department of Natural Resources, Jefferson City, Mo., 97 p.

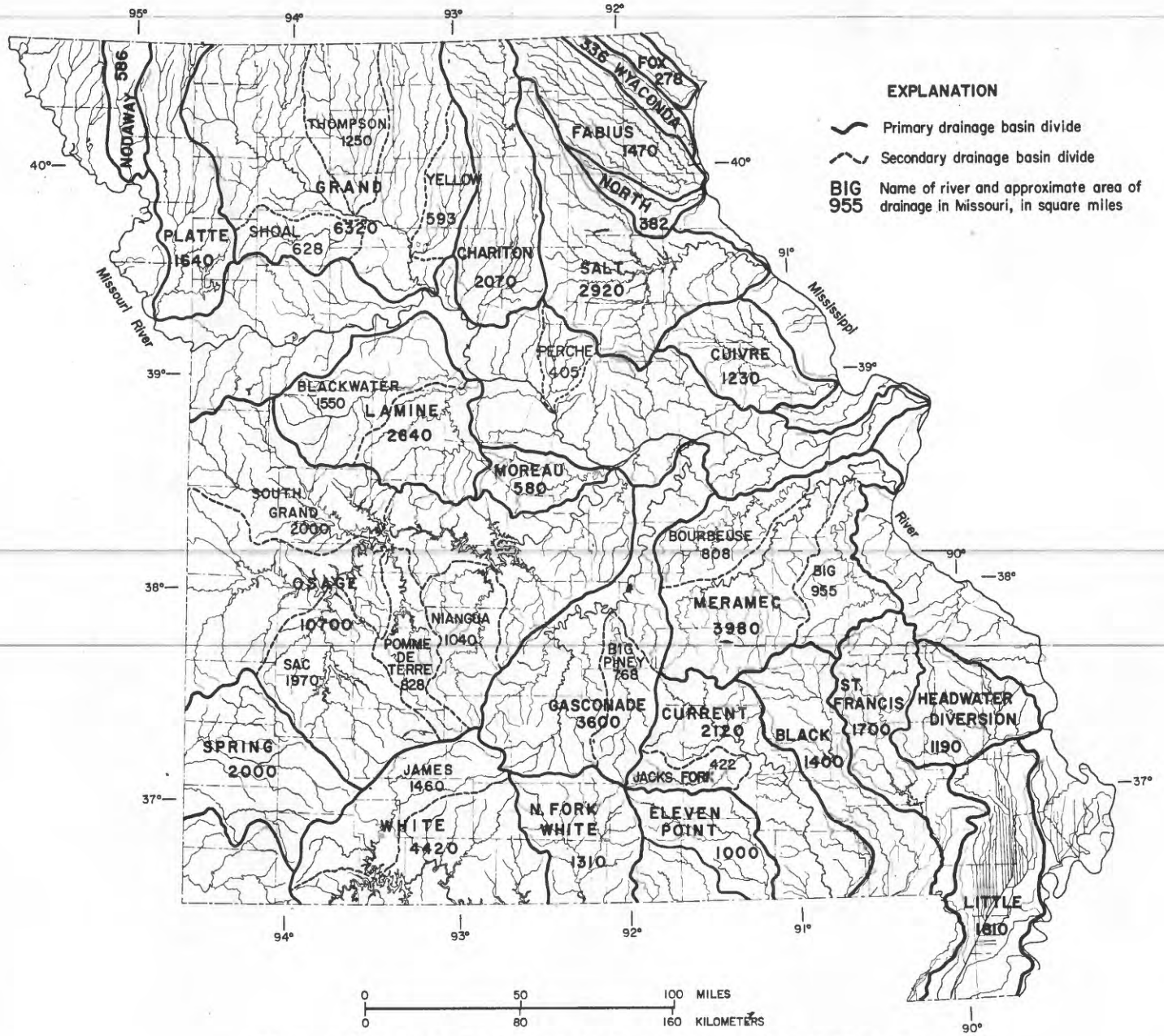


Figure 3.--Drainage basins in Missouri (modified from Missouri Department of Natural Resources, 1982).

UE	Union Electric
HTC	Highway and Transportation Commission
NPS	National Park Service
SCS	Soil Conservation Service
USGS	U.S. Geological Survey

Type of data collected

C - Chemical
P - Peak stage and peak discharge only
D - Discharge--continuous record of stage and discharge
L - Low flow only
R - Reservoir content
Rr - Rainfall-runoff
S - Sediment
St - Stage only
T - Temperature

Hydrologic-data stations in operation during fiscal year 1983

Station number	Station name	Cooperation	Type of data
05490600	Des Moines River at St. Francisville	USGS, CE RI	CST
05495000	Fox River at Wayland	CE RI	D
05495100	Big Branch Tributary near Wayland	HTC	P
05496000	Wyaconda River above Canton	HTC, CE RI	D
05497000	North Fabius River at Monticello	CE RI	D
05497300	North Fabius River near Durham	DGLS	L
05497500	Middle Fabius River near Baring	DGLS	P
05498000	Middle Fabius River near Monticello	CE RI	D
05498300	Middle Fabius River near Durham	DGLS	L
05500000	South Fabius River near Taylor	CE RI, DEQ	DC
05500500	North River at Bethel	DGLS	P
05501000	North River at Palmyra	CE RI	D
05502000	Bear Creek at Hannibal	CE RI	D
05502300	Salt River at Hagars Grove	CE STL	D
05503500	North Fork Salt River at Hunneywell	CE STL	DST
05503800	Crooked Creek near Paris	CE STL	D
05505000	South Fork Salt River at Santa Fe	CE STL	D
05506500	Middle Fork Salt River at Paris	CE STL	DST
05506800	Elk Fork Salt River near Madison	CE STL	D
05507600	Lick Creek near Perry	CE STL	DST
05507800	Salt River near Center	CE STL	D
05508000	Salt River near New London	CE STL, USGS	DCS
05508800	Spencer Creek near Frankford	CE STL	D
05509300	Salt River near Ashburn	DGLS, CE STL	LSt
05501600	Mississippi River at Hannibal	DEQ	C
05513600	Camp Creek near Elsberry	HTC	P
05514500	Cuivre River near Troy	CE STL, DEQ	DC
05587500	Mississippi River at Alton, Ill.	CE STL, USGS	DS
05587550	Mississippi River below Alton, Ill.	USGS	C
06810050	High Creek near Rock Port	DGLS	L
06811600	Rock Creek near Rock Port	DGLS	L
06813000	Tarkio River at Fairfax	DGLS	D
06815575	Squaw Creek near Mound City	DGLS	L
06817500	Nodaway River near Burlington Junction	CE KC	D
06817700	Nodaway River near Graham	DGLS	L

Hydrologic-data stations in operation during fiscal year 1983--continued

Station number	Station name	Cooperation	Type of data
06817800	Nodaway River near Oregon	DEQ, DGLS	CL
06817980	Blacksnake Creek at St. Joseph	HTC	Rr
06818000	Missouri River at St. Joseph	CE KC, USGS	DCS
06818490	Bee Creek near Platte City	DGLS	L
06818900	Platte River at Ravenwood	CE KC	P
06819090	Platte River near St. Joseph	DGLS	L
06819500	One Hundred and Two River at Maryville	DGLS	D
06820460	One Hundred and Two River at Avenue City	DGLS	L
06820480	One Hundred and Two River near St. Joseph	DGLS	L
06820490	Third Fork Platte River near Easton	DGLS	L
06820500	Platte River near Agency	CE KC	D
06821130	First Creek near Nashua	DGLS	P
06821150	Little Platte River at Smithville	CE KC	D
06821190	Platte River at Sharps Station	CE KC, USGS	DC
06821200	Platte River at Platte City	DGLS	L
06893000	Missouri River at Kansas City	CE KC	D
06893500	Blue River near Kansas City	CE KC	D
06893558	Brush Creek at Summit Avenue at Kansas City	HTC	Rr
06893570	Round Grove Creek at Raytown Road in Kansas City	HTC	Rr
06893590	Blue River at 12th Street in Kansas City	CE KC	St
06893680	Mill Creek at Gladstone	HTC	Rr
06893710	Cates Branch at Liberty	HTC	Rr
06893793	Little Blue River below Longview Damsite in Kansas City	CE KC	D
06893880	Jackson County Lake near Blue Springs	CE KC	D
06893890	East Fork Little Blue River near Blue Springs	CE KC	D
06893900	Little Blue River near Blue Springs	DGLS	L
06894000	Little Blue River near Lake City	CE KC	D
06894800	Sni-A-Bar Creek near Wellington	DGLS	L
06895000	Crooked River near Richmond	DGLS, CE KC	LP
06895500	Missouri River at Waverly	CE KC	D

Hydrologic-data stations in operation during fiscal year 1983--continued

Station number	Station name	Cooperation	Type of data
06896000	Wakenda Creek at Carrollton	CE KC	P
06896182	Wildcat Creek at Stanberry	DGLS	L
06896550	Grand River near Darlington	DGLS	L
06896650	Sampson Creek at Pattonsburg	DGLS	L
06896700	O'Neill Branch at Osborn	HTC	P
06896900	Grand River near Pattonsburg	DGLS	L
06897000	East Fork Big Creek near Bethany	CE KC	P
06897300	Big Creek near Pattonsburg	DGLS	L
06897500	Grand River near Gallatin	CE KC	D
06897520	Marrowbone Creek near Gallatin	CE KC	D
06897700	Grand River Tributary near Utica	HTC	P
06898200	Thompson River near Trenton	DGLS	L
06898210	Sugar Creek at Brimson	DGLS	L
06899100	Weldon River at Trenton	DGLS	L
06899500	Thompson River at Trenton	CE KC	D
06899680	Grand River at Chillicothe	CE KC	P
06900000	Medicine Creek near Galt	DGLS	D
06900500	Medicine Creek near Sturges	DGLS	L
06900600	Medicine Creek near Wheeling	DGLS	L
06901000	Locust Creek near Milan	DGLS	L
06901500	Locust Creek near Linneus	DGLS	L
06902000	Grand River near Sumner	CE KC, USGS	DCS
06904050	Chariton River at Livonia	DGLS, CE KC	LD
06904300	Shoal Creek near Hartford	CE KC	P
06904500	Chariton River at Novinger	CE KC	D
06905000	Chariton River at Elmer	CE KC	P
06905200	Chariton River near Callao	DGLS	L
06905500	Chariton River near Prairie Hill	CE KC, USGS	DCS
06906000	Mussel Fork near Musselfork	CE KC	C
06906190	Long Branch Lake near Macon	CE KC	R
06906200	East Fork Little Chariton River near Macon	CE KC	D
06906300	East Fork Little Chariton River near Huntsville	CE KC, DEQ	DC
06906315	Sweet Spring Creek near Moberly	DGLS	L
06906400	Middle Fork Little Chariton River near Thomas Hill	CE KC	P
06906500	Missouri River at Glasgow	CE KC	St

Hydrologic-data stations in operation during fiscal year 1983--continued

Station number	Station name	Cooperation	Type of data
06907000	Lamine River at Clifton City	CE KC, DGLS	LP
06907080	Brushy Creek Tributary at Sedalia	HTC	Rr
06907100	Muddy Creek near Sedalia	DGLS	L
06907650	Clear Creek near Valley City	DGLS	L
06907700	Blackwater River at Valley City	CE KC	P
06908000	Blackwater River at Blue Lick	CE KC	D
06908420	Salt Fork Blackwater River near Marshall	DGLS	L
06908500	Shiloh Branch near Marshall	HTC	P
06908800	Lamine River near Blackwater	USGS	CS
06909000	Missouri River at Boonville	CE KC	D
06909400	Cottonwood Creek Tributary near Estill	HTC	P
06909500	Moniteau Creek near Fayette	CE KC	P
06910270	Moniteau Creek near Jamestown	DGLS	L
06910450	Missouri River at Jefferson City	UE	St
06910485	Burris Fork near California	DGLS	L
06910490	South Moreau Creek near Russellville	DGLS	L
06910500	Moreau River near Jefferson City	CE KC	P
06916653	Mulberry Creek at Mulberry	USGS	Rr
06916654	Unnamed Tributary to Mulberry Creek near Amoret	USGS	Rr
06916655	Mulberry Creek near Amoret	USGS	Rr
06918080	Osage River near Schell City	CE KC, USGS	DCS
06918200	North Fork Panther Tributary near Appleton City	HTC	P
06918340	Monegaw Creek near Monegaw Springs	DGLS	L
06918420	Sac River at Ash Grove	DGLS	L
06918440	Sac River near Dadeville	CE KC	D
06918450	Limestone Creek at South Greenfield	DGLS	L
06918460	Turnback Creek above Greenfield	CE KC	D
06918740	Little Sac River near Morrisville	CE KC	D
06918750	Franca Branch near Brighton	HTC	P
06918990	Stockton Lake near Stockton	CE KC	R
06919000	Sac River near Stockton	CE KC	D
06919020	Sac River below Stockton	CE KC	D
06919200	Sac River Tributary near Caplinger Mills	HTC	P
06919500	Cedar Creek near Pleasant View	CE KC	D
06919900	Sac River near Caplinger Mills	CE KC	D

Hydrologic-data stations in operation during fiscal year 1983--continued

Station number	Station name	Cooperation	Type of data
06920500	Osage River at Osceola	CE KC	St
06920600	Weaubleau Creek near Osceola	DGLS	L
06921000	Pomme de Terre River near Bolivar	DGLS	L
06921070	Pomme de Terre River near Polk	CE KC, DGLS	D
06921200	Lindley Creek near Polk	CE KC	D
06921325	Pomme de Terre Lake near Hermitage	CE KC	R
06921350	Pomme de Terre River near Hermitage	CE KC	D
06921590	South Grand River at Archie	CE KC	D
06921720	Big Creek at Blairstown	CE KC	P
06921800	Grandaddy Creek near Urich	HTC	P
06922200	Tebo Creek at Leesville	CE KC	C
06922440	Harry S. Truman Lake near Warsaw	CE KC	R
06922450	Osage River below Harry S. Truman Dam	CE KC	D
06922500	Osage River at Warsaw	CE KC	St
06922550	Osage River below Warsaw	CE KC	St
06922560	Lake of the Ozarks at Oar House Marina	CE KC	St
06922580	Big Turkey Creek near Warsaw	DGLS	L
06922650	Lake of the Ozarks at Turkey Creek Cove	CE KC	St
06922780	Deer Creek near Edwards	DGLS	L
06922790	Lake of the Ozarks above Buffalo Creek	CE KC	St
06922900	Lake of the Ozarks at Rainy Creek	CE KC	St
06923200	Niangua River near Buffalo	DGLS	L
06923250	Niangua River near Windyville	DGLS	L
06923500	Bennett Spring at Bennett Springs	DGLS	D
06923700	Niangua River at Bennett Springs	DEQ	C
06923900	Niangua River near Eldridge	DGLS	L
06925200	Starks Creek at Preston	HTC	P
06925250	Little Niangua River near Macks Creek	DGLS	L
06925440	Grandglaize Creek near Brumley	DGLS	L
06925445	Gravois Creek at Gravois Mills	DGLS	L
06925500	Lake of the Ozarks near Bagnell	DGLS	R
06926000	Osage River near Bagnell	UE	D
06926160	Saline Creek near Tuscumbia	DGLS	L
06926250	Little Tavern Creek near St. Elizabeth	DGLS	L
06926500	Osage River near St. Thomas	UE	D
06926510	Osage River below St. Thomas	USGS	CS

Hydrologic-data stations in operation during fiscal year 1983--continued

Station number	Station name	Cooperation	Type of data
06926700	Maries River near Vienna	DGLS	L
06926820	Little Maries River near Vienna	DGLS	L
06927000	Maries River at Westphalia	DGLS, CE KC	LP
06927520	Bailey Creek at Morrison	DGLS	L
06927580	Gasconade River near Hartville	DGLS	L
06927600	Wheeler Branch near Mountain Grove	HTC	P
06927650	Beaver Creek near Manes	DGLS	L
06927730	Osage Fork at Rader	DGLS	L
06927750	Osage Fork near Orla	DGLS	L
06928000	Gasconade River near Hazelgreen	DGLS	LP
06928300	Roubidoux Creek at Fort Leonard Wood	DGLS	L
06928500	Gasconade River near Waynesville	DGLS	L
06928600	Gasconade River near Hooker	DEQ	C
06929300	Big Piney River near Licking	DGLS	L
06930450	Big Piney River at Devils Elbow	DEQ	C
06930800	Gasconade River above Jerome	USGS	CS
06932000	Little Piney Creek at Newburg	DGLS	D
06933500	Gasconade River at Jerome	DGLS	D
06933790	Spring Creek near Vichy	DGLS	L
06934000	Gasconade River at Rich Fountain	CE KC	P
06934500	Missouri River at Hermann	CE KC, USGS	DCST
06934700	Loutre River at McKittrick	DGLS	L
06935300	Charette Creek near Marthasville	DGLS	L
07010000	Mississippi River at St. Louis	CE STL, USGS	DST
07010120	Gravois Creek near Kirkwood	DGLS	L
07010500	Maramec Spring near St. James	DGLS	D
07011200	Love Creek near Salem	HTC	P
07011600	Love Branch at Rolla	HTC	Rr
07013000	Meramec River near Steelville	CE STL	D
07013050	Crooked Creek near Dillard	DEQ	C
07014100	Courtois Creek at Courtois	DGLS	L
07014130	Indian Creek at Courtois	DGLS	L
07014500	Meramec River near Sullivan	CE STL, DEQ	DC
07014800	Indian Creek near St. Clair	DGLS	L
07015720	Bourbeuse River near Highgate	CE STL	D

Hydrologic-data stations in operation during fiscal year 1983--continued

Station number	Station name	Cooperation	Type of data
07015780	Little Bourbeuse River near Sullivan	DGLS	L
07015800	Langenberg Branch near Rosebud	HTC	P
07016500	Bourbeuse River at Union	CE STL	D
07017200	Big River at Irondale	CE STL	D
07017650	Fourche-A-Renault Creek near Potosi	DGLS	L
07017800	Mineral Fork near Potosi	DGLS	L
07017900	Old Mines Creek near Potosi	DGLS	L
07018000	Big River near DeSoto	CE STL	D
07018500	Big River near Byrnesville	CE STL	D
07019000	Meramec River near Eureka	CE STL, USGS	DCS
07019280	Meramec River at Paulina Hills	DEQ	C
07020100	Establishment Creek at Bloomsdale	DGLS	L
07020250	River aux Vases near St. Genevieve	DGLS	L
07020300	Saline Creek near St. Marys	DGLS	L
07020500	Mississippi River at Chester, Ill.	CE STL	DST
07020600	Apple Creek at Appleton	DGLS	L
07020950	Castor River near Cascade	DGLS	L
07020970	Bear Creek near Lowndes	DGLS	L
07021000	Castor River at Zalma	DGLS	D
07021500	Little Whitewater River near Millersville	DGLS	L
07021530	Byrd Creek near Jackson	DGLS	L
07021800	Headwater Diversion Channel near Allenville	DGLS	L
07022000	Mississippi River at Thebes, Ill.	CE STL, USGS	DCS
07024100	Wilkerson ditch near East Prairie	DGLS	L
07024150	St. James ditch at East Prairie	DGLS	L
07036090	Twelvemile Creek near Annapolis	DGLS	L
07036100	St. Francis River near Saco	DGLS, DEQ	LC
07036940	Big Creek at Chloride	DEQ	C
07037200	Crane Pond Creek near Annapolis	DGLS	L
07037500	St. Francis River near Patterson	DGLS	D
07038100	St. Francis River near Greenville	CE STL	St
07039000	Wappapello Lake at Wappapello	CE STL	R
07039500	St. Francis River at Wappapello	CE STL	D
07040700	Ditch 9 near Gideon	DGLS	L
07040800	Main ditch 6 east of Malden	DGLS	L

Hydrologic-data stations in operation during fiscal year 1983--continued

Station number	Station name	Cooperation	Type of data
07040850	Main ditch near Bernie	DGLS	L
07040900	Main ditch 2 at Malden	DGLS	L
07041050	Main ditch near Malden	DGLS	L
07041100	Main ditch at Holcomb	DGLS	L
07042400	Main ditch 1 near Matthews	DGLS	L
07042500	Little River ditch 251 near Lilbourn	DGLS	D
07043050	Ditch 24 at Heagy	DGLS	L
07043100	Old Channel ditch 1 near Chafee	DGLS	L
07043500	Little River ditch 1 near Morehouse	DGLS	D
07046001	Little River ditches near Kennett	DEQ	C
07046510	Pemiscot Bayou near Holland	DGLS	L
07046520	Main ditch 1 near Deering	DGLS	L
07050540	James River near Northview	DGLS	L
07050560	Panther Creek near Northview	DGLS	L
07050580	James River near Strafford	CE LR	D
07050700	James River near Springfield	CU	D
07050800	Maple Grove Branch near Ozark	HTC	P
07052260	Finley Creek near Linden	DGLS	L
07052360	Crane Creek near Galena	DGLS	L
07052500	James River at Galena	CE LR	D
07052900	Flat Creek near Cape Fair	DGLS	L
07053400	Table Rock Lake near Branson	DGLS, CE LR	R
07053500	White River near Branson	RECORDS FURNISHED BY CORPS OF ENGINEERS	D
07053700	Lake Taneycomo at Branson	DEQ	C
07053850	Swan Creek at Garrison	DGLS	L
07054020	Beaver Creek near Ava	DGLS	L
07054040	Beaver Creek near Bradleyville	DGLS	L
07057470	North Fork River near Dora	DGLS	L
07057480	Spring Creek near Sycamore	DGLS	L
07057500	North Fork River near Tecumseh	CE LR	D
07057680	Hunter Creek at Vera Cruz	DGLS	L
07057700	Bryant Creek near Evans	DGLS	L
07058000	Bryant Creek near Tecumseh	CE LR	D
07061300	East Fork Black River at Lesterville	DGLS	D
07061500	Black River near Annapolis	CE LR	D

Hydrologic-data stations in operation during fiscal year 1983--continued

Station number	Station name	Cooperation	Type of data
07062000	Clearwater Lake near Piedmont	CE LR	R
07062500	Black River at Leeper	CE LR	D
07063000	Black River at Poplar Bluff	CE LR	D
07063100	Lake Slough near Quilin	DGLS	L
07063130	Menorkenut Slough near Quilin	DGLS	L
07064400	Montauk Springs at Montauk	NPS	C
07064440	Current River below Montauk State Park	NPS	C
07064480	Ashley Creek near Montauk State Park	DGLS	L
07064520	Big Creek at Cedar Grove	DGLS	L
07064530	Welch Spring near Akers	NPS	C
07064540	Gladden Creek at Akers	DGLS	L
07064555	Pulltite Spring near Round Spring	NPS	C
07064750	Sinking Creek near Shannondale	DGLS	L
07064770	Barren Creek near Shannondale	DGLS	L
07065000	Round Spring at Round Spring	NPS	C
07065050	Big Creek near Round Spring	DGLS	L
07065500	Alley Spring at Alley	NPS	C
07065950	Mahans Creek at West Eminence	DGLS	L
07066000	Jacks Fork at Eminence	DGLS	D
07066100	Shawnee Creek near Eminence	DGLS	L
07066110	Jacks Fork above Two Rivers	NPS	C
07066510	Current River above Powder Mill	NPS	C
07066520	Blair Creek near Round Spring	DGLS	L
07066550	Blue Spring near Eminence	NPS	C
07066600	Rocky Creek near Eminence	DGLS	L
07066750	Pine Valley Creek near Van Buren	DGLS	L
07066800	Sycamore Creek near Winona	HTC	P
07066990	Pike Creek at Van Buren	DGLS	L
07067000	Current River at Van Buren	DGLS, CE LR	D
07067500	Big Spring near Van Buren	DGLS, NPS	DC
07067800	Current River below Hawes Campground	NPS	C
07068000	Current River at Doniphan	CE LR	D
07068250	Middle Fork Little Black River at Grandin	SCS	DT
07068300	North Prong Little Black River near Grandin	SCS	D
07068350	South Prong Little Black River near Grandin	DOC	P

Hydrologic-data stations in operation during fiscal year 1983--continued

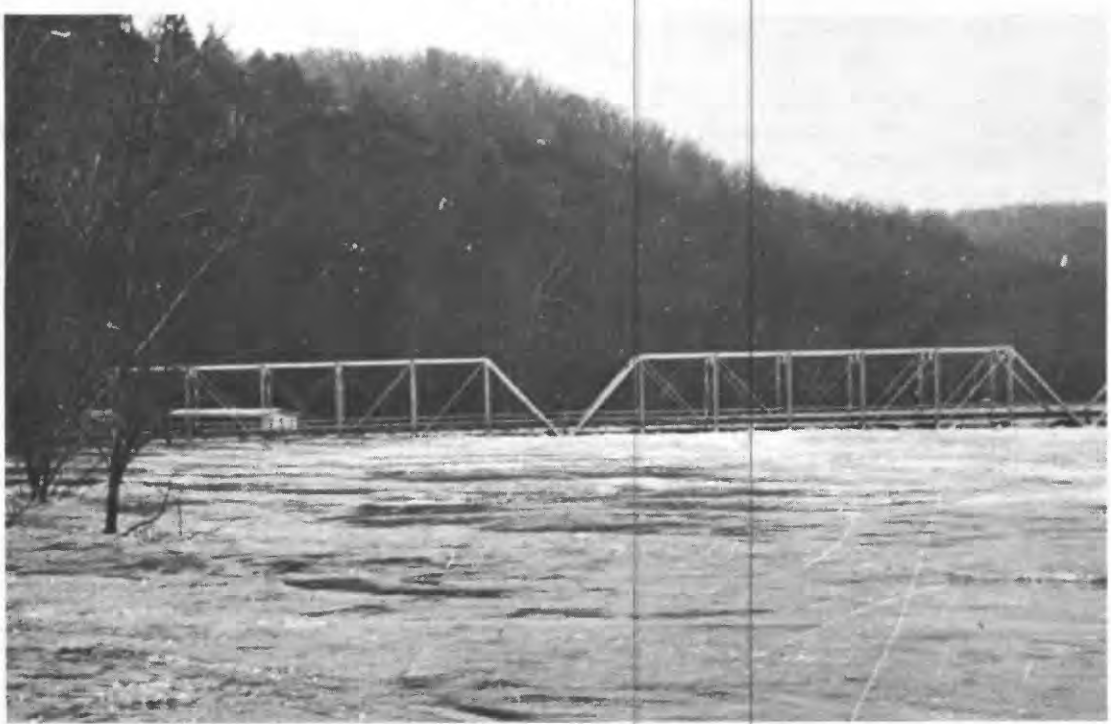
Station number	Station name	Cooperation	Type of data
07068380	Little Black River near Grandin	SCS	DCST
07068470	Beaverdam Creek near Fairdealing	DOC	P
07068510	Little Black River below Fairdealing	SCS	DCST
07068540	Logan Creek at Oxly	SCS	DCST
07068560	Ditch 2 near Sinsabaugh	SCS	PCST
07068600	Little Black River at Success, Ark.	SCS	DCST
07068863	Fourche River near Poynor	DOC	DT
07071000	Greer Spring at Greer	RECORDS FURNISHED BY U.S. FOREST SERVICE	D
07071500	Eleven Point River near Bardley	DGLS, CE LR	D
07071850	Frederick Creek near Myrtle	DGLS	L
07185500	Stahl Creek near Miller	HTC	P
07186000	Spring River near Waco	CE TU	D
07186080	Center Creek near Wentworth	DGLS	L
07186200	Center Creek near Fidelity	DGLS	L
07186400	Center Creek near Carterville	DGLS, DEQ	DC
07186480	Center Creek near Smithfield	DEQ	C
07187000	Shoal Creek above Joplin	CE TU	D
07188660	Mikes Creek at Powell	DGLS	L
07188840	Little Sugar Creek at Pineville	DGLS	L
07188860	Indian Creek at McNatt	DGLS	L
07189000	Elk River at Tiff City	DEQ[1]	C
07189090	Buffalo Creek near Tiff City	DGLS	L
07189100	Buffalo Creek at Tiff City	DGLS	L

[1]Discharge records furnished by Oklahoma District.

MISSOURI DISTRICT PROJECTS

Missouri District projects address a wide range of hydrologic needs. Projects are designed and planned with the cooperators and other federal agencies to be responsive to the needs of people of Missouri. The following pages give information on projects now in progress.

Meramec River near Eureka, Missouri; record flood of December 1982



Gasconade River at Jerome, Missouri; record flood of December 1982.

PROJECT TITLE: COLLECTION OF SURFACE-WATER DATA MØ 00-001

COOPERATORS:
City of Springfield Utilities
Department of Conservation
Division of Geology and Land Survey
Highway and Transportation Commission
Little Drainage District
National Weather Service
Union Electric Company of Missouri
U.S. Army, Corps of Engineers

LOCATION: Statewide

PROJECT CHIEF: L. A. Waite

PROBLEM: 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, and waste disposal.

OBJECTIVES: (1) To collect surface-water data sufficient to satisfy needs for current-purpose uses, such as assessment of water resources; operation of reservoirs or industries; forecasting; disposal of wastes, both common and nuclear, and pollution controls; discharge data to accompany water-quality measurements; compact and legal requirements; and research or special studies. (2) To collect data necessary for analytical studies to understand cause-effect relations and define the trends and statistical properties of streamflow.

APPROACH: Standard methods of data collection will be used as described in the series "Techniques of Water-Resources Investigations of the U.S. Geological Survey." Partial-record gaging will be used instead of complete-record gaging where it serves the required purpose.

ACTIVITIES DURING FISCAL YEAR 1982: The 1981 annual water-data report was completed and submitted to the U.S. Government Printing Office during September 1982; printed copies were distributed to cooperators and other federal agencies.

PROPOSED ACTIVITIES DURING FISCAL YEAR 1983: A target date of June 1983 for completion of the 1982 water-data report is anticipated.

REPORTS:

U.S. Geological Survey, 1982, Water-resources data for Missouri, water year 1981: U.S. Geological Survey Water-Data Report MO 81-1 (published annually).

Becker, L. D., Alexander, T. W., and Waite, L. A., 1983, Floods in Kansas City, Missouri and vicinity, August 12-13, 1982: U.S. Geological Survey Water-Resources Investigations Report (in review).

PROJECT TITLE: COLLECTION OF GROUND-WATER DATA MØ 00-002

COOPERATOR: Department of Natural Resources
Division of Geology and Land Survey

LOCATION: Statewide

PROJECT CHIEF: L. F. Emmett

PROBLEM: Ground-water information is needed to evaluate the effects of climatic variations on recharge to and discharge from the aquifer systems, to provide a data base from which to measure the effects of development, to assist in the prediction of future supplies, and to provide data for management of the resource.

OBJECTIVES: (1) To collect data sufficient to provide a long-term data base so that the general response of the hydrologic system to natural climatic variations and induced stresses is known and potential problems can be defined soon enough to allow proper planning and management. (2) To provide a data base against which the short-term records acquired in areal studies can be analyzed.

APPROACH: Evaluation of regional geology allows broad, general definition of aquifer systems and their boundary conditions. Within this framework, data will be collected to help define stresses on the system and the hydrologic properties of the aquifers. The data-collection network will be refined as records accumulate and detailed areal studies of the ground-water system more closely define the aquifers, their properties, and the stresses to which they are subjected.

ACTIVITIES DURING FISCAL YEAR 1982: Eighty-two individual borehole-geophysical logs were made in 15 deep-water wells in various part of the State. Two single-well aquifer tests were made in the Current River area.

PROPOSED ACTIVITIES DURING FISCAL YEAR 1983: Make aquifer tests, if suitable sites can be determined. Establish well network for twice-yearly water-level measurements in Audrain and Vernon Counties.

PROJECT TITLE: COLLECTION OF QUALITY-WATER DATA MØ 00-003

COOPERATORS:
Department of Conservation
Department of Natural Resources
Division of Environmental Quality
National Park Service
U.S. Army, Corps of Engineers

LOCATION: Statewide

PROJECT CHIEF: P. W. Cross

PROBLEM: Water-resource planning and water-quality assessment require a statewide and nationwide base of relatively standardized information. For planning and realistic assessment of the water resources, the chemical and physical quality of the rivers and streams must be defined and monitored.

OBJECTIVES: To provide water-quality data for planning and action programs and to provide data for state and federal management of interstate and international waters.

APPROACH: Operation of a network of water-quality stations to measure chemical concentrations, loads, and time trends as required by planning and management agencies.

ACTIVITIES DURING FISCAL YEAR 1982: The monthly water-quality network included 14 National Stream Quality Accounting Network (NASQAN) stations, 15 stations in cooperation with the Missouri Division of Environmental Quality, and 1 station in cooperation with the Corps of Engineers. Two U.S. Geological Survey monitors were operated in cooperation with the city of Springfield. One temperature-recording station was operated in cooperation with the Missouri Department of Conservation, and three temperature-recording stations were operated in cooperation with the Corps of Engineers.

One set of samples was collected at 11 sites for the National Park Service. Daily temperature and specific conductance samples were collected by an observer at one site and data were used to calculate dissolved-solids concentrations and loads.

PROPOSED ACTIVITIES DURING FISCAL YEAR 1983: The water-quality network will include 18 monthly sampling sites for the Missouri Division of Environmental Quality, 1 monthly sampling site for the Corps of Engineers, 11 semiannual sites for the National Park Service, and 10 bimonthly and 4 quarterly sampling sites for the National Stream Quality Accounting Network (NASQAN). One continuous-temperature recorder will be operated.

COLLECTION OF QUALITY-WATER DATA MØ 00-003--continued

All multiparameter monitors in the Missouri District will be discontinued and the three temperature recorders operated in cooperation with the Corps of Engineers will be removed. Daily temperature and specific conductance samples will be collected at one site.

REPORT: U.S. Geological Survey, 1982, Water-resources data for Missouri, water year 1981: U.S. Geological Survey Water-Data Report MO 81-1 (published annually).

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PROJECT TITLE: SEDIMENT STATIONS MØ 00-004

COOPERATOR: U.S. Army, Corps of Engineers

LOCATION: Statewide

PROJECT CHIEF: W. R. Berkas

PROBLEM: Water-resources planning and water-quality assessment require a nationwide base level of relatively standardized information. Sediment concentrations and discharges in Missouri's rivers and streams need to be defined and monitored.

OBJECTIVES: Provide a national bank of sediment data for use in broad federal and state planning and action programs, including federal and state management of interstate and international waters.

APPROACH: Establish and operate a network of sediment stations to provide spatial and temporal averages and trends of sediment concentration, sediment discharge, and particle size of sediment being transported by rivers and streams.

ACTIVITIES DURING FISCAL YEAR 1982: Daily sediment samples were collected on a continuing basis at eight stations, and the records were prepared for publication in the annual water-data report.

PROPOSED ACTIVITIES FOR FISCAL YEAR 1983: Continue collecting daily sediment data at eight stations.

REPORT: U.S. Geological Survey, 1982, Water-resources data for Missouri, water year 1981: U.S. Geological Survey Water-Data Report MO 81-1 (published annually).

PROJECT TITLE: A WATER USE DATA-COLLECTION AND REPORTING PROGRAM FOR MISSOURI MØ 79-007

COOPERATOR: Department of Natural Resources
Division of Geology and Land Survey

LOCATION: Statewide

PROJECT CHIEF: John Skelton

PROBLEM: As population increases in an area and industry expands to meet the needs of that population, demand for and use of water will increase. This places a two-fold stress on the water supply. The increased demand may decrease availability, and increased use may degrade the quality. Therefore, any water-resource assessment must take water use into account.

OBJECTIVES: To establish a program to systematically collect data for the withdrawal and return of water for all types of water uses. The program will provide a broad data base from which many types of analyses can be made. In addition to obtaining a greater knowledge of the overall hydrologic effects of increased withdawals from the water system, data obtained through the program will be added to the national water use data base to assist in the national water-resources assessment.

APPROACH: Water use data will be collected by categories on a statewide basis. Existing data will be compiled from State files, stored in the Missouri Department of Natural Resources data system and made available for entry into the U.S. Geological Survey aggregated data base. Data-collection methods and sampling strategies will be devised to acquire additional data. A map report will depict 1980 water use and a detailed report will describe data-collection methods and sampling strategies. Statistical summaries will be included in the annual water-data reports.

ACTIVITIES DURING FISCAL YEAR 1982: A mockup of the 1980 water use map report was prepared. The Manager of the National Water Use Information Program, Reston, Va., conferred with Federal and State personnel about the program and future plans, and the project planning document was prepared.

PROPOSED ACTIVITIES DURING FISCAL YEAR 1983: Prepare an outline and assign topics for detailed water use report to be completed by the Missouri Division of Geology and Land Survey. Continue to develop and debug existing software, and integrate U.S. Geological Survey software into the State computer system with necessary modifications

A WATER USE DATA-COLLECTION AND REPORTING PROGRAM FOR MISSOURI

MØ 79-007--continued

to achieve State goals. Enter available information into the data system and collect data on a statewide basis by categories.

REPORT: Marikos, Mark, and Skelton, John, 1982, Estimated water use in Missouri, 1980: Missouri Division of Geology and Land Survey Open-File Map Report, 1 sheet (in press).

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PROJECT TITLE: HYDROLOGY OF STREAMS IN ST. LOUIS COUNTY MØ 70-017

COOPERATOR: St. Louis County, Department of Highways and Traffic

LOCATION: St. Louis County, Missouri

PROJECT CHIEF: T. W. Alexander

PROBLEM: The population of St. Louis County is increasing, and rapid development of rural areas is resulting in stormwater drainage problems. A flood-frequency report, 100-year flood profiles, and flood-prone area maps were prepared to aid in designing roads, developing zoning ordinances, planning channel improvement, protecting flood plains, and other uses. As rapid development of rural areas continues, additional data need to be collected to update flood information.

OBJECTIVE: The objective is to update the estimate of the effects of increasing urbanization on runoff from small streams in St. Louis County, Mo.

APPROACH: Continuous rainfall-runoff data will continue to be collected at approximately 13 gaging stations. The lonter-termed data base will be used to update flood-frequency curves. A linear multiple regression method will be used to indicate the overall effect of urbanizatiion within the basins.

HYDROLOGY OF STREAMS IN ST. LOUIS COUNTY MØ 70-017--continued

ACTIVITIES DURING FISCAL YEAR 1982: Data storage and updating was completed and modeling was started for 13 rainfall-runoff stations within 7 basins of St. Louis County.

PROPOSED ACTIVITIES DURING FISCAL YEAR 1983: The rainfall-runoff modeling and flood-frequency analysis will be completed, and any necessary reports will be prepared.

REPORT: Spencer, D. W., and Alexander, T. W., 1978, Technique for estimating the magnitude and frequency of floods in St. Louis County, Missouri: U.S. Geological Survey Water-Resources Investigations Report 78-139, 23 p.

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PROJECT TITLE: HYDROLOGIC AND WATER-QUALITY CHARACTERISTICS OF STREAMS AND SHALLOW AQUIFERS IN COAL-MINING AREAS OF MISSOURI
MØ 79-038

COOPERATOR: Federal Program

LOCATION: North-central and western Missouri

PROJECT CHIEF: J. H. Barks

PROBLEM: Missouri produces several million tons of coal each year. Recent legislation requires that the adverse effects of mining be minimized through detailed planning and control measures. To comply with the regulations, it is necessary to define the hydrologic characteristics of streams and aquifers in coal-mining areas.

OBJECTIVE: To provide hydrologic information on the environmental setting of coal provinces of Missouri. This information will aid state and federal regulatory agencies in making pre-mining decisions regarding coal mining and improve their ability to predict regional impacts of mining.

HYDROLOGIC AND WATER-QUALITY CHARACTERISTICS OF STREAMS AND SHALLOW AQUIFERS IN COAL-MINING AREAS OF MISSOURI MØ 79-038

APPROACH: Information will be obtained during a systematic three-phase program. The first phase will be the description of the physical setting; the second phase will be the collection of synoptic and continuous ground-water, streamflow, and water-quality data; and the third phase will be an analysis of data and reporting of interpretative results.

ACTIVITIES DURING FISCAL YEAR 1982: Continued rainfall-runoff data collection in two coal-mining basins. Water-quality data collected during the study were prepared for publication in reports for Coal Areas 38 and 39. Project commitments were met by the scheduled completion date of September 1982.

PROPOSED ACTIVITIES DURING FISCAL YEAR 1983: Continue operatiion of the rainfall-runoff gages in the Mulberry Creek basin of western Missouri during fiscal year 1983.

REPORTS: Vaill, J. E., and Barks, J. H., 1980, Physical environment and hydrologic characteristics of coal-mining areas in Missouri: U.S. Geological Survey Water-Resources Investigations Report 80-67, 33 p.

Planned: Data collected during fiscal year 1983 will be published in Coal Area 39 report.

PROJECT TITLE: THE EFFECTS OF LAND IMPROVEMENT PRACTICES ON THE SURFACE-WATER RESOURCES OF THE LITTLE BLACK RIVER BASIN, MISSOURI MØ 80-040

COOPERATOR: Soil Conservation Service

LOCATION: Little Black River basin, south-central Missouri

PROJECT CHIEF: W. R. Berkas

PROBLEM: The Soil Conservation Service has been authorized to implement various types of water-land improvement practices in the Little Black River basin. Quantitative determinations are needed to evaluate the hydrologic consequences of these practices. The Soil Conservation Service has requested the assistance of the U.S. Geological Survey in the collection of data and the evaluation and documentation of the project effects on runoff characteristics, water quality, water temperatures, and sediment loads in the Little Black River basin.

OBJECTIVES: Determine and document the short-term and long-term effects of the proposed Soil Conservation Service project on runoff characteristics, water quality, water temperatures, and sediment loads in the Little Black River basin.

APPROACH: A data-collection network will consist of 10 sites. Daily discharge will be determined at six of the sites, daily sediment at five sites, continuous water temperature at four sites, water quality at six sites, peak flow at three sites, and partial-record discharge and sediment at one site. A low-flow seepage run will be made in the basin. Recent geomorphic changes will be identified by field reconnaissance. Data will be collected before and after implementation of the Soil Conservation Service's land-improvement structures.

ACTIVITIES DURING FISCAL YEAR 1982: Data collection at the 10 stations in the Little Black River basin progressed as scheduled. Backwater conditions occurred at the station, Little Black River at Success, Ark., during periods of high flow in the Current River; therefore, a slope gage was installed at Little Black River near Naylor to calculate discharge during high-flow backwater conditions.

THE EFFECTS OF LAND IMPROVEMENT PRACTICES ON THE SURFACE-WATER RESOURCES OF THE LITTLE BLACK RIVER BASIN, MISSOURI MØ 80-040--continued

PROPOSED ACTIVITIES DURING FISCAL YEAR 1983: Continue the sampling program with emphasis on sampling during high-flow conditions.

REPORT: Annual Progress Report: A progress report was submitted to the Soil Conservation Service during January 1982.

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PROJECT TITLE: SOURCE AND CHARACTERISTICS OF SEDIMENT IN THE UPPER SALT RIVER BASIN, MISSOURI MØ 80-041

COOPERATOR: Department of Natural Resources
Division of Environmental Quality

LOCATION: Salt River basin, northeastern Missouri

PROJECT CHIEF: W. R. Berkas

PROBLEM: The Missouri statewide 208 report identified sediment as the principal nonpoint-source pollutant in Missouri streams. However, the estimated sediment yields were based on empirical relationships rather than actual data. The Salt River basin was selected for a study to collect instream sediment information for comparison with the empirically estimated sediment yields.

OBJECTIVES: Characterize the stage of erosion and sedimentation in the basin and relate various types of soil to sediment delivery to streams and sediment transport from lower-order to higher-order streams.

APPROACH: Recent geomorphic changes will be identified by field reconnaissance. Five discharge and daily sediment-sampling stations will be operated on the five major tributaries in the upper Salt River basin. Delivery predictions will be made as a function of the types of erosion and compared to data collected. Possibly, a vigil network will be established in the basin to monitor long-term changes; these stations would be measured every 10 years.

SOURCE AND CHARACTERISTICS OF SEDIMENT IN THE UPPER SALT RIVER BASIN, MISSOURI MØ 80-041--continued

ACTIVITIES DURING FISCAL YEAR 1982: Daily suspended-sediment data were collected at six stations until June 30, 1982, when data collection was terminated. A report describing the sediment characteristics in the Salt River basin was begun.

PROPOSED ACTIVITIES DURING FISCAL YEAR 1983: Complete report.

REPORT: W. R. Berkas, 1983, Suspended-sediment data in the Salt River basin: U.S. Geological Survey Open-File Report (in review).

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PROJECT TITLE: HYDROGEOCHEMICAL EFFECTS AFTER STRIP MINING OF COAL IN THE PRAIRIE HILL AREA, NORTH-CENTRAL MISSOURI MØ 80-045

COOPERATOR: Federal Program

LOCATION: North-central Missouri

PROJECT CHIEF: D. C. Hall

PROBLEM: Information about the chemical reactions that occur as water moves through spoil piles and natural rocks is insufficient for predicting the effects of coal mining on the geochemistry of ground water. A prerequisite to determining the reactions and resulting water quality is an accurate description of the mineralogy of natural rocks and an understanding of the three-dimensional flow and water-quality system in natural rocks and spoils.

OBJECTIVE: Develop the capability to predict water-quality changes resulting from strip mining of high-sulfur bituminous coal in a humid climate.

HYDROGEOCHEMICAL EFFECTS AFTER STRIP MINING OF COAL IN THE PRAIRIE HILL AREA, NORTH-CENTRAL MISSOURI MØ 80-045--continued

APPROACH: The investigation will include a well inventory and drilling and testing of wells as needed to describe a conceptual model of the ground-water flow system and water-quality variations within the flow system. Water-level measurements, core-sample, and water-quality analyses will be made. Results will be used in constructing a geochemical model of the ground water. Water-quality and gain-loss data will be used to assess the impact of earlier strip mining on water quality in East Fork Little Chariton River.

ACTIVITIES DURING FISCAL YEAR 1982: Fieldwork related to coal-spoil geochemistry was completed and data analysis and interpretation were begun.

PROPOSED ACTIVITIES DURING FISCAL YEAR 1983: A report describing the geohydrology of the spoil areas will be completed. The project has been expanded to include the long-term impact of strip mining of coal on water quality in East Fork Little Chariton River. Approximately 12 additional test holes will be drilled, and additional water-level, water-quality, and stream gain-loss data will be collected.

REPORTS: Planned: Hydrology of coal-mine spoil in the Bevier area, north-central Missouri: U.S. Geological Survey Water-Supply Paper.

Long-term effects of strip mining of coal on East Fork Little Chariton River between Macon and Huntsville, Missouri: U.S. Geological Survey Water-Resources Investigations Report.

PROJECT TITLE: MISSOURI SMALL-STREAMS ANALYSIS MØ 81-046

COOPERATOR: Missouri Highway and Transportation Commission

LOCATION: Statewide

PROJECT CHIEF: L. D. Becker

PROBLEM: Streamflow information has been collected on small rural streams in Missouri since 1948 and on small urban streams since 1976. A recent evaluation of the rural streamflow data indicates that further data collection would not improve statistical relationships that are used to predict floodflows. As a result, efforts must be directed toward determining better predictive tools and more definitive basin parameters. Requirements necessary for rainfall-runoff modeling have been met in the urban data-collection part of the program. Data evaluation and analysis by way of rainfall-runoff model calibration are now needed.

OBJECTIVE: Emphasize data analysis and thereby provide statistical or other predictive tools.

APPROACH: Urban data will be evaluated and then used to calibrate a rainfall-runoff model at 10 sites. Long-term peak-flow data will be generated through the calibrated model at each site and used to develop relationships defining floodflows at ungaged urban areas of Missouri.

The small rural streamflow network will be decreased to two streamflow-gaging stations to sample long-term trends. Streamflow characteristics for all rural basins (areas ranging from 0.1 to 21.3 square miles), together with their various physical or dimensionless basin characteristics, will be used to determine the most effective model and most descriptive basin characteristic for defining floodflows at ungaged rural areas of Missouri.

ACTIVITIES DURING FISCAL YEAR 1982: Data evaluation was begun at 4 of 10 urban sites. Long-term flood data were synthesized for one site. Model applicability was tested and transferability of urban flood information inferred.

PROPOSED ACTIVITIES DURING FISCAL YEAR 1983: Continue data collection at urban sites where an insufficient number of flow hydrographs are available. Continue model calibration at sites where and when sufficient data are available. Continue investigation of magnitude and frequency of Missouri floods.

MISSOURI SMALL-STREAMS ANALYSIS MØ 81-046--continued

REPORTS: Planned: Water-Resources Investigations Report series:

1. Transferability of flood-frequency relationships for urban areas in Missouri.
2. Factors affecting floodflows in Missouri.
3. The magnitude and frequency of Missouri floods.
4. Culvert flow and embankment storage for small drainage areas of Missouri.

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PROJECT TITLE: HYDROGEOLOGY OF THE PALEOZOIC AQUIFERS IN SOUTHERN MISSOURI
MØ 81-047

COOPERATOR: Federal Program

LOCATION: Southern Missouri

PROJECT CHIEF: L. F. Emmett

PROBLEM: Increased use of ground water has led to conflicts among water users. In addition a new awareness of the potential for contamination and water-quality deterioration is increasing the need to understand water-quality variations. Public demand eventually can be expected to result in schemes to manage the resource to obtain maximum use with minimum deterioration.

Successful management plans need to be based on factual data collated in a quantitative description of the flow system. Such an understanding does not now exist, but is a prerequisite to further progress in the development of the resource.

OBJECTIVES: The objectives are to provide the regional aquifer study with concepts and data that will allow evaluation of the aquifer's water-supply potential and to evaluate the aquifer's response to projected development schemes. More specifically, the study will be designed to: (1) Describe the geologic, hydrologic and water-quality characteristics, and the hydrologic boundaries of the aquifers; (2) Develop a regional data base on water use, including hydrologic and geologic parameters; (3) Describe the past, present, and future problems

associated with water use; and (4) evaluate the aquifer's responses to possible future changes in land use and pumpage.

APPROACH: From existing data construct preliminary digital model of southern Missouri. Test conceptual model and determine sensitivity of system to transmissivity, storage, vertical permeability, and boundaries. Use model to select areas for supplemental hydrogeologic data collection. Attempt to delimit recharge areas using geologic concepts and streamflow data. Use hydrograph separation techniques and ground-water levels to estimate discharge to streams. Refine digital model of the aquifer using revised estimates of recharge, discharge, and water use. Determine location and movement of fresh-saltwater interface in response to pumpage. If practical, use computer simulation techniques to predict saltwater movement in response to use.

ACTIVITIES DURING FISCAL YEAR 1982: Stratigraphic and potentiometric data were compiled for use in the three-dimensional digital model of the ground-water flow system of the Ozarks subregion. Water-level data were analyzed and compiled from hundreds of wells and selected data were used to construct a prepumping potentiometric map, which will be used in calibration of the model. Maps showing configuration of the tops of each model layer were prepared; surface-water data were compiled and will be used to estimate aquifer diffusivity.

PROPOSED ACTIVITIES DURING FISCAL YEAR 1983: Compile ground-water use and aquifer characteristics data, start well inventory, and simulate flow system.

REPORTS: Planned: A conceptual model of the Cambrian-Ordovician aquifer, southern Missouri: U.S. Geological Survey Water-Resources Investigations Report.

Hydrogeology of the Cambrian-Ordovician aquifer, southern Missouri: U.S. Geological Survey Professional Paper.

PROJECT TITLE: GROUND-WATER RESOURCES IN BARTON, BATES, AND VERNON COUNTIES
MØ 81-048

COOPERATOR: Department of Natural Resources
Division of Geology and Land Survey

LOCATION: Western Missouri

PROJECT CHIEF: M. J. Kleeschulte

PROBLEM: Ground water for supplemental irrigation in Barton, Bates, and Vernon Counties comes from deep wells open to the Roubidoux Formation and the Gasconade Dolomite. All public-supply wells in the area are open to these same formations. The fresh-saltwater boundary extends through the area and limited data indicate that there may be seasonal as well as long-term movement of the saltwater. There is concern that additional withdrawal of ground water for irrigation may lower the potentiometric surface and possibly cause saltwater encroachment.

OBJECTIVE: Determine the availability and quality of ground water and the possibilities for saltwater encroachment as a result of pumping from the deep aquifer (Roubidoux Formation and Gasconade Dolomite).

APPROACH: Compile and evaluate existing hydrogeologic information. Inventory all large-capacity wells and sufficient additional wells to construct potentiometric maps. Collect and analyze water samples for major inorganic constituents and selected radioelements. Determine location and movement of fresh-saltwater interface in response to pumping. Monitor water levels and collect water samples from wells near the interface. Aquifer tests, borehole geophysical logging, and packer testing will be run at selected sites. Prepare digital model of flow system and predict potentiometric surface for given pumping regime. Prepare interpretative report describing hydrologic boundaries of the aquifers and their geologic, hydrologic, and water-quality characteristics.

GROUND-WATER RESOURCES IN BARTON, BATES, AND VERNON COUNTIES
MØ 81-048--continued

ACTIVITIES DURING FISCAL YEAR 1982: Water levels were measured in approximately 200 wells in Vernon, Bates, and adjacent Missouri counties before and after the irrigation season. Water samples were collected for chemical analysis from 65 wells; aquifer characteristics were determined from water-level measurements; geologic sections were prepared; and isopachous maps of confining layers and aquifers were prepared.

PROPOSED ACTIVITIES DURING FISCAL YEAR 1983: Obtain historic and current water use data; summarize existing water-quality data; and prepare report.

REPORT: Planned: Ground-water resources of Barton, Bates, and Vernon Counties, Missouri: U.S. Geological Survey Water-Resources Investigations Report.

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PROJECT TITLE: CHARACTERISTICS OF URBAN RUNOFF IN THE BLUE RIVER BASIN IN KANSAS CITY, MISSOURI MØ 81-049

COOPERATOR: Department of Natural Resources
Division of Environmental Quality

LOCATION: Western Missouri

PROJECT CHIEF: D. W. Blevins

PROBLEM: Nonpoint-source pollution is a major problem in urban areas of Missouri. Stormwater control systems may be at least a partial solution to the problem. However, these systems cannot be efficiently designed and used until a monitoring method has been developed that will evaluate the potential pollution sources, such as downtown, industrial, residential, and undeveloped areas, with respect to relative contributions of pollutants from each source. It is possible that runoff from some areas will not need to be treated, thus leading to substantial savings in the construction and operation of treatment plants.

CHARACTERISTICS OF URBAN RUNOFF IN THE BLUE RIVER BASIN IN KANSAS CITY, MISSOURI MØ 81-049--continued

OBJECTIVE: Characterize the quality of storm runoff from a large basin draining a predominantly metropolitan area. This information will be used to develop methods for establishing monitoring programs for other urban basins to define broad areas that contribute major comtaminants so that stormwater-control systems can be efficiently designed.

APPROACH: Samples will be collected by automatic samplers during the complete storm hydrographs and composited on a discharge-weighted basis to four samples per site. The samples will be analyzed for constituents considered important, based on earlier synoptic sampling. Graphical and comparison techniques will be used to determine the major pollutants and their relation to land use.

ACTIVITIES DURING FISCAL YEAR 1982: Composite storm-runoff sampling was done on four mainstem sites and two homogeneous land use sites. Discrete sampling was done on the rising limb of hydrographs at the mainstem stations, Blue River and Brush Creek. An annotated outline of the report was prepared.

PROPOSED ACTIVITIES DURING FISCAL YEAR 1983: Statistical analysis of stormwater data will be done to search for relationships in the data, effects of urban runoff, and to compare with low-flow characteristics. A report summarizing the sampling methods and stormwater-quality characteristics of the Blue River will be prepared, reviewed, and submitted for Director's approval.

REPORT: D. W. Blevins, 1983, Characterization of stormwater quality in the Blue River of Kansas City, Missouri: U.S. Geological Survey Water-Resources Investigations Report (in preparation).

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PROJECT TITLE: HYDROLOGY OF COAL AREA 38, WESTERN REGION, INTERIOR PROVINCE, IOWA AND MISSOURI MØ 81-051

COOPERATOR: Federal Program

LOCATION: Northern Missouri and southern Iowa

PROJECT CHIEF: John Skelton

HYDROLOGY OF COAL AREA 38, WESTERN REGION, INTERIOR PROVINCE, IOWA AND MISSOURI MØ 81-051--continued

PROBLEM: Coal Area 38, which includes the Grand, Thompson, and Chariton rivers in northern Missouri, contains significant coal reserves that are being developed at an accelerated pace. Mining companies are required by law to analyze the hydrologic effects of proposed activities and take appropriate measures to minimize adverse effects. All applications for permits to mine must include a description of the geology, hydrology, and water-quality and quantity for all lands within the proposed mine-plan area, the adjacent area, and the general area. There is a need for information about the water resources of Area 38 that is comprehensive in scope and easily understood.

OBJECTIVE: Summarize available hydrologic information for Coal Area 38 in northern Missouri and southern Iowa and provide extensive references to sources of additional and more detailed information in a report that can be used by the coal-mining industry, regulatory agencies, and consultants.

APPROACH: The Missouri and Iowa districts will collaborate to compile available information and prepare text and illustrations. A topic outline will be developed, based on coal hydrology reports from other sections of the country, but oriented to the hydrology and problems of Area 38. Regional hydrology will be emphasized and sources of information will be cited. No new information will be collected.

ACTIVITIES DURING FISCAL YEAR 1982: The report was assembled and reviewed during a storyboard conference in Iowa City. Mockups of the report received technical review by colleagues in South Dakota and Missouri. Mockups were revised following colleague reviews, and the report was transmitted to Central Region headquarters. The report was approved by the Central Region staff and Reston headquarters and transmitted to Madison, Wis., for publication.

PROPOSED ACTIVITIES DURING FISCAL YEAR 1983: Report will be published in the Water-Resources Investigations Report series.

REPORT: Detroy, M. G., and Skelton, John, 1982, Hydrology of Area 38, Western Region, Interior Coal Province, Iowa and Missouri: U.S. Geological Survey Water-Resources Investigations Report 82-1014 (in press).

PROJECT TITLE: HYDROGEOLOGY OF SOUTHEASTERN MISSOURI MØ 82-052

COOPERATOR: Federal Program

LOCATION: Southeastern Missouri

PROJECT CHIEF: T. O. Mesko

PROBLEM: Alluvial, Tertiary, Cretaceous, and Paleozoic aquifers are the principal sources of domestic, municipal, industrial, and agricultural water supplies in the Mississippi embayment area of southeastern Missouri. A quantitative analysis of the flow system, quality, and use of the ground-water resources is needed to manage the resources effectively.

OBJECTIVES: The objectives are to provide the regional aquifer study with concepts and data that will allow evaluation of the aquifers' water-supply potential and their response to projected development schemes. The study is designed to describe the geologic, hydrologic, and water-quality characteristics of the aquifers; develop a regional data base on water use, including geologic, hydrologic, and water-quality parameters; and determine the recharge from the Paleozoic highlands.

APPROACH: Compile and analyze existing geologic, hydrologic, and water use data. Inventory Tertiary, Cretaceous, and Paleozoic wells to complete areal coverage and provide sites for hydrologic testing and sampling. Make field measurements and analyze water samples for 50 to 75 wells for major inorganic constituents, selected radioelements, and isotopes. Perform hydraulic testing, geophysical logging, and water-quality sampling in selected wells to determine vertical differences. Prepare refined geologic, potentiometric, and water-quality maps.

ACTIVITIES DURING FISCAL YEAR 1982: A review of work previously done was begun and a summation of available data was tabulated. A predevelopment potentiometric map of the alluvium was drafted. Collection of geophysical logs and a search for additional geophysical data was started.

HYDROGEOLOGY OF SOUTHEASTERN MISSOURI MØ 82-052--continued

PROPOSED ACTIVITIES DURING FISCAL YEAR 1983: A log-file and literature search will continue. Geologic and stratigraphic sections will be drawn. Geophysical-log search will continue, and laboratory core analyses will be made on selected samples. A computer file of all geophysical data will be established. Geochemical and geophysical data will be correlated; water use data for 1980 will be tabulated; and well-inventory and water-level measurements will continue.

REPORTS: Planned: Hydrogeology of southeastern Missouri: U.S. Geological Survey Water-Resources Investigations Report.

Ground-water model of the Mississippi embayment of Arkansas and Missouri: U.S. Geological Survey Professional Paper.

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PROJECT TITLE: HYDROLOGY OF VERONA AND AURORA AREA, SOUTHWESTERN MISSOURI
MØ 82-053

COOPERATOR: Federal Program

LOCATION: Southwestern Missouri

PROJECT CHIEF: J. H. Barks

PROBLEM: Streambed material and alluvium may be contaminated with dioxin in the upstream part of the Spring River basin near Verona and Aurora, Mo. This area is in a karst limestone terrane. Some of the surface flow is lost through permeable soil into solution-affected limestone. Detailed geologic and ground-water information are not available for the area. Sediment may be the primary dioxin transport mechanism.

OBJECTIVE: The objective is to determine the water movement and sediment characteristics in the Verona-Aurora area so that flow transport mechanisms will be known if water contamination from dioxin occurs.

HYDROLOGY OF VERONA AND AURORA AREA, SOUTHWESTERN MISSOURI MØ 82-053--continued

APPROACH: Available information will be compiled for the area and a general geologic map will be prepared. Shallow (Mississippian) and deep (Cambrian-Ordovician) wells will be inventoried and potentiometric maps will be prepared for both aquifers. Seepage runs will be made to determine gaining and losing stream reaches. Major springs will be located and their recharge areas determined. Suspended- and bottom-sediment samples will be collected at four to six stations and analyzed for concentration and particle size.

ACTIVITIES DURING FISCAL YEAR 1982: Geologic mapping and inventory of shallow and deep wells were completed for about a 192 square-mile area. A potentiometric map, prepared from water levels measured in about 100 shallow wells, indicated that water movement in the shallow aquifer generally follows surface topography and the streams act as drains. A potentiometric map, prepared from water levels measured in about 50 deep wells, indicates that the water-level elevations in the deep aquifer are about 50 to 175 feet less than those in the shallow aquifer.

PROPOSED ACTIVITIES DURING FISCAL YEAR 1983: A dye trace will be made from the hazardous-waste disposal site at Verona. Seepage runs will be made on the Spring River and Honey Creek. Additional dye traces will be made at losing reaches of the streams, if hydrologic conditions are favorable. The results will be interpreted and presented in a State report.

REPORT: Barks, J. H., and others, 1983, Geology, water movement, and sediment characteristics of the Spring River basin upstream from La Russell, southwestern Missouri: Missouri Division of Geology and Land Survey Water Resources Report (in review).

PROJECT TITLE: HYDROLOGY OF COAL AREA 39, WESTERN REGION, INTERIOR COAL PROVINCE, KANSAS AND MISSOURI MØ 82-054

COOPERATOR: Federal Program

LOCATION: Western Missouri and eastern Kansas

PROJECT CHIEF: John Skelton

PROBLEM: Coal Area 39, which includes the Missouri, South Grand, Little Osage, and Marais des Cygnes Rivers in western Missouri, contains significant coal reserves that are being developed at an accelerating pace. Mining companies are required by law to analyze the hydrologic effects of proposed activities and to take appropriate measures to minimize adverse effects. All applications for permits to mine need to include a description of the geology, hydrology, and water quality and quantity for all lands within the proposed mine-plan area, the adjacent area, and the general area. There is a need for information about the water resources of Coal Area 39 that is both comprehensive in scope and easily understood.

OBJECTIVE: The objective is to summarize available hydrologic information for Coal Area 39 in western Missouri and eastern Kansas and to provide extensive references to sources of additional and more detailed information in a report that can be used by the coal-mining industry, regulatory agencies, and consultants.

APPROACH: The Missouri and Kansas districts will collaborate to compile available information and prepare text and illustrations. A topic outline will be developed, based on coal hydrology reports from other sections of the country, but oriented to the hydrology and problems of Coal Area 39. Regional hydrology will be emphasized and sources of information will be cited. No new information will be collected.

HYDROLOGY OF COAL AREA 39, WESTERN REGION, INTERIOR COAL PROVINCE, KANSAS AND MISSOURI MØ 82-054--continued

ACTIVITIES DURING FISCAL YEAR 1982: New project.

PROPOSED ACTIVITIES DURING FISCAL YEAR 1983: The topic outline for the report will be prepared and topics assigned to contributors. A work schedule for completion of all sections of the report will be established. Each contributor will assemble information for their assigned topics and will begin summarizing and interpreting the information for presentation.

REPORT: Planned: Hydrology of Coal Area 39, Interior Province, Kansas and Missouri: U.S. Geological Survey Water-Resources Investigations Report (in preparation).

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PROJECT TITLE: ANALYSIS OF SOME OF THE HYDROLOGIC AND STRUCTURAL IMPACTS FROM THE DECEMBER 1982 MISSOURI FLOOD MØ 83-055

COOPERATOR: Department of Natural Resources
Division of Geology and Land Survey

LOCATION: East-central Missouri

PROJECT CHIEF: D. W. Spencer

PROBLEM: The Meramec River reached a peak flow 1.2 times the 100-year flood at the Meramec River near Eureka, Mo., and caused widespread damage leaving many people homeless. Floodwaters also produced extreme stresses on many small reservoir structures for many drainages in the State of Missouri.

OBJECTIVES: The objectives are to compare the December 1982 flood with other recorded historical floods and to determine the impacts on inundated areas and small reservoir structures.

APPROACH: The U.S. Geological Survey will obtain aerial photographs and river-profile data from commercial and federal sources; compile, evaluate, and summarize hydrologic data; and collect any additional required field data. The Department of Natural Resources, Division of Geology and Land Survey, will obtain and

ANALYSIS OF SOME OF THE HYDROLOGIC AND STRUCTURAL IMPACTS FROM THE DECEMBER 1982 MISSOURI FLOOD MØ 83-055--continued

evaluate historical design information for selected impoundments; evaluate impacts of the flood on reservoir structures; and evaluate outflow amounts with reservoir in place.

PROPOSED ACTIVITIES DURING FISCAL YEAR 1983: A flood report will be prepared, using the STOP format, in cooperation with the Division of Geology and Land Survey. Approval will be requested for publication as a State Water Resources Report.

REPORT: Planned: Analysis of some of the hydrologic and structural impacts from the December 1982 Missouri flood: Missouri Division of Geology and Land Survey Water Resources Report.

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PROJECT TITLE: EFFECTS OF ABANDONED SURFACE AND UNDERGROUND COAL MINES ON WATER QUALITY IN THE CLAYBANK CREEK PLANNING UNIT, NORTH-CENTRAL MISSOURI MØ 83-056

COOPERATOR: Department of Natural Resources
Land Reclamation Commission

LOCATION: North-central Missouri

PROJECT CHIEF: D. W. Blevins

PROBLEM: Past undergound and surface mining have disturbed approximately 4,500 acres of the Claybank Creek watershed. Thomas Hill Reservoir, which is at the mouth of the watershed, receives large amounts of suspended sediment from runoff and acid drainage from abandoned mines, gob piles, and spoil piles. The relative contribution of each mined area to the deterioration of water quality is unknown. The identification, quantification, and description of these contributions are needed to begin remedial action.

OBJECTIVE: The objective of the study is to identify and monitor all significant surface and ground-water acid-mine sources in the Claybank Creek area. Each mine source will be evaluated to determine its relative contribution to the total acid-mine drainage problem in the Claybank Creek watershed.

EFFECTS OF ABANDONED SURFACE AND UNDERGROUND COAL MINES ON WATER QUALITY IN THE CLAYBANK CREEK WATERSHED IN NORTH-CENTRAL MISSOURI MØ 83-056--continued

APPROACH: This study will include a reconnaissance to locate existing water-quality problems in Claybank Creek, Thomas Hill Reservoir, and the underlying mines and ground-water system. This will be accomplished using literature review, aerial photography, seepage surveys, water impoundment surveys, and a survey of existing wells and mine shafts. The reconnaissance data will be used to select critical sites to monitor the dynamics of the hydrologic system of Claybank Creek and Thomas Hill Reservoir. Parameters to be monitored include: Streamflow, rainfall, ground-water levels, specific conductance, pH, alkalinity, acidity, sulfate, total and dissolved iron, total and dissolved manganese, dissolved-solids concentration, and suspended sediment.

PROPOSED ACTIVITIES DURING FISCAL YEAR 1983: Existing information will be compiled, a reconnaissance of the basin will be made, and a network of monitoring stations will be established.

REPORT: Planned: Effects of coal mining on the water quality of Claybank Creek in north-central Missouri: U.S. Geological Survey Water-Resources Investigations Report.

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Selected references on water resources in Missouri are listed on the following pages; many of these references are available for inspection at the office of the U.S. Geological Survey and the Division of Geology and Land Survey in Rolla, Mo.

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U.S. Geological Survey
604 South Pickett Street
Alexandria, VA 22304

Professional Papers, Bulletins, Water-Supply Papers, Techniques of Water-Resources Investigations, Earthquake Information Bulletins, and popular leaflets, pamphlets, and booklets may be purchased from the above address. Additional information is given in "A Guide to Obtaining Information from the U.S. Geological Survey, 1982," Geological Survey Circular 777, available without cost from the above address.

Open-File and Water-Resources Investigations Reports for Missouri are available for inspection at the Missouri District office. Information on the availability of microfiche or paper-duplicate copies of these reports may be obtained from:

Open-File Services Section
U.S. Geological Survey
Box 25425, Denver Federal Center
Denver, CO 80225

Map information:

To order maps of areas east of the Mississippi River (including Minnesota, Puerto Rico, and the Virgin Islands) write:

Eastern Distribution Branch
U.S. Geological Survey
1200 South Eads Street
Arlington, VA 22202

To order maps of areas west of the Mississippi River (including Alaska, Hawaii, Louisiana, Guam, and Samoa) write:

Western Distribution Branch
U.S. Geological Survey
Box 25286
Denver Federal Center
Denver, CO 80225

The U.S. Geological Survey National Center maintains a library with an extensive earth-sciences collection. Local libraries may obtain books, periodicals, and maps through interlibrary loan by writing:

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