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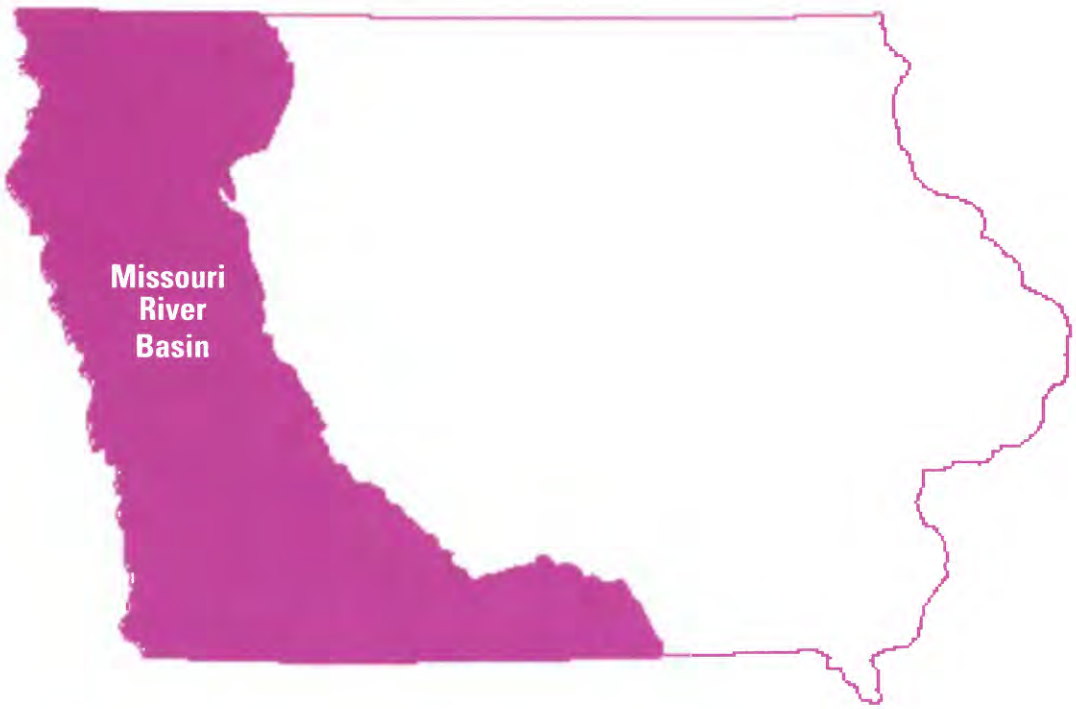
Water Resources Data
Iowa
Water Year 1999

Volume 2. Surface Water—Missouri River Basin, and Ground Water

Water-Data Report IA-99-2



U.S. Department of the Interior
U.S. Geological Survey

Prepared in cooperation with the
Iowa Department of Natural Resources
(Geological Survey Bureau),
Iowa Department of Transportation, and with
Federal agencies

CALENDAR FOR WATER YEAR 1999

1998

OCTOBER

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1999

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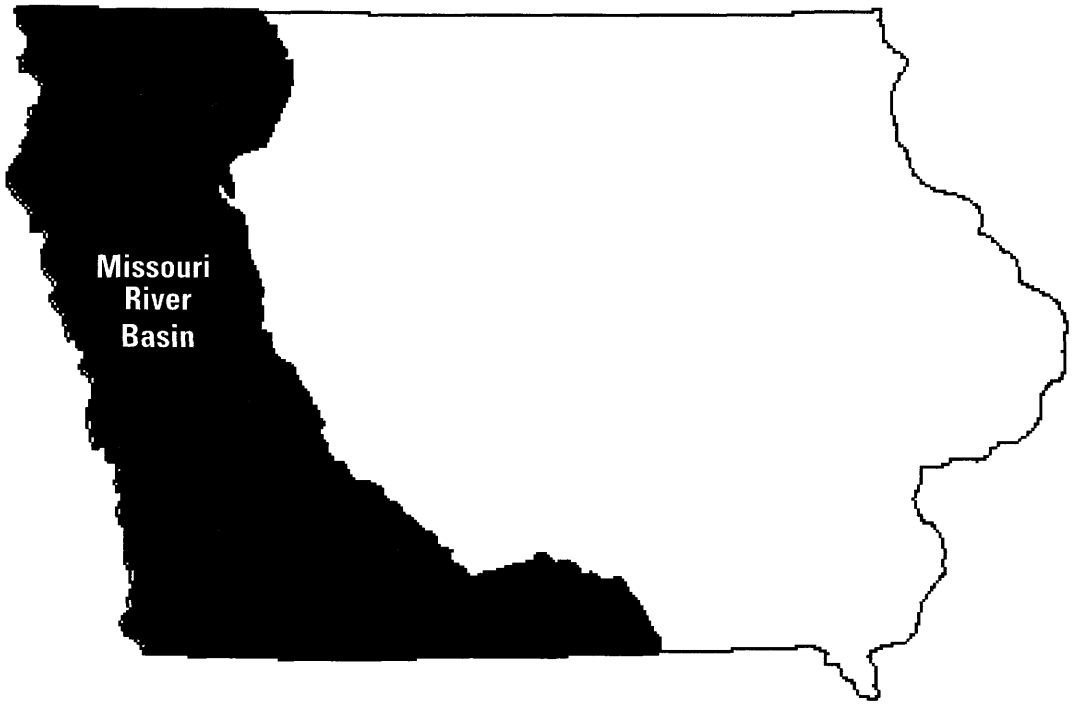
U.S. Department of the Interior
U.S. Geological Survey

Water Resources Data Iowa Water Year 1999

Volume 2. Surface Water—Missouri River Basin, and Ground Water

By G.M. Nalley, J.G. Gorman, R.D. Goodrich, V.E. Miller, M.J. Turco, and S.M. Linhart

Water-Data Report IA-99-2



Prepared in cooperation with the Iowa Department of Natural Resources (Geological Survey Bureau), Iowa Department of Transportation, and with Federal agencies

UNITED STATES DEPARTMENT OF THE INTERIOR

BRUCE BABBITT, Secretary

U.S. GEOLOGICAL SURVEY

Charles G. Groat, Director

For information on the water program in Iowa, write to:

District Chief, Water Resources Division
U.S. Geological Survey
P.O. Box 1230
Iowa City, Iowa 52244

2000

PREFACE

This volume of the annual hydrologic data report of Iowa is one of a series of annual reports that document hydrologic data gathered from the U.S. Geological Survey's surface- and ground-water data-collection networks in each State, Puerto Rico, and the Trust Territories. These records of streamflow, ground-water levels, and quality of water provide the hydrologic information needed by local, State, and Federal agencies, and the private sector for developing and managing our Nation's land and water resources.

This report is the culmination of a concerted effort by dedicated personnel of the U.S. Geological Survey who collected, compiled, analyzed, verified, and organized the data, and who typed, edited, and assembled the report. The authors had primary responsibility for assuring that the information contained herein is accurate, complete, and adheres to Geological Survey policy and established guidelines.

Personnel in charge of the field units are:

Joseph G. Gorman, Western Field Unit

Robert D. Goodrich, Eastern Field Unit

The data was collected, computed and processed by the following personnel:

K.D Becher	J.W. Harms	J.A. Noe
J.A. Bjorholm	L.C. Kerr	M.J. Noon
J.F. Cerveny	A.C. Koehler	E.M. Sadorf
D.T. Conell	R.L. Kopish	T.R. Schmidt
A.R. Conkling	R.L. Kuzniar	D.J. Schnoebelen
J.J. Copa	B.D. Lanning	P.K. Smith
J.L. Dyke	S.M. Linhart	J.R. Sondag
D.A. Eash	P.D. Lustgraaf	W.A. Taylor
J.D. Eash	J.C. McVay	S.A. Thul
E.E. Fischer	V.E. Miller	M.J. Turco
J.A. Handel	J.F. Nania	

This report was prepared in cooperation with the State of Iowa and with other agencies under the general supervision of Greg M. Nalley, Chief Hydrologic Surveillence Section, and Robin G. Middlemis-Brown, District Chief, Iowa.

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13. ABSTRACT *(Maximum 200 words)*
Water resources data for Iowa for the 1999 water year consists of records of stage, discharge, and water quality of streams; stage, and/or contents of lakes and reservoirs; ground water levels and water quality of ground-water wells. This report volume contains discharge records for 31 gaging stations; stage or contents for 3 lakes; water quality for 1 stream-gaging station, and sediment records for 3 stream-gaging stations. Also included are data for 34 crest-stage partial record stations and ground-water levels for 176 wells. Additional water data were collected at various sites, but are not part of the systematic data collection program and are published as miscellaneous discharge and miscellaneous water-quality analyses.

14. SUBJECT TERMS
*Iowa, *Hydrological data, *Surface water, *Water quality, Flow rates, Gaging stations, Lakes, Reservoirs, Chemical analyses, Sediment, Water temperatures, Sampling sites, Water levels, Water analyses, Data collection.

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SURFACE-WATER STATIONS, IN DOWNSTREAM ORDER, FOR WHICH RECORDS ARE PUBLISHED IN THIS VOLUME

{Letter after station name designates types of data: (d) discharge, (c) chemical, (p) precipitation, (s) sediment, (t) temperature, (e) elevations, gage heights, or contents}

SURFACE-WATER STATIONS, IN DOWNSTREAM ORDER, FOR WHICH RECORDS ARE PUBLISHED IN THIS VOLUME

(h)—10-year hydrograph included with data

(h)—10-year hydrograph included with data

(h)—10-year hydrograph included with data

(h)—10-year hydrograph included with data

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DISCONTINUED SURFACE-WATER DISCHARGE OR STAGE-ONLY STATIONS

The following continuous-record surface-water discharge or stage-only stations (gaging stations) in Iowa have been discontinued. Daily streamflow or stage records were collected and published for the period of record, expressed in water years, shown for each station. Discontinued project stations with less than 3 years of record have not been included. Information regarding these stations may be obtained from the District Office at the address given on the back side of the title page of this report.

[(d), discharge station; (e), elevation (stage only) station; *, currently operated as crest-stage partial-record station]

Station name	Station number	Drainage area (mi^2)	Period of record
Upper Iowa River at Decorah, Ia. (d)	05387500	511	1952-83
Upper Iowa River near Decorah, Ia. (d)	05388000	568	1913-14; 1919-27, 1933-51
Paint Creek at Waterville, Ia. (d)	05388500	42.8	1952-73
Yellow River at Ion, Ia. (d)	05389000	221	1934-51
Turkey River at Spillville, Ia. (d)	05411600	177	1957-73; 1978-91
Big Springs near Elkader, Ia. (d)	05411950	103	1938; 1982-83; 1988-95
Turkey River at Elkader, Ia. (d)	05412000	891	1932-42
Unnamed Creek near Luana, Ia. (d)	05412056	1.15	1986-92
Silver Creek near Luana, Ia (d)	05412060	4.39	1986-98
Little Maquoketa River near Durango, Ia. (d)	05414500*	130	1934-82
Maquoketa River near Manchester, Ia. (d)	05417000	305	1933-73
Maquoketa River near Delhi, Ia. (d)	05417500	347	1933-40
Bear Creek near Monmouth, Ia. (d)	05417700	61.3	1957-76
Maquoketa River above North Fork Maquoketa River near Maquoketa, Ia. (d)	05418000	938	1913-14
North Fork Maquoketa River at Fulton, Ia. (d)	05418450	516	1977-91
Elk River near Almont, Ia. (d)	05420300	55.9	1995-97
Wapsipinicon River near Elma, Ia. (d)	05420560	95.2	1958-92
Wapsipinicon River near Tripoli, Ia (d)	05420860	343	1996-98
Wapsipinicon River at Stone City, Ia. (d)	05421500	1,324	1903-14
Crow Creek at Eldridge, Ia. (d)	05422420	2.20	1977-82
Crow Creek at Mt. Joy, Ia. (d)	05422450	6.90	1977-82
Pine Creek near Muscatine, Ia. (d)	05448150	38.9	1975-82
Eagle Lake Inlet near Britt, Ia. (e)	05448285	3.83	1975-80
Eagle Lake Outlet near Britt, Ia. (e)	05448290	11.3	1975-80
West Branch (West Fork) Iowa River near Klemme, Ia. (d)	05448500	112	1948-58
East Branch (East Fork) Iowa River near Klemme, Ia. (d)	05449000	133	1948-76; 1977-95
Iowa River near Iowa Falls, Ia. (d)	05450000	665	1911-14
Upper Pine Lake at Eldora, Ia. (e)	05450500	14.9	1936-70
Lower Pine Lake at Eldora, Ia. (e)	05451000	15.9	1936-70
Iowa River near Belle Plaine, Ia. (d)	05452500	2,455	1939-59
Lake Macbride near Solon, Ia. (e)	05453500	27.0	1937-71
Ralston Creek at Iowa City, Ia. (d)	05455000	3.01	1924-87
Cedar River at Mitchell, Ia. (d)	05457500	826	1933-42
Shell Rock River near Northwood, Ia. (d)	05459000	300	1945-86
Shell Rock River at Marble Rock, Ia. (d)	05460500	1,318	1933-53
Shell Rock River at Greene, Ia. (d)	05461000	1,357	1933-42
Flood Creek near Powersville, Ia (d)	05461390	127	1996-98
Shell Rock River near Clarksville, Ia. (d)	05461500	1,626	1915-27; 1932-34
Black Hawk Creek at Hudson, Ia. (d)	05463500	303	1952-95
Fourmile Creek near Lincoln, Ia. (d)	05464130	13.8	1962-67; 1969-74; 1976-80
Half Mile Creek near Gladbrook, Ia. (d)	05464133	1.33	1962-67; 1969-74; 1976-80
Fourmile Creek near Traer, Ia. (d)	05464137	19.5	1962-74; 1975-80
Wolf Creek near Dysart, Ia (d)	05464220	299	1996-98
Prairie Creek at Fairfax, Ia. (d)	05464640	178	1966-82
Lake Keomah near Oskaloosa, Ia. (e)	05472000	3.06	1936-71
Skunk River at Coppock, Ia. (d)	05473000	2,916	1913-44

Discontinued Surface-Water Discharge or Stage-Only Stations—Continued

Station name	Station number	Drainage area (mi^2)	Period of record
Big Creek near Mount Pleasant, Ia. (d)	05473500	106	1955-79
Des Moines River at Estherville (d)	05476500*	1,372	1951-95
East Fork Des Moines River near Burt, Ia. (d)	05478000	462	1951-74
Des Moines River near Fort Dodge, Ia. (d)	05479500	3,753	1911-13
Lizard Creek near Clare, Ia. (d)	05480000	257	1940-82
Des Moines River near Boone, Ia. (d)	05481500	5,511	1920-68
North Raccoon River near Newell, Ia. (d)	05482135*	233	1982-95
Storm Lake at Storm Lake, Ia. (e)	05482140	28.3	1970-75
Big Cedar Creek near Varina, Ia. (d)	05482170	80.0	1960-91
East Fork Hardin Creek near Churdan, Ia. (d)	05483000	24.0	1953-91
Hazelbrush Creek near Maple River, Ia. (d)	05483343	9.22	1990-94
Springbrook Lake near Guthrie Center, Ia. (e)	05483460	5.18	1936-71
Raccoon River at Des Moines, Ia. (e)	05485000	3,628	1902-03
Lake Ahquabi near Indianola, Ia. (e)	05487000	4.93	1936-71
White Breast Creek near Knoxville, Ia. (d)	05488000	380	1945-62
Muchakinock Creek near Eddyville, Ia. (d)	05489190	70.2	1975-79
Lake Wapello near Drakesville, Ia. (e)	05490000	7.75	1936-71
Sugar Creek near Keokuk, Ia. (d)	05491000	105	1922-31; 1958-73
Fox River at Cantril, Ia. (d)	05494500	161	1940-51
Rock River at Rock Rapids, Ia. (d)	06483270	788	1959-74
Dry Creek at Hawarden, Ia. (d)	06484000	48.4	1948-69
West Branch Floyd River near Struble, Ia. (d)	06600300*	108	1955-95
Monona-Harrison Ditch near Blencoe, IA (d)	06602410	4,440	1939-42
Loon Creek near Orleans, Ia. (d)	06603920	31.0	1971-74
Spirit Lake Outlet at Orleans, Ia. (e)	06604100	75.6	1971-74
Milford Creek at Milford, Ia. (d)	06604400	146	1971-74
Little Sioux River at Spencer, Ia. (d)	06605100	990	1936-42
Little Sioux River at Gillett Grove, Ia. (d)	06605600	1,334	1958-73
Little Sioux River near Kennebeck, Ia. (d)	06606700	2,738	1939-69
Odebolt Creek near Arthur, Ia. (d)	06607000	39.3	1957-75
Maple River at Turin, Ia. (d)	06607300	725	1939-41
Little Sioux River near Blencoe, Ia. (d)	06607510	4,440	1939-42
Steer Creek near Magnolia, Ia. (d)	06609200	9.26	1963-69
Thompson Creek near Woodbine, Ia. (d)	06609590	6.97	1963-69
Willow Creek near Logan, Ia. (d)	06609600	129	1972-75
Indian Creek at Council Bluffs, Ia. (d)	06610500	6.92	1954-76
Mosquito Creek near Earling, Ia. (d)	06610520	32.0	1965-79
Waubonsie Creek near Bartlett, Ia. (d)	06806000	30.4	1946-69
West Nishnabotna River at Harlan, Ia. (d)	06807320	316	1977-82
West Nishnabotna River at (near) White Cloud, Ia. (d)	06807500	967	1918-24
Mule Creek near Malvern, Ia. (d)	06808000	10.6	1954-69
Spring Valley Creek near Tabor, Ia. (d)	06808200	7.6	1955-64
Davids Creek near Hamlin, Ia. (d)	06809000	26.0	1952-73
Tarkio River at Stanton, Ia. (d)	06811840*	49.3	1958-91
Tarkio River at Blanchard, Ia. (d)	06812000	200	1934-40
West Nodaway River at Villisca, Ia. (d)	06816500	342	1918-25
Platte River near Diagonal, Ia. (d)	06818750*	217	1969-91
East Fork One Hundred and Two River near Bedford, Ia. (d)	06819190	92.1	1959-83
Elk River near Decatur City, Ia. (d)	06897950*	52.5	1968-94
Weldon River near Leon, Ia. (d)	06898400	104	1959-91

Discontinued Surface-Water Discharge or Stage-Only Stations—Continued

Station name	Station number	Drainage area (mi^2)	Period of record
Honey Creek near Russell, Ia. (d)	06903500	13.2	1952-62
Chariton River near Centerville, Ia. (d)	06904000	708	1938-59

DISCONTINUED SURFACE-WATER-QUALITY STATIONS

The following water-quality stations have been discontinued in Iowa. Continuous daily records of water temperature, specific conductance, or sediment and monthly or periodic samples of chemical quality or biological data were collected and published for the period of record shown for each station.

[Type of record: Chem.–chemical quality, Cond.–specific conductance, Temp.–water temperature, Sed.–sediment, Bio.–biological; *, periodic data available subsequent to period of daily record]

Station name	Station number	Drainage area (mi^2)	Type of record	Period of record
Upper Iowa River at Decorah, Ia.	05387500	511	Sed. Temp.	1963-68 1963-83
Upper Iowa River near Dorchester, Ia.	05388250	770	Sed., Temp.*, Cond.*	1975-81
Paint Creek at Waterville, Ia.	05388500	42.8	Temp. Sed.	1952-56 1952-57
Unnamed Creek near Luana	05412070	1.15	Chem.	1986-92
Turkey River at Garber, Ia.	05412500	1,545	Temp.*, Sed.*	1957-62
Mississippi River at Dubuque, Ia.	05414700	81,600	Chem.	1969-73
Maquoketa River near Maquoketa, Ia	05418500	1,553	Sed., Temp., Cond.	1978-82; 1995-97
Elk River near Almont, Ia	05420300	55.9	Sed., Temp., Cond.	1995-97
Mississippi River at Clinton, Ia	05420500	85,600	Sed.	1995-97
Wapsipinicon River near Tripoli, Ia	05420860	343	Chem.	1996-98
Wapsipinicon River at Independence, Ia.	05421000	1,048	Cond.* Temp.*, Sed.*	1968-70 1967-70
Crow Creek at Bettendorf, Ia.	05422470	17.8	Cond.*, Temp.*, Sed.	1978-82
Iowa River near Rowan, Ia.	05449500	429	Temp.*, Sed.* Chem.	1957-62 1996-98
Iowa River at Marshalltown, Ia	05451500	1,532	Temp., Sed.	1988-95
Iowa River at Iowa City, Ia.	05454500	3,271	Chem.. Temp.*, Sed. Cond.	1906-07; 1944-54 1944-87 1968-87
Ralston Creek at Iowa City, Ia.	05455000	3.01	Cond Sed. Temp.	1968-87 1952-87 1967-87
Flood Creek near Powersville, Ia	05461390	127	Chem.	1996-98
Shell Rock River at Shell Rock, Ia.	05462000	1,746	Temp.*	1953-68
Cedar River at Cedar Falls, Ia	05463050	4,734	Chem.	1975-79; 1984; 1986-1995
Cedar River near (at) Gilbertville, Ia.	05464020	5,234	Chem.	1971; 1975-81
Fourmile Creek near Lincoln, Ia.	05464130	13.78	Chem., Temp., Sed.	1969-74
Half Mile Creek near Gladbrook, Ia.	05464133	1.33	Chem., Temp., Sed.	1969-74
Fourmile Creek near Traer, Ia.	05464137	19.51	Chem., Temp., Sed.	1969-74
Wolf Creek near Dysart, Ia	05464220	299	Chem.	1996-98
Cedar River near Palo, Ia.	05464450	6,380	Chem.	1975-79
Cedar River at Cedar Rapids, Ia.	05464500	6,510	Chem.* Temp.* Sed.	1906-07; 1944-54 1944-54 1943-54
Cedar River near Bertram, Ia.	05464760	6,955	Chem.	1975-81
Iowa River at Wapello, Ia	05465500	12, 499	Chem.	1977-95
Mississippi River at Burlington, Ia.	05469720	114,000	Chem.	1969-73
South Skunk River at Colfax, Ia	05471050	803	Cond.*, Temp.*, Sed.	1989-93
Skunk River at Augusta, Ia	05474000	4,303	Chem.	1977-95
Mississippi River at Keokuk, Ia.	05474500	119,000	Chem.	1974-87
Des Moines River at Fort Dodge, Ia.	05480500	4,190	Chem.	1972-73
Des Moines River at 2nd Avenue at Des Moines, Ia.	05482000	6,245	Chem. Temp.*, Sed.	1954-55 1954-61
East Fork Hardin Creek near Churdan, Ia.	05483000	24.0	Temp.*, Sed.*	1952-57
Hazelbrush Creek near Maple River, Ia	05483343	9.22	Cond., Temp., Sed.	1991-94

Discontinued Surface-Water Quality Stations—Continued

Station name	Station number	Drainage area (mi^2)	Type of record	Period of record
Middle Raccoon River near Bayard, Ia.	05483450	375	Cond.*, Temp.*, Sed.	1979-85
Middle Raccoon River at Panora, Ia.	05483600	440	Cond.*, Temp.*, Sed.	1979-85
Raccoon River at Van Meter, Ia	05484500	3,441	Chem. Bio.	1974-79; 1986-94 1974-79
Raccoon River at Des Moines, Ia.	05485000	3,590	Chem., Temp.	1945-47
Des Moines River below Raccoon River at Des Moines, Ia.	05485500	9,879	Chem.* Temp.*, Sed.	1944-45 1944-47
Des Moines River below Des Moines, Ia.	05485520	9,901	Chem.	1971; 1974-81
Middle River near Indianola, Ia.	05486490	503	Temp.*, Sed.	1962-67
White Breast Creek near Dallas, Ia.	05487980	342	Chem. Temp.*, Sed.	1969-73 1967-73
Big Sioux River at Sioux City, Ia.	06485950	9,410	Chem.	1969-73
Missouri River at Sioux City, Ia.	06486000	314,600	Chem.	1972-86
Floyd River at James, Ia.	06600500	886	Temp.*, Sed., Cond.*	1968-73
Floyd River at Sioux City, Ia.	06600520	921	Chem.	1969-73
Missouri River at Decatur, Neb.	06601200	316,160	Chem.	1974-81
Spirit Lake near Orleans, Ia.	06604000	75.6	Temp.	1968-75
Little Sioux River at Correctionville, Ia.	06606600	2,500	Chem.* Temp.* Sed.	1954-55 1951-62 1950-62
Little Sioux River near Kennebec, Ia.	06606700	2,738	Temp. Sed.	1951-55 1950-57
Little Sioux River at River Sioux, Ia.	06607513	3,600	Chem.	1969-73
Soldier River near Mondamin, Ia.	06608505	440	Chem.	1970-73
Steer Creek near Magnolia, Ia.	06609200	9.26	Temp., Sed., Cond.	1963-69
Thompson Creek near Woodbine, Ia.	06609590	6.97	Temp., Sed., Cond.	1963-69
Willow Creek near Logan, Ia.	06609600	129	Cond., Temp. Sed.	1972-75 1971-75
Missouri River at Omaha, Nebr.	06610000	322,800	Cond.*	1969-86
Mule Creek near Malvern, Ia.	06808000	10.6	Temp. Sed.	1958-69 1954-69
Davids Creek near Hamlin, Ia.	06809000	26.0	Temp.* Sed.	1952-53; 1965-68 1952-68
East Nishnabotna River at Red Oak, Ia.	06809500	894	Temp.*, Sed., Cond.*	1962-73
Nishnabotna River above Hamburg, Ia.	06810000	2,806	Chem. Temp.*, Cond. Bio.	1979-93 1979-81 1979-81
Nodaway River at Clarinda	06817000	762	Cond.*, Temp.*, Sed.	1976-92
Platte River near Diagonal, Ia.	06818750	217	Chem.	1969-73
Elk Creek near Decatur City, Ia.	06897950	52.5	Bio. Chem.	1970-72 1968-94
Thompson River at Davis City, Ia.	06898000	701	Chem. Temp.*, Sed., Cond.*	1967-73 1968-73
Weldon River near Leon, Ia.	06898400	104	Chem.	1968-73
Chariton River near Chariton, Ia.	06903400	182	Temp.*, Sed., Cond.*	1969-73
Honey Creek near Russell, Ia.	06903500	13.2	Sed.	1952-62
Chariton River near Rathbun, Ia.	06903900	549	Temp.*, Sed.*, Cond.*	1962-69

INTRODUCTION

The Water Resources Division of the U.S. Geological Survey, in cooperation with State, county, municipal, and other Federal agencies, obtains a large amount of data pertaining to the water resources of Iowa each water year. These data, accumulated during many water years, constitute a valuable data base for developing an improved understanding of the water resources of the State. To make this data readily available to interested parties outside of the Geological Survey, the data is published annually in this report series entitled "Water Resources Data - Iowa" as part of the National Water Data System.

Water resources data for water year 1999 for Iowa consists of records of stage, discharge, and water quality of streams; stage and contents of lakes and reservoirs; and water levels and water quality of ground water. This report, in two volumes, contains stage or discharge records for 123 gaging stations; stage or contents records for 10 lakes and reservoirs; water-quality records for 4 gaging stations; sediment records for 12 gaging stations; and water levels for 175 ground-water observation wells. Also included are peak-flow data for 93 crest-stage partial-record stations, water-quality data from 67 municipal wells, and precipitation data collected at 6 gaging stations and 2 precipitation sites. Additional water data were collected at various sites not included in the systematic data-collection program, and are published here as miscellaneous measurements and analyses. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating local, State, and Federal agencies in Iowa.

Records of discharge or stage of streams, and contents or stage of lakes and reservoirs were first published in a series of U.S. Geological Survey water-supply papers entitled "Surface Water Supply of the United States." Through September 30, 1960, these water-supply papers were published in an annual series; during 1961-65 and 1966-70, they were published in 5-year series. Records of chemical quality, water temperatures, and suspended sediment were published from 1941 to 1970 in an annual series of water-supply papers entitled "Quality of Surface Waters of the United States." Records of ground-water levels were published from 1935 to 1974 in a series of water-supply papers entitled "Ground-Water Levels in the United States." Water-supply papers may be consulted in the libraries of the principal cities in the United States, or they may be purchased from Books and Open-File Reports Section, Federal Center, Box 25425, Denver, Colorado 80225.

For water years 1961 through 1970, streamflow data were released by the Geological Survey in annual reports on a State-boundary basis. Water-quality records for water years 1964 through 1970 were similarly released either in separate reports or in conjunction with streamflow records.

Beginning with the 1971 water year, water data for streamflow, water quality, and ground water is published in official U.S. Geological Survey reports on a State-boundary basis. These official reports carry an identification number consisting of the two-letter State postal abbreviation, the last two digits of the water year, and the volume number. For example, this report is identified as "U.S. Geological Survey Water-Data Report IA-99-1." These water-data reports are for sale by the National Technical Information Service, U.S. Department of Commerce, Springfield, Virginia 22161.

Additional information for ordering specific reports may be obtained from the District Chief at the address given on the back of the title page or by telephone, (319) 337-4191.

COOPERATION

The U.S. Geological Survey and organizations in the State of Iowa have had cooperative agreements for the systematic collection of streamflow records since 1914, for ground-water levels since 1935, and for water-quality records since 1943. Organizations that assisted in collecting data through cooperative agreements with the U.S. Geological Survey in Iowa during water year 1999 are:

Iowa Department of Natural Resources (Geological Survey Bureau)
Iowa Department of Transportation
Iowa Highway Research Board

Iowa State University
University of Iowa, Institute of Hydraulic Research
University of Iowa, Hygienic Laboratory
University of Iowa

Appanoose County Board of Supervisors
Davis County Board of Supervisors
Freemont County Board of Supervisors
Van Buren County Board of Supervisors

City of Ames
City of Bettendorf
City of Bloomfield
City of Burlington
City of Cedar Rapids
City of Charles City
City of Clear Lake
City of Clinton
City of Coralville
City of Davenport
City of Des Moines
City of Des Moines Water Works
City of Fort Dodge
City of Iowa City
City of Marshalltown
City of Milford
City of Mt. Pleasant
City of Ottumwa Water and Hydro Plant
City of Sioux City
City of Waterloo Water Pollution Control Plant
City of West Des Moines

Assistance in the form of funds or services was given by the U.S. Army Corps of Engineers in collecting streamflow records for 72 stream gaging stations. Assistance also was furnished by NOAA-National Weather Service, U.S. Department of Commerce, and Biological Resources Division (BRD) of U.S. Geological Survey.

The following organizations aided in collecting records: Milford Municipal Utilities, Central Iowa Energy Cooperative, Union Electric Company.

Organizations that supplied data are acknowledged in the station descriptions.

SUMMARY OF HYDROLOGIC CONDITIONS

Surface Water

For water year 1999 (October 1, 1998 to September 30, 1999) climatological conditions were wetter than normal and warmer than normal. Recorded precipitation for the year ranged from 1.50 inches above normal in the Northwest Iowa Climatological District to 8.95 inches greater than normal in the Northeast Iowa Climatological District (fig. 1). Precipitation recorded for the State averaged 37.38 inches, which was 4.27 inches greater than normal, or 113 percent of the normal 33.11 inches for 1961-90 (table 1). Overall, water year 1999 was the 17th wettest and the 21st warmest for 126 years of record. [In this summary of hydrologic conditions, all data and statistics pertaining to precipitation and temperature in Iowa were provided by Harry Hillaker, State Climatologist, Iowa Department of Agriculture and Land Stewardship, (oral and written commun., 1999)]

October was the wettest in 126 years of record. Statewide average precipitation was 4.98 inches, which was 197 percent of normal. Climatological Districts reported above average precipitation, ranging from 261 percent of normal in the East-central District to 150 percent of normal in the West-central District. For the three index surface-water stations in Iowa, mean monthly discharge for 05464500 Cedar River at Cedar Rapids was above normal (East-central District), while 05480500

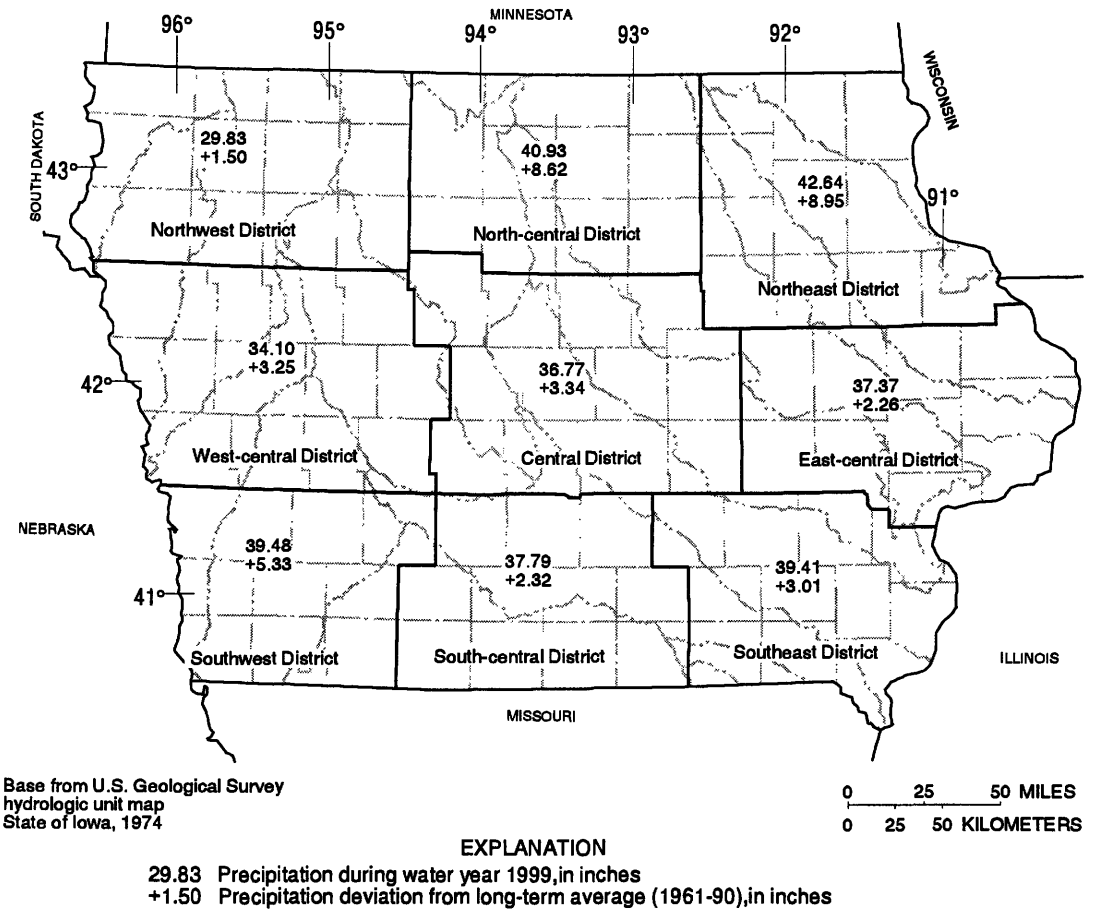

Figure 1. Precipitation record for the National Weather Service's designated Climatological Districts for water year 1999 (source: Harry Hillaker, State Climatologist, Iowa Department of Agriculture and Land Stewardship, written commun., 1999).

Table 1. Monthly and annual precipitation during the 1999 water year as a percentage of normal precipitation (1961-90).
[Source: Harry Hillaker, State Climatologist, Iowa Department of Agriculture and Land Stewardship, written commun., 1999]

National Weather Service Climatological District	1998			1999									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Annual
Northwest	211	155	36	179	63	44	202	84	150	125	26	26	105
North-central	186	55	23	181	77	45	230	172	130	212	53	39	127
Northeast	210	64	18	201	89	38	187	162	96	247	93	38	127
West-central	150	82	34	147	137	46	246	88	136	122	94	32	110
Central	200	67	24	147	78	50	182	133	131	102	94	40	110
East-central	261	59	39	175	106	48	173	102	105	116	71	54	106
Southwest	122	142	26	94	159	42	170	157	116	90	103	58	116
South-central	190	139	46	82	158	57	167	130	104	65	86	67	106
Southeast	231	124	67	201	101	54	159	100	102	61	79	88	108
Statewide	197	96	35	159	105	147	198	125	121	129	78	49	113

Des Moines River at Fort Dodge (Central District) and 06810000 Nishnabotna River above Hamburg (Southwest District) was in the normal range (fig. 2). For the remainder of this section, these stations will be referred to as "Cedar Rapids," "Fort Dodge," and "Hamburg," respectively. The location of all active continuous-record gaging stations in Iowa is shown in figure 3, and the location of all active crest-stage gaging stations is shown in figure 4.

Precipitation for November averaged 96 percent of normal. Climatological District reports ranged from 155 percent of normal in the Northwest District to 55 percent of normal in the North-central District. Mean monthly discharge at Cedar Rapids and Fort Dodge was above normal, but was in the normal range for Hamburg.

December was the 11th driest reported for 126 years of record. Precipitation for the month was 35 percent of normal at 0.45 inches. All Climatological Districts reported precipitation below normal. Average snowfall for the month was 5.5 inches. Cedar Falls and Fort Dodge index stations had a mean monthly discharge above normal, but Hamburg experienced normal mean monthly discharge.

Increases of precipitation during January were 159 percent of normal, with total precipitation of 1.37 inches. This was the 8th consecutive January with precipitation at or above normal. Precipitation ranged from 201 percent of normal in the Northeast Climatological District to 82 percent of normal in the South-central District. Snowfall for the month was 12.5 inches, making this the 12th snowiest January in 112 years of record. Index stations reported mean daily discharge above normal for the month at Cedar Rapids and within the normal range at Fort Dodge and Hamburg.

Near normal precipitation was experienced during February with the average precipitation of 0.97 inches, being 105 percent of normal. Average precipitation was 159 percent of normal in the Southwest and 63 percent of normal in the Northwest Climatological District. Snowfall for the month was 6.3 inches, while above average temperatures made this the 9th warmest February for 127 years of record. Above normal monthly mean discharge was experienced at Cedar Rapids and Fort Dodge, while Hamburg reported a monthly mean discharge in the normal range.

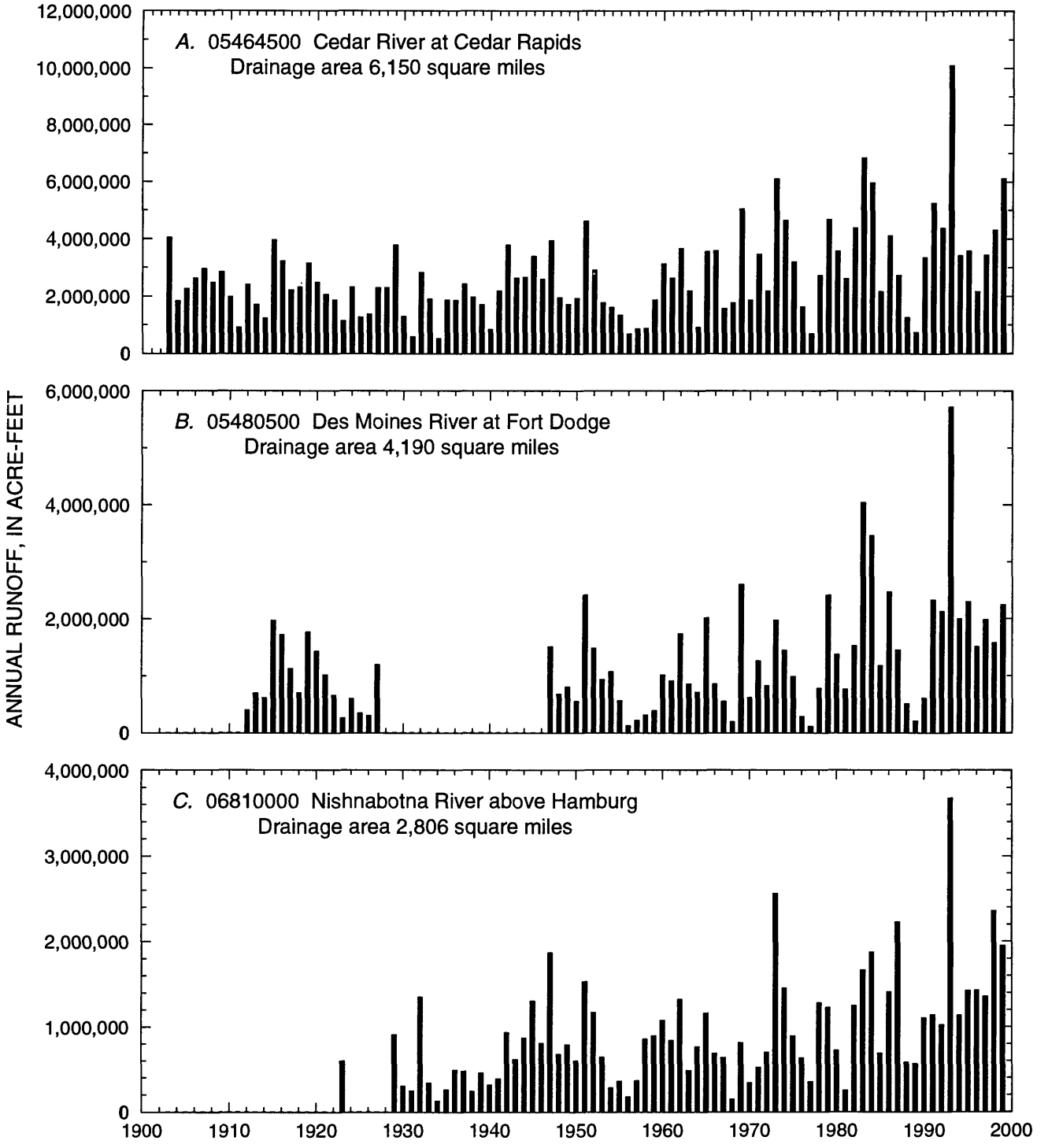

Figure 2. Annual runoff for period of record at index stations.

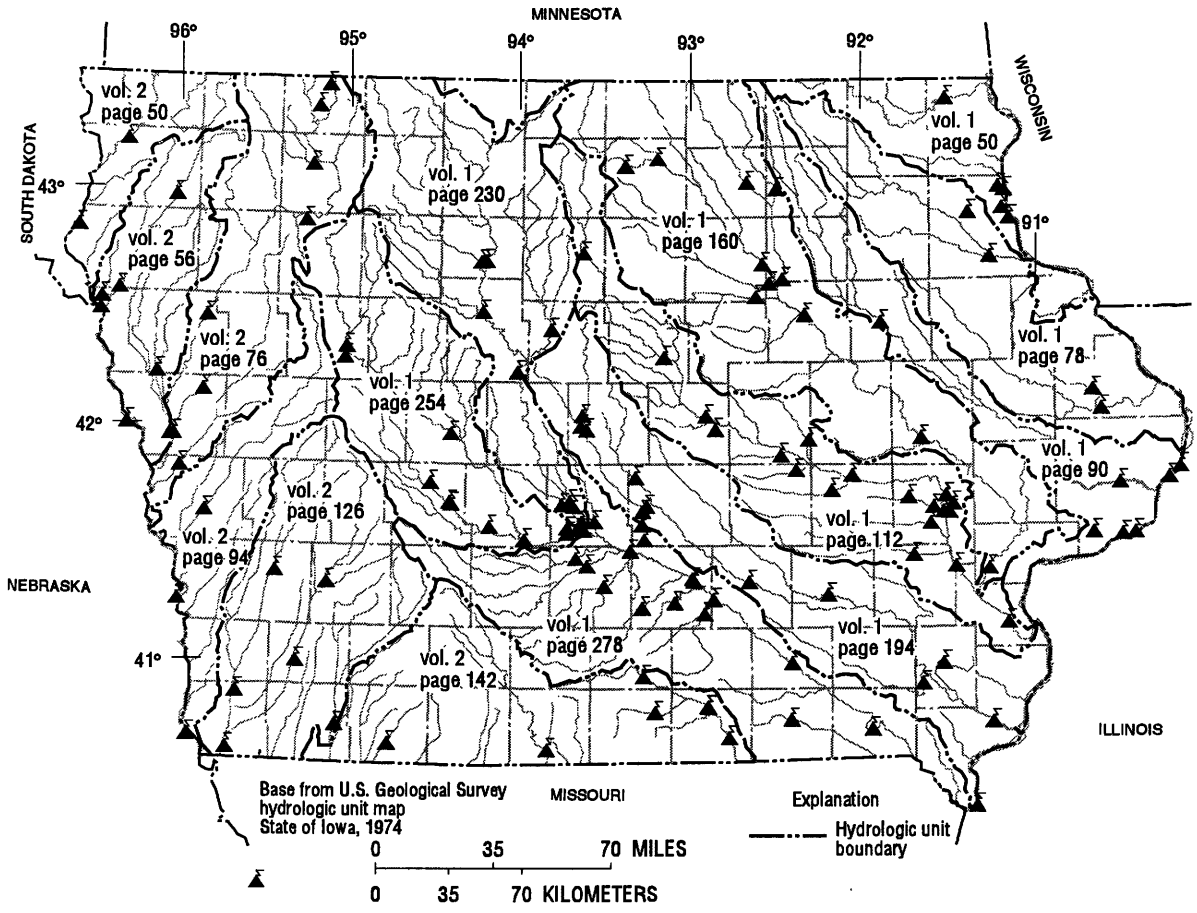

Figure 3. Location of active continuous-record gaging stations in Iowa, water year 1999. [See indicated volume and page number for gaging-station identification.]

Statewide average precipitation fell below normal for March, with 1.04 inches that was 47 percent of normal. All Climatological Districts reported precipitation below normal. For the month snowfall was 9.0 inches. This month, index stations at Fort Dodge and Hamburg had normal mean monthly discharge, but mean monthly discharge for Cedar Rapids was above normal.

April precipitation rebounded to 198 percent of normal, after the average statewide precipitation of 6.25 inches was recorded. This resulted in April being the wettest for 127 years of record. Precipitation ranged from 246 percent of normal in the West-central District to 159 percent of normal in the Southeast District. Average snowfall for the state was 0.2 inches. Mean monthly discharge for the index station at Cedar Rapids was in the normal range and in the above normal range for Fort Dodge and Hamburg.

The statewide average precipitation for May was 4.96 inches, which was 125 percent of normal. Range of precipitation was 172 percent in the North-central District to 84 percent of normal in the Northwest District. Mean monthly discharge was above normal at index stations Cedar Rapids and Hamburg and normal at Fort Dodge.

For June, statewide average precipitation was 5.33 inches or 121 percent of normal. Differences for Climatological Districts were 150 percent of normal in the Northwest District to 96 percent of normal in the Northeast District. All index stations were in the above normal range for the month.

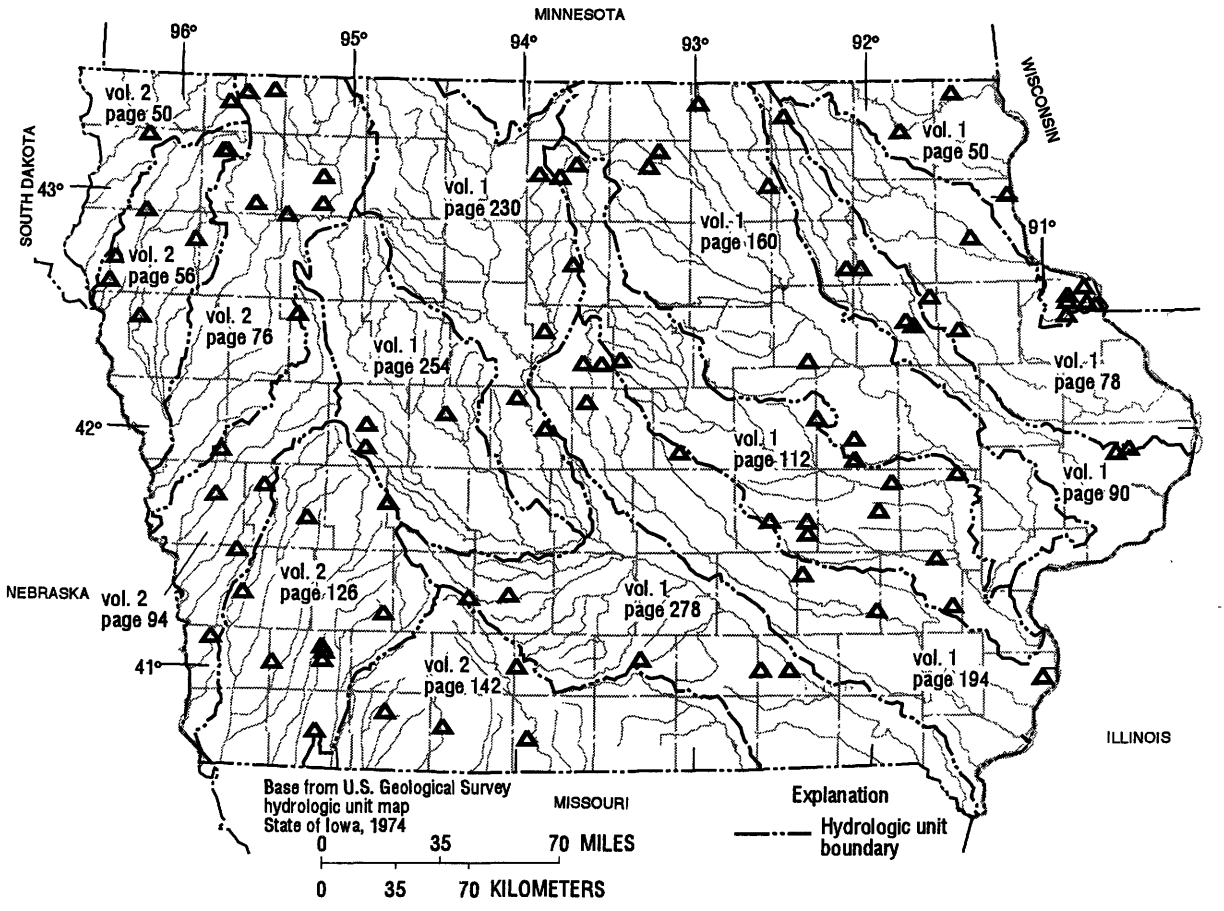

Figure 4. Location of active crest-stage gaging stations in Iowa, water year 1999. [See indicated volume and page number for gaging-station identification.]

Total July statewide precipitation averaged 5.33 inches or 121 percent of normal. However, heavy rains in the North-central and Northeast Climatological Districts resulted in record flooding, while all other reporting Districts experienced below normal or slightly above normal precipitation. Range of precipitation was 247 percent of normal in the Northeast District and 61 percent of normal in the Southeast District. This was the warmest July in 127 years of record. Index stations at Cedar Rapids, Fort Dodge, and Hamburg all reported a mean monthly discharge above normal.

The Southwest Climatological District reported monthly mean precipitation 103 percent of normal for August, but the remaining eight districts ranged from 94 percent of normal in the West-central and Central Districts to 26 percent of normal in the Northwest District. Average statewide precipitation in the state was 4.03 inches. Mean monthly discharge at index stations Cedar Rapids and Hamburg was above normal, while Fort Dodge experienced mean monthly discharge in the normal range.

Dry conditions continued into September, with average statewide precipitation of 1.87 inches, which was 49 percent of normal. Climatological District precipitation ranged from 88 percent of normal in the Southeast District to 26 percent of normal in the Northwest District. This was the 19th driest September for 127 years of record. Above average mean monthly discharge was experienced at Cedar Rapids and Hamburg and in the normal range at Fort Dodge.

The water-year 1999 runoff at Cedar Rapids was 6,119,000 acre-feet, which is greater than the mean annual runoff for the period of record, 2,724,000 acre-feet. The water-year 1999 runoff at Fort Dodge was 2,238,000 acre-feet, which is greater

than the mean for the period of record, 1,293,000 acre-feet. The water-year 1999 runoff at Hamburg was 1,947,000 acre-feet, which is greater than the mean for the period of record, 926,500 acre-feet.

Suspended Sediment

Daily suspended-sediment discharge data (hereafter referred to as sediment discharge in this report) were collected at 12 streamflow-gaging stations in Iowa during the 1999 water year. Four stations have 21 years or more of record: 05389500 Mississippi River at McGregor, 05465500 Iowa River at Wapello, 05474000 Skunk River at Augusta, and 05481650 Des Moines River near Saylorville; three stations on the Missouri River have 13 years of record: 06486000 Missouri River at Sioux City, Iowa, 06610000 Missouri River at Omaha, Nebraska, and 06807000 Missouri River at Nebraska City, Nebraska; two stations in northeast Iowa have 8 years of record: 05389400 Bloody Run Creek near Marquette and 05411400 Sny Magill Creek near Clayton; and three stations in central Iowa have 4 years of record: 05471040 Squaw Creek near Colfax, 05487540 Walnut Creek near Prairie City, and 05487550 Walnut Creek near Vandalia. The locations of active sediment and surface water-quality stations are shown in figure 5.

The peak daily sediment discharge on 5 of 12 stations occurred between April 16-24, after a significant rain event. Four others peaked between May 12-17.

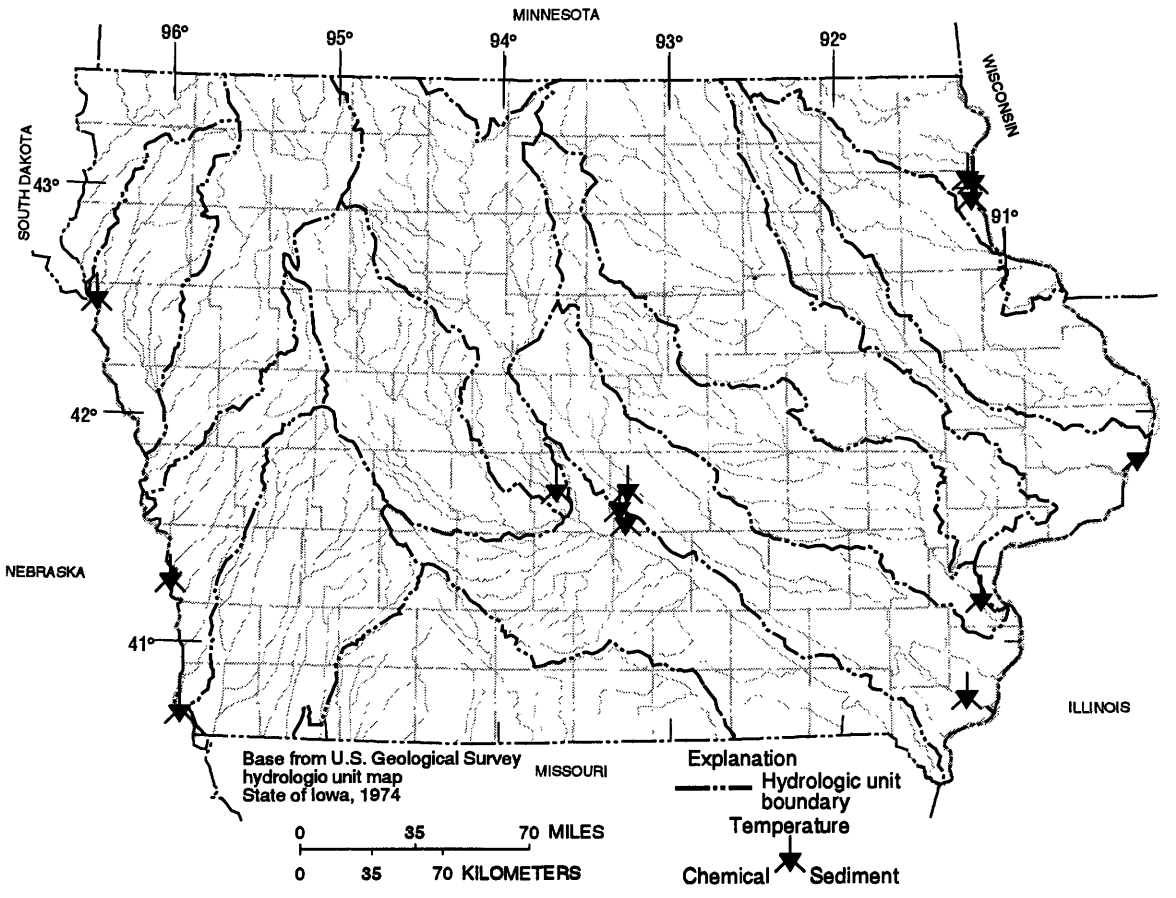

Figure 5. Location of active sediment and surface-water quality stations in Iowa, water year 1999.

Mississippi River at McGregor, which has most of its drainage basin in Minnesota and Wisconsin, had an annual sediment discharge of 878,000 tons, which was the fifth lowest sediment discharge in 24 years of record, and 51.1 percent of the average mean sediment discharge (fig. 6).

The sediment station on the Des Moines River near Saylorville in central Iowa is downstream from a major flood-control reservoir (Saylorville Reservoir). The annual sediment discharge at this station for water year 1999 was 294,000 tons. This represents 115 percent of the 22-year mean sediment discharge. The mean annual sediment discharge since dam completion is 256,000 tons (fig. 6).

Sediment discharges for Iowa River at Wapello and Skunk River at Augusta in southeast Iowa were indicative of the above-normal precipitation in central and eastern Iowa. The Iowa River basin drainage includes parts of the Southeast, East-central, Central, Northeast, and North-central Climatological Districts, and drains an area nearly three times as large as the Skunk Basin. These districts had about 116 percent of normal precipitation. Wapello had an annual sediment discharge of 2.47 million tons. This represents 89 percent of the 21-year mean sediment discharge of 2.77 million tons (fig. 6). The headwaters of the Skunk River basin are in central Iowa, and flow is southeasterly to the confluence with the Mississippi River. A substantial part of the drainage basin is located in the Southeast Climatological District. The annual precipitation for this district was 111 percent of normal for water year 1999. The 1999 annual sediment discharge for Skunk River at Augusta was 2.74 million tons, which is 97 percent of the 24-year mean sediment discharge of 2.83 million tons (fig. 6).

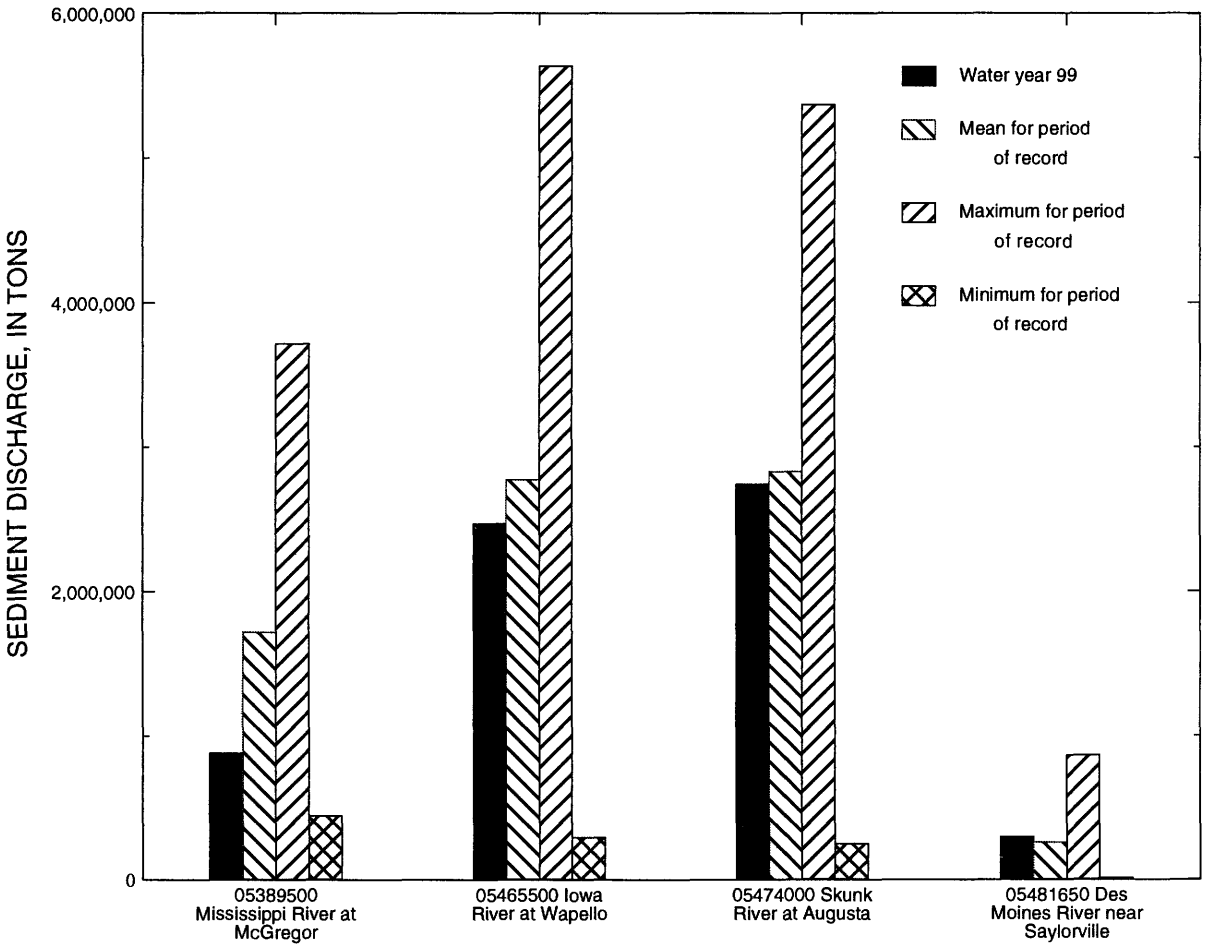

Figure 6. Comparison of annual sediment discharge for water year 1999 with mean, previous maximum, and previous minimum annual sediment discharges for periods of record at four long-term daily sediment stations in Iowa.

The 1999 annual sediment discharge for the two small drainage area stations located in northeast Iowa reflect the effect of precipitation patterns on small drainage basins. The annual sediment discharge for Bloody Run Creek near Marquette (05489400) was 2,635 tons, of which approximately 59 percent was measured during the month of May. The annual runoff was 56 percent of the 8-year mean sediment discharge of 4,726 tons. The annual sediment discharge for Sny Magill Creek near Clayton (05411400) was 6,028 tons. This runoff represents 119 percent of the 8-year mean sediment discharge of 5,062 tons. Sixty-seven percent of Sny Magill's annual sediment discharge was measured in May, and approximately 65 percent of the yearly total was measured on May 16-17. These stations are paired in a study on sediment-reduction techniques, with the Sny Magill Basin having the techniques implemented and the Bloody Run Basin not implemented.

The annual sediment discharge for the three stations located in central Iowa with less than approximately 20 square miles of drainage reflect precipitation patterns on small drainage basins. The 1999 sediment discharge for Squaw Creek near Colfax (05471040) was 8,007 tons. The 1999 sediment discharge for Walnut Creek near Prairie City (05487540) was 1,688 tons, while Walnut Creek near Vandalia (05487550) was 8,779 tons of annual sediment discharge. Vandalia has a drainage area approximately three times the size of Prairie City, but had about 5.2 times the amount of sediment discharge of Prairie City.

The three Missouri River stations (fig. 5) have large drainage areas, which the sediment discharges reflect. The annual sediment discharge at Sioux City was 9.5 million tons, which was 75 percent of the 13-year mean of 12.8 million tons. The sediment discharge at Omaha was 17.4 million tons, which was 77 percent of the 13-year mean of 22.6 million tons. The annual sediment discharge at Nebraska City was 31.5 million tons, which was 90 percent of the 13-year mean of 35.1 million tons.

Ground-Water-Level Observation Network

The ground-water monitoring network in Iowa provides a historical record of the water-level changes in the Nation's most important aquifers. The locations of the 175 wells monitored on a quarterly, monthly, or intermittent basis in Iowa during water year 1999 are shown in figure 7.

In this report, records of water levels are presented for a network of observation wells. However, many other water levels are measured through Federal, State, and local agency cooperative projects and entered into computer storage. Information for specific projects may be obtained from the District Chief, Iowa District, or via the world wide web using the following universal resource locator address: <URL: `http://ia.water.usgs.gov/`>.

Measurements of water levels are made in many types of wells under varying conditions, but the methods of measurement are standardized to the extent possible. The equipment and measuring techniques used at each observation well ensure that measurements at each well are of consistent accuracy and reliability.

Tables of water-level data are presented by counties arranged in alphabetical order. The principal identification number for a given well is the 15-digit number that appears in the upper left corner of the table. The secondary identification number is the local well number, an alphanumeric number, derived from the township-range location of the well.

Water-level records are obtained from direct measurements with a steel tape or from an airline. The water-level measurements in this report are given in feet with reference to land-surface datum. Land-surface datum is a datum plane that is approximately at land surface at each well. The measuring point is the height above or below the land-surface datum and the point where the water level is measured. Both the measuring point and land-surface datum are provided for each well.

Water levels are reported to as many significant figures as can be justified by the local conditions. For example, in a measurement to a depth of water of several hundred feet, the error of determining the absolute value of the total depth to water may be a few tenths of a foot, whereas the error in determining the net change of water level between successive measurements may be only a hundredth or a few hundredths of a foot. For lesser depths to water, the accuracy is greater. Accordingly, most measurements are reported to a hundredth of a foot, but some are given to a tenth of a foot or a larger unit.

Ground-water supplies in Iowa are withdrawn from unconsolidated and bedrock aquifers. There are three types of unconsolidated aquifers: (1) alluvial aquifers, which consist of sand-and-gravel deposits associated with present-day fluvial systems; (2) glacial-drift aquifers, which consist of shallow, discontinuous, permeable lenses of sand and gravel interbedded with less-permeable glacial drift; and (3) buried-channel aquifers. Buried-channel aquifers were formed in areas where coarse sand and gravel were deposited in bedrock valleys and overlain by a thick layer of glacial drift.

Six wells completed in an unconsolidated aquifer recorded a new historic water levels during the 1999 water year. Three wells recorded new historic high water levels (table 2) and three wells recorded new historic low water levels (table 3).

Table 2. Historical high-water levels measured during water year 1999 in wells completed in unconsolidated aquifers.
[Values in feet below land surface]

County	Well number	Aquifer type	New historical high water level	Date measured	Previous historical high water level	Date measured
Johnson	414221091361103	Buried Channel	121.61	01/20/1999	123.39	11/20/1996
Pottawattamie	411359095171901	Buried Channel	123.19	08/11/1999	124.45	05/05/1994
Washington	421829091304701	Glacial-drift	1.29	04/16/1999	1.53	05/23/1984

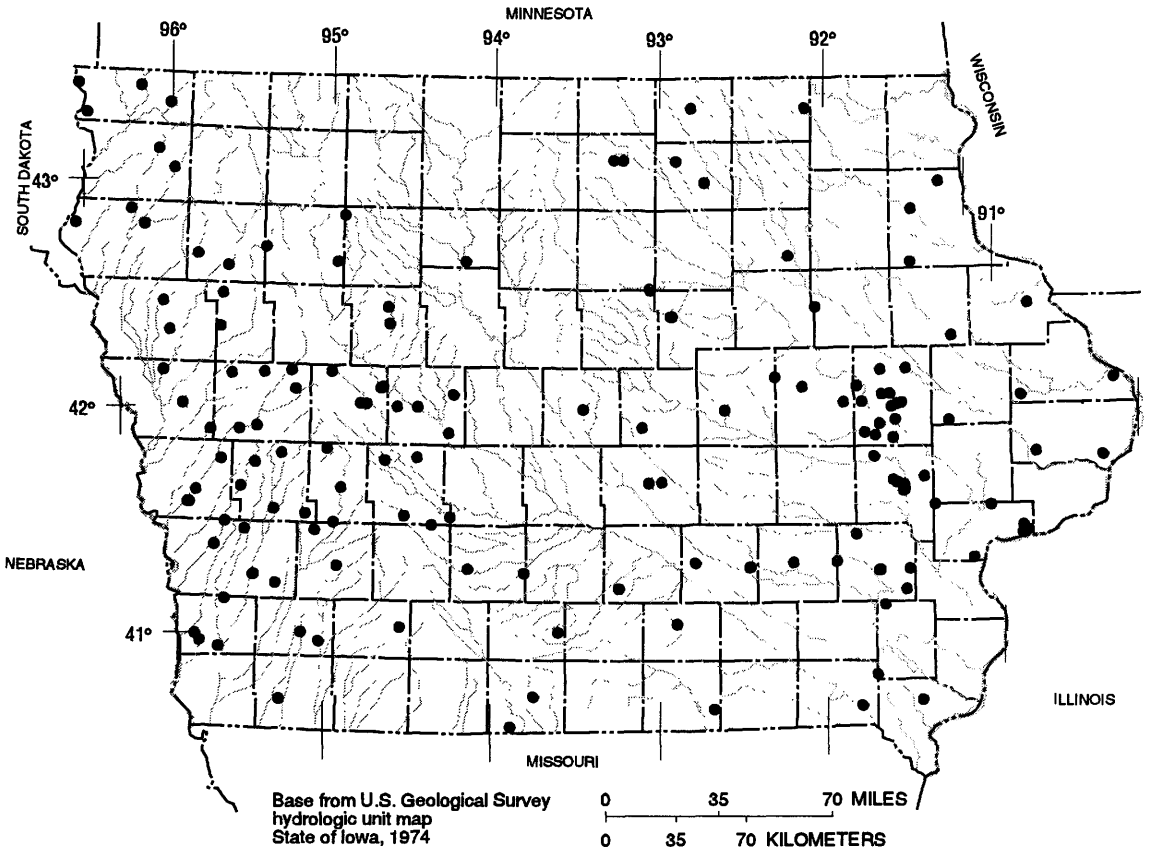

Figure 7. Location of wells in the ground-water-level observation network in Iowa, water year 1999.

Table 3. Historical low-water levels measured during water year 1999 in wells completed in unconsolidated aquifers.
[Values in feet below land surface]

County	Well number	Aquifer type	New historical low water level	Date measured	Previous historical low water level	Date measured
Crawford	420608095111701	Buried Channel	217.70	02/11/1999	212.90	01/09/1991
Crawford	421106095125501	Buried Channel	66.41	08/09/1999	65.18	08/05/1997
Shelby	413953095302601	Glacial Drift	19.38	11/04/1998	19.28	11/06/1992

The five major bedrock-aquifer units in Iowa are the Cambrian-Ordovician, Silurian-Devonian, Mississippian, Pennsylvanian, and Dakota. The Cambrian-Ordovician aquifer system consists of aquifers in sandstone of Early Cambrian age and dolomite and sandstone of Late Cambrian to Early Ordovician age. The Dresbach is the basal aquifer of the Cambrian-Ordovician aquifer system and is present locally in northeastern and east-central Iowa. Overlying the Dresbach aquifer is the more areally extensive Jordan-St. Peter aquifer. A confining shale unit separates the Jordan-St. Peter aquifer from the Galena aquifer, the uppermost aquifer in the Cambrian-Ordovician aquifer system. Overlying the Cambrian-Ordovician aquifer system is the Silurian-Devonian aquifer, which yields water from fractures in Silurian dolomite and Devonian limestone. Overlying the Silurian-Devonian aquifer is the Mississippian aquifer, which is composed of limestone and dolomite of Mississippian age and underlies about 60 percent of Iowa. Overlying the Mississippian aquifer are discontinuous lenses of sandstone in the Cherokee and Kansas City Groups of Pennsylvanian age, which form small, localized aquifers. The Dakota aquifer is the youngest bedrock-aquifer unit in the State and yields water from sandstone of Cretaceous age in northwest and western Iowa.

Forty wells completed in bedrock aquifers recorded new historical water levels during the 1999 water year. Twelve wells recorded historical high water levels (table 4), and 28 wells recorded historical low water levels (table 5).

Table 4. Historical high water levels measured during water year 1999 in wells completed in bedrock aquifers.
{Values in feet below land surface; readings above land surface indicated by "+"]

County	Well number	Aquifer type	New historical high water level	Date measured	Previous historical high water level	Date measured
Bremer	424224092133901	Silurian-Devonian	86	10/05/1998	89	08/07/1997
Clinton	414806090212301	Silurian-Devonian	19.99	02/09/1999	27.67	08/06/1997
Ida	423108095383201	Mississippian	180.25	08/09/1999	180.97	07/27/1994
Jackson	420433090502401	Silurian-Devonian	59.74	05/03/1999	62.89	08/06/1997
Linn	420730091490401	Silurian-Devonian	20.73	05/03/1999	84.17	04/05/1976
Linn	421207091312201	Silurian-Devonian	10	08/09/1999	12	05/04/1998
Plymouth	424833096324701	Dakota	135.73	02/10/1999	136.54	05/05/1998
Story	420129093273701	Cambrian-Ordovician	295	02/08/1999	370	05/08/1997
Washington	412750091495201	Mississippian	+.59	11/04/1998	+.57	05/05/1997
Washington	411822091411001	Cambrian-Ordovician	249	05/10/1999	304	04/24/1997
Washington	411812091412601	Cambrian-Ordovician	240	11/04/1998	247	04/25/1997
Woodbury	422830096000511	Dakota	198.70	08/10/1999	199.06	05/11/1995

Table 5. Historical low-water level measured during water year 1999 in wells completed in bedrock aquifers.
[Values in feet below land surface]

County	Well number	Aquifer type	New historical low water level	Date measured	Previous historical low water level	Date measured
Appanoose	404103092404001	Cambrian-Ordovician	389.00	02/08/1999	382.42	08/06/1997
Buena Vista	424023095571401	Dakota	96.16	08/04/1999	95.30	12/12/1978
Calhoun	422339094375101	Cambrian-Ordovician	287	02/10/1999	237	08/06/1997
Cherokee	424348095231601	Cambrian-Ordovician	196.17	10/02/1998	194.73	02/03/1993
Clayton	425433091285002	Cambrian-Ordovician	10.86	08/25/1999	10.38	07/20/1989
Clinton	414806090212301	Silurian-Devonian	30.50	05/03/1999	27.67	08/06/1997
Decatur	404422093445602	Cambrian-Ordovician	442.66	08/12/1999	441.28	10/04/1997
Dubuque	422901090471901	Cambrian-Ordovician	248.02	05/04/1999	242.45	08/05/1997
Floyd	430800092540301	Cambrian-Ordovician	198	08/03/1999	186	05/05/1997, 02/12/1997
Grundy	422611092552501	Cambrian-Ordovician	296	08/02/1999	297	08/04/1997
Howard	432158092065801	Cambrian-Ordovician	340	08/02/1999	320	02/12/1997, 08/02/1997
Ida	422215095390811	Dakota	206.69	10/03/1998	206.50	05/07/1982
Jackson	420433090502401	Silurian-Devonian	64.22	02/09/1999	63.19	08/04/1998
Johnson	414132091345503	Silurian-Devonian	309	07/28/1999	301	08/16/1996
Johnson	414145091350101	Cambrian-Ordovician	411	07/08/1999, 08/12/1999, 09/09/1999	395	07/03/1996
Johnson	413950091322402	Cambrian-Ordovician	360	05/12/1999	340	04/30/1998
Lee	404306091270201	Cambrian-Ordovician	266.61	08/06/1999	264.74	08/06/1998
Linn	420200091363001	Cambrian-Ordovician	325	08/19/1999	293	07/24/1998
Linn	420219091344101	Cambrian-Ordovician	384	08/18/1999	351	08/10/1998
Madison	411727093483001	Mississippian	280.26	08/19/1999	279.45	08/04/1997
Mahaska	411912092273601	Mississippian	107.51	02/08/1999	103.61	03/05/1990-03/08/1990
Mahaska	411914092274701	Mississippian	106.03	05/05/1999	103.20	10/26/1989
Muscatine	412833090482001	Silurian-Devonian	269	07/06/1999, 08/03/1999	260	04/07/1998
Muscatine	412952090501101	Silurian-Devonian	161	08/03/1999	160	09/01/1998
Osceola	431620095250511	Dakota	197.03	05/05/1999	195.05	08/06/1992
Plymouth	425249096125001	Dakota	124.71	11/02/1998	124.25	07/02/1991
Story	420957092181801	Cambrian-Ordovician	367	11/02/1998	350	01/03/1997
Washington	411300091320701	Mississippian	78.09	08/05/1999	77.04	11/27/1990

Surface-Water Quality

Surface-water-quality data were collected in Iowa during water year 1999 at two National Stream-Quality Accounting Network (NASQAN) stations. The NASQAN stations in Iowa are the Mississippi River at Clinton (station number 05420500) and Missouri River at Omaha (06610000) (fig. 5). The combined drainage area of the two stations is approximately 408,000 sq. miles. Land use throughout the two drainage basins is primarily agricultural. Fifteen water samples were collected at Missouri River at Omaha, and 13 water samples were collected at Mississippi River at Clinton during the 1999 water year.

Nearly all the samples collected at the two stations contained detectable concentrations of agricultural chemicals. Detections of dissolved nitrite plus nitrate as nitrogen (hereafter referred to as nitrate) were common during the 1999 water year, with all samples containing concentrations greater than the detection level of 0.05 mg/L (milligrams per liter). Nitrate concentrations at Clinton ranged from 1.21 mg/L on September 9 to 3.88 mg/L, April 28 and at Omaha from 0.285 mg/L September 7 to 3.58 mg/L, April 20 at Omaha. Nitrate concentrations in water samples did not exceed 10 mg/L, which is the U.S. Environmental Protection Agency (USEPA) Maximum Contaminant Level (MCL) for public drinking water (USEPA, 1990 Maximum contaminant levels, subpart B of part 141, National primary drinking-water regulations: U.S. Code of Federal Regulations, Title 40, Parts 100 to 149, revised as of July 1, 1990, p. 553-677).

Pesticide analyses were completed for 28 water samples collected at the two NASQAN stations. Atrazine and metolachlor, two of the most commonly used herbicides in Iowa, were detected throughout the year at both NASQAN stations. Acetochlor and cyanazine were detected at least nine times at both sites. The largest herbicide concentration was 2.44 ug/L (micrograms per liter) of atrazine in the water sample collected from the Mississippi River on May 21. The largest overall concentration of acetochlor, alachlor, atrazine, cynazine, and metolachlor in a single event was also on the Mississippi River on May 21. This water sample had 1.66 ug/L of acetochlor, 0.105 ug/L of alachlor, 2.44 ug/L of atrazine, 0.172 ug/L of cyanazine, and 1.27 ug/L of metolachlor. No concentrations for any herbicide exceeded USEPA MCL's (USEPA,1992, Fact sheet: EPA 570/9-91-012FS, December 1992). Herbicide concentrations were generally larger in samples collected during May, June, and July than in samples collected at other times during water year 1999. Water samples collected in September through February had the lowest overall concentrations of the five herbicides during the 1999 water year.

Ground-Water Quality

The Iowa ground-water-quality monitoring program has been operated since 1982 by the U.S. Geological Survey in cooperation with the University of Iowa Hygienic Laboratory and the Iowa Department of Natural Resources, Geological Survey Bureau. The purpose of the program is twofold: (1) provide consistent and representative data describing the chemical water quality of the principal aquifers of the State; and (2) determine possible trends in both water quality and spatial distribution of water quality.

The ground-water-quality monitoring program was initiated to continue a program begun in 1950 by the State Health Department that consisted of periodic, nonspecific sampling of untreated water from municipal supply wells. Each year, approximately 250 wells, primarily municipal supply, were randomly-selected for sampling between April and November. Between 1985 and 1989, the emphasis of the program was on the analysis of nitrate and herbicide concentrations in samples from wells less than 200 feet in depth. Because of the random pattern of sampling both spatially (different wells each year) and seasonally (different times during the year), trends in ground-water quality were difficult to determine from the data. Therefore, in 1990, to provide year-to-year continuity of data and a more statistically sound basis for the study of long-term water-quality trends, a sampling strategy based on a random selection of wells weighted by aquifer vulnerability was implemented. Aquifer vulnerability was determined by the frequency of atrazine detections in water samples collected from wells in the respective aquifers. In 1990 and 1991, a fixed network of 50 wells was selected to be sampled annually, and approximately 200 wells continued to be selected on a rotational basis.

In 1992, the investigation of water-quality trends became the primary focus of the program, and a 10-year work plan was designed to eliminate spatial and seasonal variance, yet allow flexibility within the schedule to address additional data needs. For sampling site selection in 1992, the well inventory was divided into categories based on aquifer type and again on well depth for surficial aquifers, and into categories designated "vulnerable to contamination" and "not vulnerable to

contamination" based on the map *Groundwater Vulnerability Regions of Iowa* (Hoyer, B.E., and Hallberg, G.R., 1991, Special Map Series 11: Iowa Department of Natural Resources, scale 1:500,000) for bedrock aquifers. Vulnerability was determined by the combination and interpretation of factors including geologic and soil data, thickness of Quaternary cover, proximity to agricultural injection wells and sinkholes through which contaminants can be introduced to the aquifer, and evaluation of historical ground water and well contamination. A total of 90 sites were selected for sampling from a well inventory comprising approximately 1,640 public supply wells. From the 90 sites in the fixed network, 45 wells from two surficial aquifer types were selected to be sampled annually. The other 45 wells (from the bedrock aquifers) were selected to be sampled on a rotational schedule based on aquifer vulnerability to contamination. The wells determined to be vulnerable to contamination would be sampled every 2 years and those wells categorized as not vulnerable to contamination would be sampled every 4 years. All 90 wells were sampled in the first 2 years (1992 and 1993) and the sampling rotation began in 1994. The sampling effort during the 1999 water year is the eighth year of this 10-year program to determine possible ground-water-quality trends.

Ground-Water Monitoring Network

During the 1999 water year, a total of 67 ground-water samples were collected from municipal wells located in four vunerable bedrock aquifers and two types of surficial aquifers throughout the State (fig. 8). These wells were sampled as part of the Iowa ground-water-quality monitoring (GWM) program to determine water-quality trends. Aquifer types include: (1)

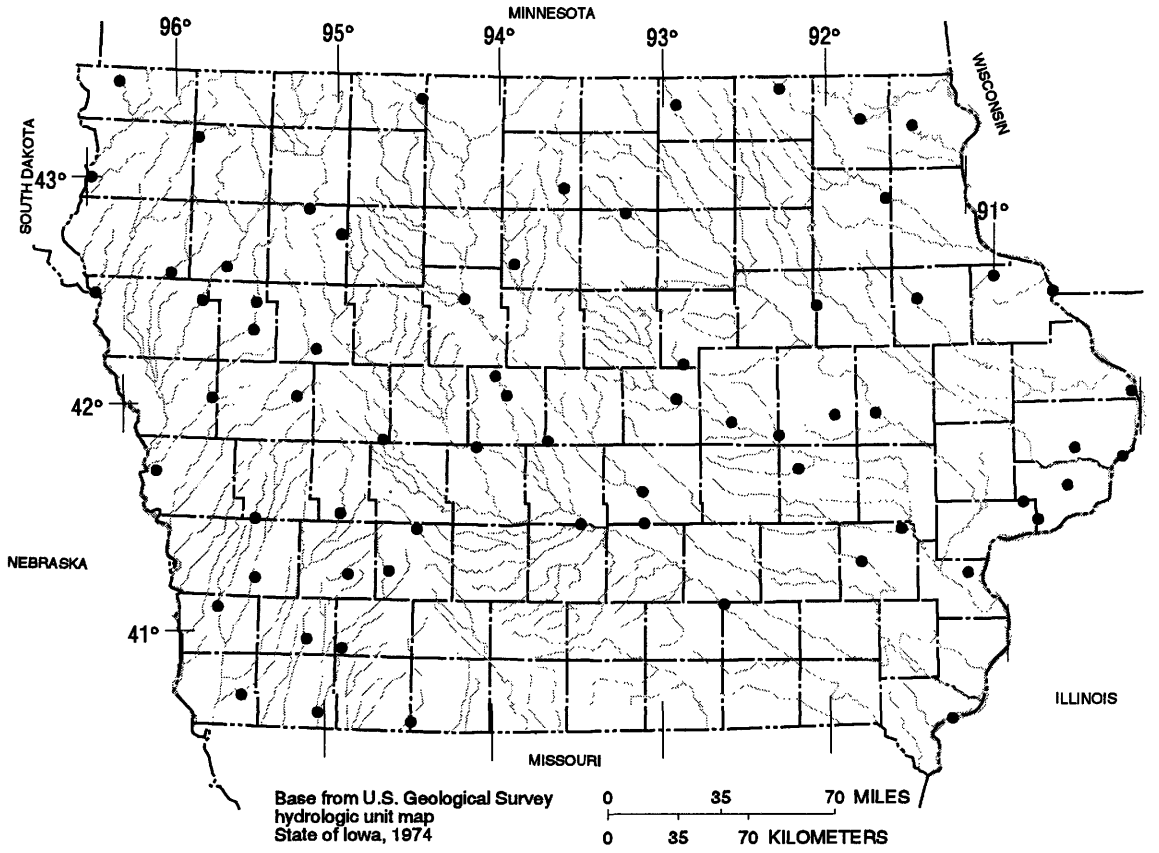

Figure 8. Location of active ground-water-quality monitoring wells in Iowa.

alluvial aquifers comprising sand and gravel associated with present-day fluvial systems; (2) glacial drift and buried-channel aquifers associated with previous glaciation; (3) cretaceous aquifer comprised of fine- to course-grained sandstones of the Dakota group; (4) carboniferous aquifer composed primarily of porous limestones and dolomites of the Mississippian age; (5) Silurian-Devonian aquifer comprised of porous and fractured limestones and dolomites; and (6) Cambrian-Ordovician aquifer comprised of the Jordan sandstone. Samples were collected during June, July, and August 1999. All samples were analyzed by the University of Iowa Hygienic Laboratory. All samples were analyzed for common ions, nutrients, and herbicides. In addition, samples from wells less than 300 feet deep were analyzed for volatile organic compounds (VOC's), and samples from wells greater than 300 feet deep were analyzed for radio chemicals. Results for all constituent analyses are published in this report. Discussion of analytical results will be limited to the nitrogen species nitrate and ammonia, and herbicides.

A summary of results for nutrient and herbicide analyses are listed by compound in table 6. Nitrate or ammonia was detected in 57 of the 67 samples analyzed for these compounds, and one or more herbicides were detected in 8 of the 66 samples. The laboratory minimum reporting level (MRL) for ammonia and nitrate is 0.10 mg/L. The MRL's for the herbicides listed below are 0.10 µg/L. The MRL is the lowest concentration reliably measured by the laboratory.

Table 6. Summary of nitrogen species and herbicides detected in samples from the Ground-Water-Quality Monitoring project, water year 1999
[µg/L, micrograms per liter; mg/L, milligrams per liter; <, less than detection limit]

Compound	Number of samples analyzed	Number of samples in which compound was detected	Median value	Maximum concentration detected
Acetochlor	66	0	<0.10 µg/L	<0.10 µg/L
Ammonia	67	28	< .10 mg/L	6.6 mg/L
Alachlor	66	0	< .10 µg/L	< .10 µg/L
Atrazine	66	5	< .10 µg/L	.31 µg/L
Butylate	66	0	< .10 µg/L	< .10 µg/L
Cyanazine	66	0	< .10 µg/L	< .10 µg/L
Deethylatrazine	66	2	< .10 µg/L	.25 µg/L
Deisopropylatrazine	66	1	< .10 µg/L	.19 µg/L
Metolachlor	66	4	< .10 µg/L	1.40 µg/L
Metribuzin	66	0	< .10 µg/L	< .10 µg/L
Nitrate	67	31	< .10 mg/L	18.0 mg/L
Prometone	66	0	< .10 µg/L	< .10 µg/L
Trifluralin	66	0	< .10 µg/L	< .10 µg/L

Concentrations of nitrate greater than 3.0 mg/L generally can be attributed to human activities, whereas concentrations less than 3.0 mg/L may indicate ambient concentrations from naturally occurring soil nitrogen or geologic deposits (Madison, R.J., and Brunett, J.O., 1984, Overview of the occurrence of nitrate in ground water of the United States, *in* National Water Summary 1984 -- Water quality trends: U.S. Geological Survey Water-Supply Paper 2275, p. 93-105). Nitrate concentrations were greater than 3.0 mg/L in 23 of 67 samples. Concentrations in seven samples exceeded 10 mg/L, which is the U.S. Environmental Protection Agency (USEPA) Maximum Contaminant Level (MCL) for public drinking water. Of the 31 samples that contained detectable concentrations of nitrate, 68 percent were from wells completed in alluvial aquifers, 10 percent were from glacial drift and buried-channel aquifers, and 22 percent were from vunerable bedrock aquifers. The median concentration of the 31 samples with detections was 5.5 mg/L. The median concentration of all samples was <0.10 mg/L. However, when all the wells are separated into categories based on well depth, the median nitrate concentrations vary from 3.8 mg/L in wells less than 50 feet deep to 4.0 mg/L in wells from 50 to 100 feet deep to <0.10 mg/L in wells greater than

100 feet deep. The maximum nitrate concentration was 18.0 mg/L. Twenty-eight samples had detectable ammonia concentrations. Of these samples, 25 percent were collected from alluvial aquifers, 36 percent were from glacial drift and buried-channel aquifers, and 39 percent were from vunerable bedrock aquifers.

Nine commonly used herbicides and two atrazine degradation products were sampled for during the 1999 water year. Water from 8 of the 66 wells sampled for herbicides contained detectable concentrations of one or more herbicides or herbicide degradation products. No sample contained herbicide concentrations that exceeded the MCL or proposed MCL of any of the analytes. Six of the eight samples contained atrazine or its degradates, deethylatrazine and deisopropylatrazine. Metolachlor and/or prometone were also detected in four of the samples. No detectable amounts of cyanazine, metribuzin, butylate, trifluralin, alachlor, or acetochlor were found in any of the samples. Five samples with detectable herbicide concentrations were from wells completed in alluvial aquifers, one sample was from the glacial drift aquifers, and two were from vulnerable bedrock aquifers.

Trends in Ground-Water Quality

In 1999, the herbicide detection frequency in all wells less than 100 feet deep was 17 percent. The detection frequency in the previous seven years is shown in figure 9. Variance in detection frequency may reflect several factors including changes in agricultural practices concerning use of herbicides, and climatic conditions.

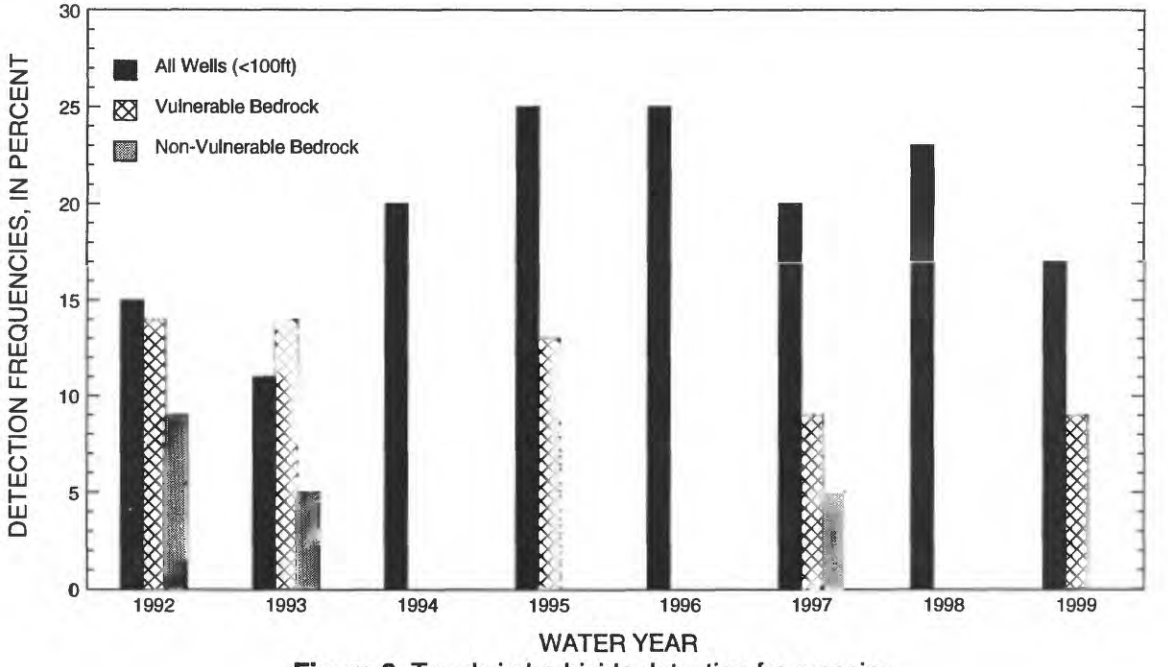

Figure 9. Trends in herbicide detection frequencies.

SPECIAL NETWORKS AND PROGRAMS

Hydrologic Benchmark Network is a network of 50 sites in small drainage basins around the country whose purpose is to provide consistent data on the hydrology, including water quality, and related factors in representative undeveloped watersheds nationwide, and to provide analyses on a continuing basis to compare and contrast conditions observed in basins more obviously affected by human activities.

National Stream-Quality Accounting Network (NASQAN) monitors the water quality of large rivers within four of the Nation's largest river basins--the Mississippi, Columbia, Colorado, and Rio Grande. The network consists of 39 stations. Samples are collected with sufficient frequency that the flux of a wide range of constituents can be estimated. The objective of NASQAN is to characterize the water quality of these large rivers by measuring concentration and mass transport of a wide range of dissolved and suspended constituents, including nutrients, major ions, dissolved and sediment-bound heavy metals, common pesticides, and inorganic and organic forms of carbon. This information will be used (1) to describe the long-term trends and changes in concentration and transport of these constituents; (2) to test findings of the National Water-Quality Assessment Program (NAWQA); (3) to characterize processes unique to large-river systems such as storage and re-mobilization of sediments and associated contaminants; and (4) to refine existing estimates of off-continent transport of water, sediment, and chemicals for assessing human effects on the world's oceans and for determining global cycles of carbon, nutrients, and other chemicals.

The National Atmospheric Deposition Program/National Trends Network (NADP/NTN) provides continuous measurement and assessment of the chemical climate of precipitation throughout the United States. As the lead federal agency, the USGS works together with over 100 organizations to accomplish the following objectives: (1) provide a long-term, spatial and temporal record of atmospheric deposition generated from a network of 191 precipitation chemistry monitoring sites. (2) provide the mechanism to evaluate the effectiveness of the significant reduction in SO2 emissions that began in 1995 as implementation of the Clean Air Act Amendments (CAAA) occurred. (3) provide the scientific basis and nationwide evaluation mechanism for implementation of the Phase II CAAA emission reductions for SO2 and NOx scheduled to begin in 2000.

Data from the network, as well as information about individual sites, are available through the world wide web at:

`http://nadp.nrel.colostate.edu/NADP`

The National Trends Network (NTN) is a 150-station network for sampling atmospheric deposition in the United States. The purpose of the network is to determine the variability, both in location and in time, of the composition of wet atmospheric deposition, which includes snow, rain, sleet, and hail. The core from which the NTN was built was the already-existing deposition-monitoring network of the National Atmospheric Deposition Program (NADP).

The National Water-Quality Assessment (NAWQA) Program of the U.S. Geological Survey is a long-term program with goals to describe the status and trends of water-quality conditions for a large, representative part of the Nation's ground- and surface-water resources; provide an improved understanding of the primary natural and human factors affecting these observed conditions and trends; and provide information that supports development and evaluation of management, regulatory, and monitoring decisions by other agencies.

Assessment activities are being conducted in 53 study units (major watersheds and aquifer systems) that represent a wide range of environmental settings nationwide and account for a large percentage of the Nation's water use. A wide array of chemical constituents will be measured in ground water, surface water, streambed sediments, and fish tissues. The coordinated application of comparative hydrologic studies at a wide range of spatial and temporal scales will provide information for decision making by water-resources managers and a foundation for aggregation and comparison of findings to address water-quality issues of regional and national interest.

Communication and coordination between USGS personnel and other local, State, and federal interests are critical components of the NAWQA Program. Each study unit has a local liaison committee consisting of representatives from key federal, State, and local water resources agencies, Indian nations, and universities in the study unit. Liaison committees

typically meet semiannually to discuss their information needs, monitoring plans and progress, desired information products, and opportunities to collaborate efforts among the agencies.

Additional information about the NAWQA Program is available through the world wide web at:

http://wwwrvares.er.usgs.gov/nawqa/nawqa_home.html

Radiochemical Programs is a network of regularly sampled water-quality stations where samples are collected to be analyzed for radioisotopes. The streams that are sampled represent major drainage basins in the conterminous United States.

Tritium Network is a network of stations which has been established to provide baseline information on the occurrence of tritium in the Nation's surface waters. In addition to the surface-water stations in the network, tritium data are also obtained at a number of precipitation stations. The purpose of the precipitation stations is to provide an estimate sufficient for hydrologic studies of the tritium input to the United States.

EXPLANATION OF THE RECORDS

The surface-water and ground-water records published in this report are for the 1999 water year that began October 1, 1998, and ended September 30, 1999. A calendar of the water year is provided on the inside of the front cover. The records contain streamflow data, stage and content data for lakes and reservoirs, water-quality data for surface and ground water, and ground-water-level data. The locations of the stations and wells where the data was collected are shown in figures 3-5, 7, 9, 10. The following sections of the introductory text are presented to provide users with a more detailed explanation of how the hydrologic data published in this report was collected, analyzed, computed, and arranged for presentation.

Station Identification Numbers

Each data station, whether streamsite or well, in this report is assigned a unique identification number. This number is unique in that it applies specifically to a given station and to no other. The number usually is assigned when a station is first established and is retained for that station indefinitely. The systems used by the U.S. Geological Survey to assign identification numbers for surface-water stations and for ground-water well sites differ, but both are based on geographic location. The "downstream order" system is used for regular surface-water stations, and the "latitude-longitude" system is used for wells.

Downstream Order System

Since October 1, 1950, the order of listing hydrologic-station records in Survey reports is in a downstream direction along the main stream. All stations on a tributary entering upstream from a mainstream station are listed before that station. A station on a tributary that enters between two mainstream stations is listed between them. A similar order is followed in listing stations on first rank, second rank, and other ranks of tributaries. The rank of any tributary, with respect to the stream to which it is immediately tributary, is indicated by an indention in the "List of Stations" in the front of this report. Each indention represents one rank. This downstream order and system of indention shows which stations are on tributaries between any two stations and the rank of the tributary on which each station is situated.

The station-identification number is assigned according to downstream order. In assigning station numbers, no distinction is made between partial-record stations and other stations; therefore, the station number for a partial-record station indicates downstream-order position in a list made up of both types of stations. Gaps are left in the series of numbers to allow for new stations that may be established; hence, the numbers are not consecutive. The complete eight-digit number for each station, such as 05388250, which appears just to the left of the station name, includes the two-digit Part number "05" plus the six-digit downstream-order number "388250." The Part number designates the major river basin; for example, Part "05" is the Mississippi River Basin.

Latitude-Longitude System

The identification numbers for wells and miscellaneous surface-water sites are assigned according to the grid system of latitude and longitude. The number consists of 15 digits. The first six digits denote the degrees, minutes, and seconds of latitude, the next seven digits denote degrees, minutes, and seconds of longitude, and the last two digits (assigned sequentially) identify the wells or other sites within a 1-second grid. This site-identification number, once assigned, is a pure number and has no locational significance. In the rare instance where the initial determination of latitude and longitude are found to be in error, the station will retain its initial identification number; however, its true latitude and longitude will be listed in the LOCATION paragraph of the station description. (See figure below.)

Latitude and longitude coordinates for wells:

1. 414315091252001
2. 414315091252002
3. 414316091251901

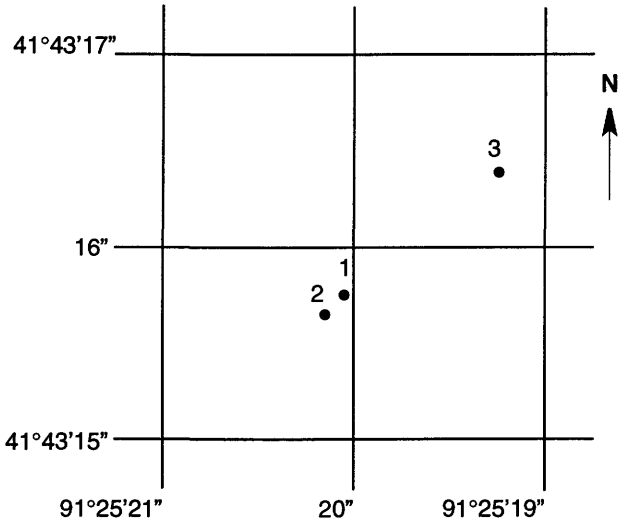

Figure 10. Latitude-longitude well number.

Numbering System For Wells

Each well is identified by means of (1) a 15-digit number that is based on the grid system of latitude and longitude, and (2) a local number that is provided for continuity with older reports and for other use as dictated by local needs. For maximum utility, latitude and longitude code numbers are determined to seconds in order that each well may have a unique number. The first six digits denote degrees, minutes, and seconds of north latitude; the next seven digits are degrees, minutes, and seconds of west longitude; and the last two numbers are a sequential number assigned in the order in which the wells are located in a 1-second quadrangle.

The local well numbers are in accordance with the Bureau of Land Management's system of land subdivision. Each well number is made up of three segments. The first segment indicates the township, the second the range, and the third the section

in which the well is located (fig. 11). The letters after the section number, which are assigned in a counter-clockwise direction (beginning with "A" in the northeast quarter), represent subdivisions of the section. The first letter denotes a 160-acre tract, the second a 40-acre tract, the third a 10-acre tract, and the fourth a 2.5 acre tract. Numbers are added as suffixes to distinguish wells in the same tract. Thus, the number 96-20-3CDBD1 designates the well in the SE 1/4 NW 1/4 SE 1/4 SW 1/4 sec.3, T.96 N., R.20 W.

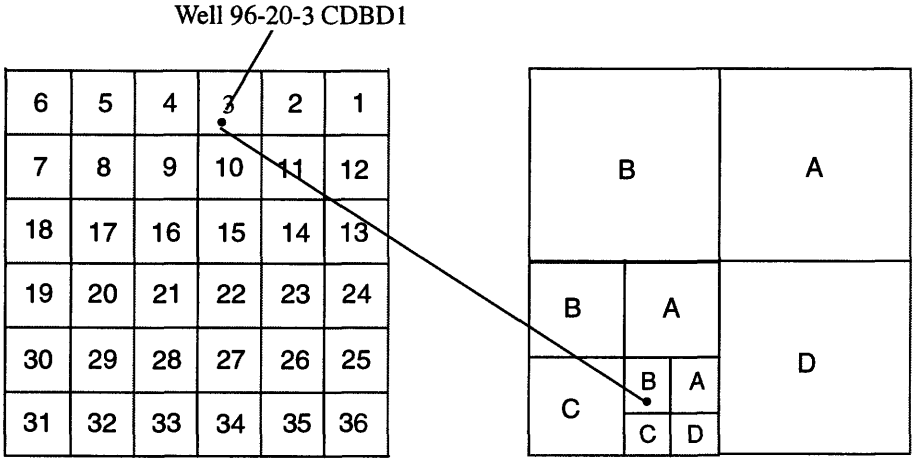

Figure 11. Local well-numbering system.

Records of Stage and Water Discharge

Records of stage and water discharge may be complete or partial. Complete records of discharge are those obtained using a continuous stage-recording device through which either instantaneous or mean daily discharges may be computed for any time, or any period of time, during the period of record. Complete records of lake or reservoir content, similarly, are those for which stage or content may be computed or estimated with reasonable accuracy for any time, or period of time. They may be obtained using a continuous stage-recording device, but need not be. Because daily mean discharges and end-of-day contents commonly are published for such stations, they are referred to as "daily stations." Location of all complete-record surface water stations which are given in this report are shown in figure 3.

Partial records are obtained through discrete measurements without using a continuous stage-recording device, and generally pertain only to a characteristic of either high, medium or low flow. The location of all active, crest-stage gaging stations are shown in figure 4.

Data Collection and Computation

The data obtained at a complete-record gaging station on a stream or canal consists of a continuous record of stage, individual measurements of discharge throughout a range of stages, and notations regarding factors that may affect the relationships between stage and discharge. This data, together with supplemental information, such as weather records, are

used to compute daily discharges. The data obtained at a complete-record gaging station on a lake or reservoir consists of a record of stage and of notations regarding factors that may affect the relationship between stage and lake content. This data is used with stage-capacity curves or tables to compute lake storage.

Continuous records of stage are obtained with analog recorders that trace continuous graphs of stage or with digital recorders that punch stage values on paper tapes at selected time intervals. Measurements of discharge are made with current meters using methods adopted by the Geological Survey as a result of experience accumulated since 1880. These methods are described in standard textbooks, in Water-Supply Paper 2175, and in U.S. Geological Survey Techniques of Water-Resources Investigations, Book 3, Chapter A6.

In computing discharge records, results of individual measurements are plotted against the corresponding stages, and stage-discharge relation curves are then constructed. From these curves, rating tables indicating the approximate discharge for any stage within the range of the measurements are prepared. If it is necessary to define extremes of discharge outside the range of the current-meter measurements, the curves are extended using: (1) logarithmic plotting; (2) velocity-area studies; (3) results of indirect measurements of peak discharge, such as slope-area or contracted-opening measurements, and computations of flow over dams or weirs; or (4) step-backwater techniques.

Daily mean discharges are computed by applying the daily mean stages (gage heights) to the stage-discharge curves or tables. If the stage-discharge relation is subject to change because of frequent or continual change in the physical features that form the control, the daily mean discharge is determined by the shifting-control method, in which correction factors based on the individual discharge measurements and notes of the personnel making the measurements are applied to the gage heights before the discharges are determined from the curves or tables. This shifting-control method also is used if the stage-discharge relation is changed temporarily because of aquatic growth or debris on the control. For some stations, formation of ice in the winter may so obscure the stage-discharge relations that daily mean discharges must be estimated from other information such as temperature and precipitation records, notes of observations, and records for other stations in the same or nearby basins for comparable periods.

At some stream-gaging stations, the stage-discharge relation is affected by the backwater from reservoirs, tributary streams, or other sources. This necessitates the use of the slope method in which the slope or fall in a reach of the stream is a factor in computing discharge. The slope or fall is obtained by means of an auxiliary gage set at some distance from the base gage. At some stations, the stage-discharge relation is affected by changing stage; at these stations, the rate of change in stage is used as a factor in computing discharge.

In computing records of lake or reservoir contents, it is necessary to have available from surveys, curves or tables defining the relationship of stage and content. The application of stage to the stage-content curves or tables gives the contents from which daily, monthly, or yearly changes then are determined. If the stage-content relation changes because of deposition of sediment in a lake or reservoir, periodic resurveys may be necessary to redefine the relation. Even when this is done, the contents computed may become increasingly in error as the lapsed time since the last survey increases. Discharges over lake or reservoir spillways are computed using stage-discharge relations.

For some gaging stations, there are periods when no gage-height record is obtained, or the recorded gage height is so faulty that it cannot be used to compute daily discharge or contents. This happens when the recorder stops or otherwise fails to operate properly, intakes are plugged, the float is frozen in the well, or for various other reasons. For these periods, the daily discharges are estimated from the recorded range in stage, discharge computed before and after the missing record, discharge measurements, weather records, and comparison with other station records from the same or nearby basins. Likewise, daily contents may be estimated from operator's logs, previous or following record, inflow-outflow studies, and other information. Information explaining how estimated daily-discharge values are identified in station records is included in the next two sections, "Data Presentation" (REMARKS paragraph) and "Identifying Estimated Daily Discharge."

Data Presentation

Streamflow data in this report are presented in a new format that is considerably different from the format in data reports prior to the 1991 water year. The major changes are that statistical characteristics of discharge now appear in tabular summaries following the water-year data table, and less information is provided in the text or station manuscript above the table. These changes represent the results of a pilot program to reformat the annual water-data report to meet current user needs and data preference.

The records published for each continuous-record surface-water discharge station (gaging station) consist of four parts, the manuscript or station description; the data table of daily mean values of discharge for the current water year with summary data; a tabular statistical summary of monthly mean flow data for a designated period, by water year; and a summary statistics table that includes statistical data of annual, daily, and instantaneous flows as well as data pertaining to annual runoff, 7-day low-flow minimums, and flow duration.

Station Manuscript

The manuscript provides, under various headings, descriptive information, such as station location; period of record; historical extremes outside period of record; record accuracy; and other remarks pertinent to station operation and regulation. The following information, as appropriate, is provided with each continuous record of discharge or lake content. Comments to follow clarify information presented under the various headings of the station description.

LOCATION.--Information on locations is obtained from the most accurate maps available. The location of the gage with respect to the cultural and physical features in the vicinity and with respect to the reference place mentioned in the station name is given. River mileages were determined by methods given in "River Mileage Measurement," Bulletin 14, Revision of October 1968, prepared by the Water Resources Council or were provided by the U.S. Army Corps of Engineers.

DRAINAGE AREA.--Drainage areas are measured using the most accurate maps available. Because the type of maps available varies from one drainage basin to another, the accuracy of drainage areas likewise varies. Drainage areas are updated as better maps become available.

PERIOD OF RECORD.--This indicates the period for which there are published records for the station or for an equivalent station. An equivalent station is one that was in operation at a time that the present station was not, and whose location was such that records from it can reasonably be considered equivalent with records from the present station.

REVISED RECORDS.-- Because of new information, published records occasionally are found to be incorrect, and revisions are printed in later reports. Listed under this heading are all the reports in which revisions have been published for the station and the water years to which the revisions apply. If a revision did not include daily, monthly, or annual figures of discharge, that fact is noted after the year dates as follows: "(M)" means that only the instantaneous maximum discharge was revised; "(m)" that only the instantaneous minimum was revised; and "(P)" that only peak discharges were revised. If the drainage area has been revised, the report in which the most recently revised figure was first published is given.

GAGE.--The type of gage in current use, the datum of the current gage sea level (see "Definition of Terms"), and a condensed history of the types, locations, and datums of previous gages are given under this heading.

REMARKS.--All periods of estimated daily-discharge record will either be identified by date in this paragraph of the station description for water-discharge stations or flagged in the daily-discharge table. (See next section, "Identifying Estimated Daily Discharge.") If a REMARKS paragraph is used to identify estimated record, the paragraph will begin with this information presented as the first entry. The paragraph is also used to present information relative to the accuracy of the records, to special methods of computation, and to conditions that affect natural flow at the station. In addition, information may be presented pertaining to average discharge data for the period of record; to extremes data for the period of record and the current year; and, possibly, to other pertinent items. For reservoir stations, information is given on the dam forming the reservoir, the capacity, outlet works and spillway, and purpose and use of the reservoir.

COOPERATION.--Records provided by a cooperating organization or obtained for the Geological Survey by a cooperating organization are identified here.

EXTREMES FOR PERIOD OF RECORD.--Extremes may include maximum and minimum stages and maximum and minimum discharges or content. Extremes are published only for stations with significant flow regulation and where extremes occurred in pre-regulation periods. Unless otherwise qualified, the maximum discharge or content is the instantaneous maximum corresponding to the highest stage that occurred. The highest stage may have been obtained from a graphic or digital recorder, a crest-stage gage, or by direct observation of a nonrecording gage. If the maximum stage did not occur on the same day as the maximum discharge or content, it is given separately. Similarly, the minimum is the instantaneous minimum discharge, unless otherwise qualified, and was determined and is reported in the same manner as the maximum.

EXTREMES OUTSIDE PERIOD OF RECORD.--Included here is information concerning major floods or unusually low flows that occurred outside the stated period of record. The information may or may not have been obtained by the U.S. Geological Survey.

REVISIONS.--If a critical error in published records is discovered, a revision is included in the first report published following discovery of the error.

Although rare, occasionally the records of a discontinued gaging station may need revision. Because, for these stations, there would be no current or, possibly, future station manuscript published to document the revision in a "Revised Records" entry, users of data for these stations who obtained the record from previously published data reports may wish to contact the District Office (address given on the back of the title page of this report) to determine if the published records were ever revised after the station was discontinued. Of course, if the data for a discontinued station were obtained by computer retrieval, the data would be current, and there would be no need to check because any published revision of data is always accompanied by revision of the corresponding data in computer storage.

Manuscript information for lake or reservoir stations differs from that for stream stations in the nature of the "Remarks" and in the inclusion of a skeleton stage-capacity table when daily contents are given.

Headings for AVERAGE DISCHARGE, EXTREMES FOR PERIOD OF RECORD, and EXTREMES FOR CURRENT YEAR have been deleted, and the information contained in these paragraphs is now presented in the tabular summaries following the discharge table or in the REMARKS paragraph, as appropriate. EXTREMES FOR PERIOD OF RECORD are now presented only for stations with significant flow regulation and where extremes occurred in pre-regulation periods. No changes have been made to the data presentations of lake contents or reservoir storage.

Data Table of Daily Mean Values

The daily table for stream-gaging stations gives mean discharge for each day and is followed by monthly and yearly summaries. In the monthly summary below the daily table, the line headed "TOTAL" gives the sum of the daily figures. The line headed "MEAN" gives the average flow in cubic feet per second during the month. The lines headed "MAX" and "MIN" give the maximum and minimum daily discharges, respectively, for the month. Discharge for the month also is usually expressed in cubic feet per second per square mile (line headed "CFSM"), or in inches (line headed "IN."), or in acre-feet (line headed "AC-FT"). Figures for cubic feet per second per square mile and runoff in inches are omitted if there is extensive regulation or diversion or if the drainage area includes large noncontributing areas. In the yearly summary below the monthly summary, the figures shown are the appropriate discharges for the calendar and water years. At some stations, monthly and (or) yearly observed discharges are adjusted for reservoir storage or diversion, or diversions or reservoir contents are given. These figures are identified by a symbol and corresponding footnote.

Statistics of Monthly Mean Data

A tabular summary of the mean (line headed "MEAN"), maximum (line headed "MAX"), and minimum (line headed "MIN") of monthly mean flows for each month for a designated period is provided below the mean values table. The water years of the first occurrence of the maximum and minimum monthly flows are provided immediately below those figures. The

designated period will be expressed as "FOR PERIOD OF RECORD, BY WATER YEAR (WY)," for unregulated streams for the water years listed in the PERIOD OF RECORD paragraph in the station manuscript. It will consist of all of the station record within the specified water years, inclusive, including complete months of record for partial water years, if any, and may coincide with the period of record for the station. The water years for which the statistics are computed will be consecutive, unless a break in the station record is indicated in the manuscript. For significantly regulated streams, the first and last water years of the range of years will be given for the post-regulation period.

Summary Statistics

A table titled "SUMMARY STATISTICS" follows the statistics of monthly mean data tabulation. This table consists of four columns, with the first column containing the line headings of the statistics being reported. The table provides a statistical summary of yearly, daily, and instantaneous flows, not only for the current water year, but also for the previous calendar year and for a designated period, as appropriate. The designated period selected, "PERIOD OF RECORD," for unregulated streams, will consist of all of the station record within the specified water years, inclusive, including complete months of record for partial water years, if any, and may coincide with the period of record for the station. The water years for which the statistics are computed will be consecutive, unless a break in the station record is indicated in the manuscript. For significantly regulated streams, the period selected will be designated as "WATER YEARS ___ - ___," for the post regulation period. All of the calculations for the statistical characteristics designated ANNUAL (See line headings below.), except for the "ANNUAL 7-DAY MINIMUM" statistic, are calculated for the designated period using complete water years. The other statistical characteristics may be calculated using partial water years.

The date or water year, as appropriate, of the first occurrence of each statistic reporting extreme values of discharge is provided adjacent to the statistic. Repeated occurrences may be noted in the REMARKS paragraph of the manuscript or in footnotes. Because the designated period may not be the same as the station period of record published in the manuscript, occasionally the dates of occurrence listed for the daily and instantaneous extremes in the designated-period column may not be within the selected water years listed in the heading. When this occurs, it will be noted in the REMARKS paragraph or in footnotes. Selected streamflow duration curve statistics and runoff data are also given. Runoff data may be omitted if there is extensive regulation or diversion of flow in the drainage basin.

The following summary statistics data, as appropriate, are provided with each continuous record of discharge. Comments to follow clarify information presented under the various line headings of the summary statistics table.

ANNUAL TOTAL.--The sum of the daily mean values of discharge for the year. At some stations, the annual total discharge is adjusted for reservoir storage or diversion. The adjusted figures are identified by a symbol and corresponding footnotes.

ANNUAL MEAN.--The arithmetic mean of the individual daily mean discharges for the year noted or for the designated period. At some stations, the yearly mean discharge is adjusted for reservoir storage or diversion. The adjusted figures are identified by a symbol and corresponding footnotes.

HIGHEST ANNUAL MEAN.--The maximum annual mean discharge occurring for the designated period.

LOWEST ANNUAL MEAN.--The minimum annual mean discharge occurring for the designated period.

HIGHEST DAILY MEAN.--The maximum daily mean discharge for the year or for the designated period.

LOWEST DAILY MEAN.--The minimum daily mean discharge for the year or for the designated period.

ANNUAL 7-DAY MINIMUM.--The lowest mean discharge for 7 consecutive days for a calendar year or a water year. Note that most low-flow frequency analyses of annual 7-day minimum flows use a climatic year (April 1 - March 31). The date shown in the summary statistics table is the initial date of the 7-day period. (This value should not be confused with the 7-day 10-year low-flow statistic.)

INSTANTANEOUS PEAK FLOW.--The maximum instantaneous discharge occurring for the water year or for the designated period. Note that secondary instantaneous peak discharges above a selected base discharge are stored in District computer files for stations meeting certain criteria. Those discharge values may be obtained by writing to the District Office. (See address on back of title page of this report.)

INSTANTANEOUS PEAK STAGE.--The maximum instantaneous stage occurring for the water year or for the designated period. If the dates of occurrence for the instantaneous peak flow and instantaneous peak stage differ, the REMARKS paragraph in the manuscript or a footnote may be used to provide further information.

INSTANTANEOUS LOW FLOW.--The minimum instantaneous discharge occurring for the water year or for the designated period.

ANNUAL RUNOFF.--Indicates the total quantity of water in runoff for a drainage area for the year. Data reports may use any of the following units of measurement in presenting annual runoff data:

Acre-foot (AC-FT) is the quantity of water required to cover 1 acre to a depth of 1 foot and is equivalent to 43,560 cubic feet or about 326,000 gallons or 1,233 cubic meters.

Cubic feet per second per square mile (CSFM) is the average number of cubic feet of water flowing per second from each square mile of area drained, assuming the runoff is distributed uniformly in time and area.

Inches (INCHES) indicates the depth to which the drainage area would be covered if all of the runoff for a given time period were uniformly distributed on it.

10 PERCENT EXCEEDS.--The discharge that is exceeded 10 percent of the time for the designated period.

50 PERCENT EXCEEDS.--The discharge that is exceeded 50 percent of the time for the designated period.

90 PERCENT EXCEEDS.--The discharge that is exceeded 90 percent of the time for the designated period.

Data collected at partial-record stations follow the information for continuous-record sites. Data for partial-record discharge stations are presented in two tables. The first is a table of annual maximum stage and discharge at crest-stage stations, and the second is a table of discharge measurements at low-flow partial-record stations. The tables of partial-record stations are followed by a listing of discharge made at sites other than continuous-record or partial-record stations. These measurements are generally made in times of drought or flood to give better areal coverage to those events. Those measurements and others collected for some special reason are called measurements at miscellaneous sites.

Identifying Estimated Daily Discharge

Estimated daily-discharge values published in the water-discharge tables of annual State data reports are identified by listing the dates of the estimated record in the REMARKS paragraph of the station description, and are flagged "e" in tables.

Accuracy of the Records

The accuracy of streamflow records depends primarily on: (1) the stability of the stage-discharge relation or, if the control is unstable, the frequency of discharge measurements; and (2) the accuracy of measurements of stage, measurements of discharge, and interpretation of records.

The accuracy attributed to the records is indicated under "REMARKS." "Excellent" means that about 95 percent of the daily discharges are within 5 percent of their true values; "good," within 10 percent; and "fair," within 15 percent. Records that do not meet the criteria mentioned are rated "poor." Different accuracies may be attributed to different parts of a given record.

Daily mean discharges in this report are given to the nearest hundredth of a cubic foot per second for values less than 1 ft ^{3}/s the nearest tenth between 1.0 and 10 ft^3/s; to whole numbers between 10 and 1,000 ft^3/s; and to 3 significant figures for more than 1,000 ft^3/s. The number of significant figures used is based solely on the magnitude of the discharge value. The same rounding rules apply to discharges listed for partial-record stations and miscellaneous sites.

Discharge at many stations, as indicated by the monthly mean, may not reflect natural runoff due to the effects of diversion, consumption, regulation by storage, increase or decrease in evaporation due to artificial causes, or to other factors. For such stations, figures of cubic feet per second per square mile and of runoff, in inches, are not published.

Other Records Available

Information used in the preparation of the records in this publication, such as discharge-measurement notes, gage-height records, temperature measurements, and rating tables is on file in various field offices of the Iowa District. Also, most of the daily mean discharges are in computer-readable form and have been analyzed statistically. Information on the availability of the unpublished information or on the results of statistical analyses of the published records may be obtained from the offices whose addresses are given on the back of the title page of this report.

Records of Surface-Water Quality

Records of surface-water quality ordinarily are obtained at or near streamgaging stations because interpretation of records of surface-water quality nearly always requires corresponding discharge data. Records of surface-water quality in this report may involve a variety of types of data and measurement frequencies.

Classification of Records

Water-quality data for surface-water sites are grouped into one of three classifications. A continuing-record station is a site where data is collected on a regularly scheduled basis. Frequency may be once or more times daily, weekly, monthly, or quarterly. A partial-record station is a site where limited water-quality data is collected systematically over a period of years. Frequency of sampling is usually less than quarterly. A miscellaneous sampling site is a location other than a continuing or partial-record station, where random samples are collected to give better areal coverage to define water-quality conditions in the river basin.

A careful distinction needs to be made between "continuing records" as used in this report and "continuous recordings," which refers to a continuous graph or a series of discrete values punched at short intervals on a paper tape. Some records of water quality, such as temperature and specific conductance, may be obtained through continuous recordings; however, because of costs, most data is obtained only monthly or less frequently. Locations of stations for which records on the quality of surface water appear in this report are shown in figure 5.

Arrangement of Records

Water-quality records collected at a surface-water daily record station are published immediately following that record, regardless of the frequency of sample collection. Station number and name are the same for both records. Where a surface-water daily record station is not available or where the water quality differs significantly from that at the nearby surface-water station, the continuing water-quality record is published with its own station number and name in the regular downstream-order sequence. Water-quality data for partial-record stations and for miscellaneous sampling sites appear in separate tables following the table of discharge measurements at miscellaneous sites.

On-Site Measurements and Sample Collection

In obtaining water-quality data, a major concern needs to be assuring that the data obtained represent the in situ quality of the water. To assure this, certain measurements, such as water temperature, pH, alkalinity and dissolved oxygen, are made onsite when the samples are taken. To assure that measurements made in the laboratory also represent the in situ water, carefully prescribed procedures are followed in collecting the samples, in treating the samples to prevent changes in quality pending analysis, and in shipping the samples to the laboratory. Procedures of onsite measurements and for collecting, treating, and shipping samples are given in publications on "Techniques of Water-Resources Investigations," Book 1, Chap. C2; Book 3, Chap. C2; Book 5, Chap. A1, A3, and A4. All of these references are listed on p. 54-56 of this report. Also, detailed information on collecting, treating, and shipping samples may be obtained from the Geological Survey District Office.

One sample can define adequately the water quality at a given time if the mixture of solutes throughout the stream cross section is homogeneous. However, the concentration of solutes at different locations in the cross section may vary widely with different rates of water discharge, depending on the source of material and the turbulence and mixing of the stream. Some streams must be sampled through several vertical sections to obtain the representative sample needed for an accurate mean concentration and for use in calculating load. All samples obtained for the National Stream Quality Accounting Network are obtained from at least several verticals. Whether samples are obtained from the centroid of flow or from several verticals depends on flow conditions and other factors, which must be evaluated by the collector.

Chemical-quality data published in this report are considered to be the most representative values available for stations listed. The values reported represent water-quality conditions at the time of sampling as much as possible, consistent with available sampling techniques and methods of analysis.

Water Temperature and Specific Conductance

Water temperatures are measured at most of the water-quality stations. The measurement of temperature and specific conductance is performed during each regular site visit (usually at a six week interval) to streamgaging stations. Records of stream temperature indicate significant thermal characteristics of the stream when analyzed over a long period of record. Large streams have small daily temperature variations, while shallow streams may have a daily range of several degrees and may closely follow the changes in air temperature. Furthermore, some streams may be affected by waste-heat discharge.

Specific conductance can be used as a general indicator of stream quality. This determination is easily made in the field with a portable meter, and the results are very useful as general indicators of dissolved-solids concentration or as a base for extrapolating other analytical data. Records for temperature and specific conductance appear in the section "Analyses of samples collected at miscellaneous sites".

Sediment

Suspended-sediment concentrations are determined from samples collected by using depth-integrating samples. Samples usually are obtained at several verticals in the cross section, or a single sample may be obtained at a fixed point and a coefficient applied to determine the mean concentration in the cross sections.

During periods of rapidly changing flow or rapidly changing concentration, samples may have been collected more frequently (twice daily, or in some instances, hourly). The published sediment discharges for days of rapidly changing flow or concentration were computed by the subdivided-day method (time-discharge weighted average). Therefore, for those days when the published sediment discharge value differs from the value computed as the product of discharge times mean concentration times 0.0027, the reader can assume that the sediment discharge for that day was computed by the subdivided-day method. For periods when no samples were collected, daily discharges of suspended sediment were estimated on the basis of water discharge, sediment concentrations observed immediately before and after the periods, and suspended-sediment loads for other periods of similar discharge.

At other stations, suspended-sediment samples were collected periodically at many verticals in the stream cross section. Although data collected periodically may represent conditions only at the time of observations, such data are useful in establishing seasonal relations between quality and streamflow and in predicting long-term sediment-discharge characteristics of the stream.

In addition to the records of the quantities of suspended-sediment, records of the periodic measurements of the particle-size distribution of the suspended-sediment and bed material are included. Miscellaneous suspended-sediment samples were collected during flood events have been included with the station's water quality data or in the section "Analyses of samples at miscellaneous sites".

Laboratory Measurements

Sediment samples, samples for indicator bacteria, and daily samples for specific conductance are analyzed locally. All other samples are analyzed in the U.S. Geological Survey laboratory in Arvada, Colorado and the University of Iowa Hygienic Laboratory. Methods used in analyzing sediment samples and computing sediment records are given in TWRI, Book 5, Chap. C1. Methods used by the U.S. Geological Survey laboratories are given in TWRI, Book 1, Chap. D2, Book 3, Chap. C2; Book 5, Chap. A1, A3, and A4.

Data Presentation

For continuing-record stations, information pertinent to the history of station operation is provided in descriptive headings preceding the tabular data. These descriptive headings give details regarding location, drainage area, period of record, type of data available, instrumentation, general remarks, cooperation, and extremes for parameters currently measured daily. Tables of chemical, physical, biological, radiochemical data, and so forth, obtained at a frequency less than daily are presented first. Tables of "daily values" of specific conductance, pH, water temperature, dissolved oxygen, and suspended sediment then follow in sequence.

In the descriptive headings, if the location is identical to that of the discharge gaging station, neither the LOCATION nor the DRAINAGE AREA statements are repeated. The following information, as appropriate, is provided with each continuous-record station. Comments that follow clarify information presented under the various headings of the station description.

LOCATION.--See Data Presentation under "Records of Stage and Water Discharge;" same comments apply.

DRAINAGE AREA.--See Data Presentation under "Records of Stage and Water Discharge;" same comments apply.

PERIOD OF RECORD.--This indicates the periods for which there are published water-quality records for the station. The periods are shown separately for records of parameters measured daily or continuously and those measured less than daily. For those measured daily or continuously, periods of record are given for the parameters individually.

INSTRUMENTATION.--Information on instrumentation is given only if a water-quality monitor temperature record, sediment pumping sampler, or other sampling device is in operation at a station.

REMARKS.--Remarks provide added information pertinent to the collection, analysis, or computation of the records.

COOPERATION.--Records provided by a cooperating organization or obtained for the Geological Survey by a cooperating organization are identified here.

EXTREMES.--Maximums and minimums are given only for parameters measured daily or more frequently. None are given for parameters measured weekly or less frequently, because the true maximums or minimums may not have been sampled. Extremes, when given, are provided for both the period of record and for the current water year.

REVISIONS.--If errors in published water-quality records are discovered after publication, appropriate updates are made to the Water-Quality File in the U.S. Geological Survey's computerized data system, WATSTORE, and subsequently by monthly transfer of update transactions to the U.S. Environmental Protection Agency's STORET system. Because the usual

volume of updates makes it impractical to document individual changes in the State data-report series or elsewhere, potential users of U.S. Geological Survey water-quality data are encouraged to obtain all required data from the appropriate computer file to insure the most recent updates.

The surface-water-quality records for partial-record stations and miscellaneous sampling sites are published in separate tables following the table of discharge measurements at miscellaneous sites. No descriptive statements are given for these records. Each station is published with its own station number and name in the regular downstream-order sequence.

Remarks Codes

The following remarks codes may appear with the water-quality data in this report:

PRINTED OUTPUT	REMARK
E	Estimated value
>	Actual value is know to be greater than the value shown
<	Actual value is known to be less than the value shown
K	Results based on colony count outside the acceptance range (non-ideal colony count)
L	Biological organism count less than 0.5 percent (organism may be observed rather than counted)
D	Biological organism count equal to or greater than 15 percent (dominant)
&	Biological organism estimated as dominant
V	Analyte was detected in both the environmental sample and the associated blank

Water Quality-Control Data

Data generated from quality-control (QC) samples are a requisite for evaluating the quality of the sampling and processing techniques as well as data from the actual samples themselves. Without QC data, environmental sample data cannot be adequately interpreted because the errors associated with the sample data are unknown. The various types of QC samples collected by this district are described in the following section. Procedures have been established for the storage of water-quality-control data within the USGS. These procedures allow for storage of all derived QC data and are identified so that they can be related to corresponding environmental samples.

Blank Samples

Blank samples are collected and analyzed to ensure that environmental samples have not been contaminated by the overall data-collection process. The blank solution used to develop specific types of blank samples is a solution that is free of the analytes of interest. Any measured value signal in a blank sample for an analyte (a specific component measured in a chemical analysis) that was absent in the blank solution is believed to be due to contamination. There are many types of blank samples possible, each designed to segregate a different part of the overall data-collection process. The types of blank samples collected in this District are:

Field blank - a blank solution that is subjected to all aspects of sample collection, field processing preservation, transportation, and laboratory handling as an environmental sample.

Trip blank - a blank solution that is put in the same type of bottle used for an environmental sample and kept with the set of sample bottles before and after sample collection.

Equipment blank - a blank solution that is processed through all equipment used for collecting and processing an environmental sample (similar to a field blank but normally done in the more controlled conditions of the office).

Sampler blank - a blank solution that is poured or pumped through the same field sampler used for collecting an environmental sample.

Filter blank - a blank solution that is filtered in the same manner and through the same filter apparatus used for an environmental sample.

Splitter blank - a blank solution that is mixed and separated using a field splitter in the same manner and through the same apparatus used for an environmental sample.

Preservation blank - a blank solution that is treated with the sampler preservatives used for an environmental sample.

Reference Samples

Reference material is a solution or material prepared by a laboratory whose composition is certified for one or more properties so that it can be used to assess a measurement method. Samples of reference material are submitted for analysis to ensure that an analytical method is accurate for the known properties of the reference material. Generally, the selected reference material properties are similar to the environmental sample properties.

Replicate Samples

Replicate samples are a set of environmental samples collected in a manner such that the samples are thought to be essentially identical in composition. Replicate is the general case for which a duplicate is the special case consisting of two samples. Replicate samples are collected and analyzed to establish the amount of variability in the data contributed by some part of the collection and analytical process. There are many types of replicate samples possible, each of which may yield slightly different results in a dynamic hydrologic setting, such as a flowing stream. The types of replicate samples collected in this District are:

Sequential samples - a type of replicate sample in which the samples are collected one after the other, typically over a short time.

Split sample - a type of replicate sample in which a sample is split into subsamples contemporaneous in time and space.

Spike Samples

Spike samples are samples to which known quantities of a solution with one or more well-established analyte concentrations have been added. These samples are analyzed to determine the extent of matrix interference or degradation on the analyte concentration during sample processing and analysis.

Dissolved Trace-Element Concentrations

NOTE.--Traditionally, dissolved trace-element concentrations have been reported at the microgram per liter (µg/L) level. Recent evidence, mostly from large rivers, indicates that actual dissolved-phase concentrations for a number of trace elements are within the range of 10's to 100's of nanograms per liter (ng/L). Data above the µg/L level should be viewed with caution. Such data may actually represent elevated environmental concentrations from natural or human causes; however, these data could reflect contamination introduced during sampling, processing, or analysis. To confidently produce dissolved trace-element data with insignificant contamination, the U.S. Geological Survey began using new trace-element protocols at some stations in water year 1994.

Change in National Trends Network Procedures

Sample handling procedures at all National Trends Network stations were changed substantially on January 11, 1994, in order to reduce contamination from the sample shipping container. The data for samples before and after that date are different and not directly comparable. A tabular summary of the differences based on a special intercomparison study is available from the NADP/NTN Coordination Office, Colorado State University, Fort Collins, CO 80523 (Telephone: 303-491-5643).

Records of Ground-Water Levels

Ground-water level data from a network of observation wells in Iowa is published in this report. This data provides a limited historical record of water-level changes in the State's most important aquifers. Locations of the observation wells in this network in Iowa are shown in figure 6. Information about the availability of the data in the water-level files and reports of the U.S. Geological Survey may be obtained from the Iowa District Office (see address on back of title page).

Data Collection and Computation

Measurements of water levels are made in many types of wells under varying conditions, but the methods of measurement are standardized to the extent possible. The equipment and measuring techniques used at each observation well ensures that measurements at each well are of consistent accuracy and reliability.

Tables of water-level data are arranged alphabetically by counties. The site identification number, based on latitude and longitude, for a given well is the 15-digit numeric value that appears in the upper left corner of the station description. The secondary identification number is the local well number, an alphanumeric value, derived from the township, range, and section location of the well (fig. 7).

Water-level records are obtained from direct measurements with a chalked steel tape, electric line, airline, or from the graph of a water-level recorder. The water-level measurements in this report are in feet with reference to land-surface datum. Land-surface datum is a plane that is approximately at land surface at each well. The elevation of the land-surface datum is given in the well description. The height of the measuring point above or below land-surface datum is given in each well description. Water levels in wells equipped with recording gages are reported for every fifth day and the end of each month (EOM).

Water-level measurements are reported to the nearest hundredth of a foot. Estimates, indicated by an "e" may be reported in tenths of a foot. Adjustments to the water level recorder chart are indicated by an "a". The error of water-level measurements may be, at most, a few hundredths of a foot.

Data Presentation

Each well record consists of two parts: the station description, and the table of water levels observed during the water year. The description of the well is presented by headings preceding the tabular data. The following explains the information presented under each heading.

LOCATION.--This paragraph follows the well identification number and includes the latitude and longitude (given in degrees, minutes, and seconds), the hydrologic unit number, the distance and direction from a geographic point of reference, and the well owner's name.

AQUIFER.--This entry is the aquifer(s) name (if one exists) and geologic age of the strata open to the well.

WELL CHARACTERISTICS.--This entry describes the well depth, casing diameter, casing depth, opening or screened interval(s), method of construction, and use of water from the well.

INSTRUMENTATION.--This paragraph provides information on the frequency of measurement and the collection method used.

DATUM.--This entry includes the land-surface elevation and the measuring point at the well. The elevation of the land-surface datum is described in feet above (or below) sea level; it is reported with a precision depending on the method of determination. The measuring point is described physically and in relation to land surface.

REMARKS.--This entry describes factors that may influence the water level in a well or the measurement of the water level, and any information not presented in the other parts of the station description but considered useful.

PERIOD OF RECORD.--This entry indicates the period for which there are published records for the well. It reports the month and year of the beginning of publication of water-level records by the U.S. Geological Survey.

REVISED RECORDS.--If any revisions of previously published data were made for water-levels, the Water Data Report in which they appeared and year published would appear here.

EXTREMES FOR PERIOD OF RECORD.--This entry contains the highest and lowest water levels for the period of record, below land-surface datum, and the dates of their occurrence.

A table of water levels follows the station description for each well. Water levels are reported in feet below land-surface datum. For wells equipped with recorders, only abbreviated tables are published. The highest and lowest water levels of the water year and the dates of occurrence are shown on a line below the abbreviated table. Because all values are not published for wells with recorders, the extremes may be values that are not listed in the table. Missing records are indicated by dashes in place of the water level.

Hydrographs are included for 59 wells which are representative of hydrologic conditions in the important aquifers in Iowa.

Only water-level data from a national network of observation wells are given in this report. This data is intended to provide a sampling and historical record of water-level changes in the Nation's most important aquifers. Locations of the observation wells in this network in Iowa are shown in figure 7.

Records of Ground-Water Quality

Records of ground-water quality in this report differ from other types of records in that for most sampling sites, they consist of only one set of measurements for the water year. The quality of ground water ordinarily changes only slowly; therefore, for most general purposes: one annual sampling, or only a few samples taken at infrequent intervals during the year, is sufficient. Frequent measurement of the same constituents is not necessary unless one is concerned with a particular problem, such as monitoring for trends in nitrate concentration. In the special cases where the quality of ground water may change more rapidly, more frequent measurements are made to identify the nature of the changes.

The records of ground-water quality in this report were obtained as a part a statewide ground-water quality monitoring network operated by the Iowa District. All samples were obtained from municipal wells throughout Iowa. This program is conducted in cooperation with the University of Iowa Hygienic Laboratory (UHL) and the Iowa Department of Natural Resources (Geological Survey Bureau). All samples are collected by USGS personnel, field-preserved and submitted to UHL for analysis. Chemical analyses include common constituents (major ions), nutrients, organic compounds, radionuclides and pesticides. Approximately 10 percent of the samples receive additional analyses for about 90 organic priority pollutants; however, these analyses are not presented in this report, but are on file in the Iowa District Office.

Most methods for collecting and analyzing water samples are described in the "U.S. Geological Survey Techniques of Water-Resources Investigations" manuals listed on a following page. The values reported in this report represent water-quality conditions at the time of sampling as much as possible, consistent with available sampling techniques and methods of analysis.

All samples were obtained by trained personnel. The wells sampled were pumped long enough to assure that the water collected came directly from the aquifer and had not stood for a long time in the well casing where it would have been exposed to the atmosphere and to the material comprising the casings. The samples collected represent raw water.

Data Presentation

The records of ground-water quality are published in a section titled GROUND-WATER QUALITY DATA immediately following the ground-water-level records. Data for quality of ground water are listed alphabetically by county, and are identified by station number. The prime identification number for wells sampled is the 15-digit station number derived from the latitude-longitude locations. No descriptive statements are given for ground-water-quality records; however, the station number, date and time of sampling, depth of well, and other pertinent data are given in the table containing the chemical analyses of the ground water. The REMARK codes listed for surface-water-quality records are also applicable to ground-water-quality records.

Explanation of Quality of Ground-Water Data Tables -- Descriptive Headings

STATION NUMBER	LOCAL WELL NUMBER	DATE	LOCAL WELL NAME	COUNTY	SAMPLE DATE	SAMPLE TIME	AQUI-FER CODE	DEPTH OF WELL, TOTAL (FT)
411441094401602	075N33W32CDDD	1943	BRIDGEWATER 1	ADAIR	08-11-92	1130	111ALVM	49

STATION NUMBER: 15-digit number based on grid system of latitude and longitude.
LOCAL WELL NUMBER: Refers to the Bureau of Land Management System of land subdivision.
DATE: The date that construction on the well was completed.
LOCAL WELL NAME: Name used by community to identify well.
COUNTY: The name of the county where the well is located.
SAMPLE DATE: Date the well was sampled.
SAMPLE TIME: Time the sample was collected.
AQUIFER CODE: Refers to the lithologic unit in which the well is completed. Derived from two digits of the GEOLOGIC UNIT, the principal unit which provides the majority of water to the well.

11 - Quaternary	33- Mississippian	36 - Ordovician
21 - Cretaceous	34 - Devonian	37 - Cambrian
32 - Pennsylvanian	35 - Silurian	

The third digit and remaining alphabetic characters refer to the more specific lithologic unit which the well is tapping. The following examples are commonly used units:

Code	General	Specific
111ALVM	Quaternary	(alluvium)
217DKOT	Cretaceous	(Dakota sandstone)
344CDVL	Devonian	(Cedar Valley limestone)

DEPTH OF WELL, TOTAL (FT): Total depth of well in feet.

ACCESS TO USGS WATER DATA

The USGS provides near real-time stage and discharge data for many of the gaging stations equipped with the necessary telemetry and historic daily-mean and peak-flow discharge data for most current or discontinued gaging stations through the world wide web (WWW). This data may be accessed at:

`http://www.usgs.gov`

Some water-quality and ground-water data also are available through the WWW. In addition, data can be provided in various machine-readable formats on magnetic tape or 3-1/2 inch floppy disk. Information about the availability of specific types of data or products, and user charges, can be obtained locally from each of the Water Resources Division District Offices (See address on the back of the title page.)

The Iowa District maintains a web site highlighting many of the District's activities. Many of the continuous stream gages presented in these reports have near-real-time data available, and all gages have historic data available. This data may be accessed at:

`http://ia.water.usgs.gov`

DEFINITION OF TERMS

Terms related to streamflow, water-quality, and other hydrologic data, as used in this report, are defined below. See also table for converting English units to International System (SI) Units on the inside of the back cover.

Acre-foot (AC-FT, acre-ft) is the quantity of water required to cover 1 acre to a depth of 1 foot and is equivalent to 43,560 cubic feet, 325,851 gallons, or 1,233 cubic meters.

Alkalinity is the capacity of solutes in an aqueous system to neutralize acid. This term designates titration of a "filtered" sample.

Annual runoff is the total quantity of water in runoff for a drainage area for the year. Data reports may use any of the following units of measurement in presenting annual runoff data:

Acre-foot (AC-FT, acre-ft) is the quantity of water required to cover 1 acre to a depth of 1 foot and is equal to 43,560 cubic feet, 325,851 gallons, or 1,233 cubic meters

Cubic foot per second per square mile [CFSM, $(ft^3/s)/mi^2$] is the average number of cubic feet of water flowing per second from each square mile of area drained, assuming the runoff is distributed uniformly in time and area.

Inch (IN., in.) as used in this report, refers to the depth to which the drainage area would be covered with water if all of the runoff for a given time period were uniformly distributed on it.

Bacteria are microscopic unicellular organisms, typically spherical, rodlike, or spiral and threadlike in shape, often clumped into colonies. Some bacteria cause disease, while others perform an essential role in nature in the recycling of materials; for example, by decomposing organic matter into a form available for reuse by plants.

Total coliform bacteria are a particular group of bacteria that are used as indicators of possible sewage pollution. This group includes coliforms that inhabit the intestine of warm-blooded animals and those that inhabit soils. They are characterized as aerobic or facultative anaerobic, gram-negative, nonspore-forming, rod-shaped bacteria that ferment lactose with gas formation within 48 hours at 35 °C. In the laboratory, these bacteria are defined as all the organisms that produce colonies with a golden-green metallic sheen within 24 hours when incubated at 35 °C plus or minus 1.0 °C on M-Endo medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

Fecal coliform bacteria are bacteria that are present in the intestine or feces of warm-blooded animals. They are often used as indicators of the sanitary quality of the water. In the laboratory, they are defined as all organisms that produce blue colonies within 24 hours when incubated at 44.5 °C plus or minus 0.2 °C on M-FC medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

Enterococcus bacteria are commonly found in the feces of humans and other warm-blooded animals. Although some strains are ubiquitous and not related to fecal pollution, the presence of enterococci in water is an indication of fecal pollution and the possible presence of enteric pathogens. Enterococcus bacteria are those bacteria that produce pink to red colonies with black or reddish-brown precipitate after incubation at 41 °C on mE agar and subsequent transfer to EIA medium. Enterococci include *Streptococcus feacalis, Streptococcus feacium, Streptococcus avium,* and their variants.

Escherichia coli (E. coli) are bacteria present in the intestine and feces of warm-blooded animals. *E. coli* are a member species of the fecal coliform group of indicator bacteria. In the laboratory, they are defined as those bacteria that produce yellow or yellow-brown colonies on a filter pad saturated with urea substrate broth after primary culturing for 22 to 24 hours at 44.5 °C on mTEC medium. Their concentrations are expressed as number of colonies per 100 mL of sample.

Base flow is flow in a channel sustained by ground-water discharge in the absence of direct runoff.

Bed material is the sediment mixture of which a streambed, lake, pond, reservoir, or estuary bottom is composed.

Bottom material: See "Bed material."

Chlorophyll refers to the green pigments of plants. Chlorophyll a and b are the two most common green pigments in plants.

Colloid is any substance with particles in such a fine state of subdivision dispersed in a medium (for example, water) that they do not settle out; but not in so fine a state of subdivision that they can be said to be truly dissolved.

Color unit is produced by 1 milligram per liter of platinum in the form of the chloroplatinate ion. Color is expressed in units of the platinum-cobalt scale.

Confined aquifer is a term used to describe an aquifer containing water between two relatively impermeable boundaries. The water level in a well tapping a confined aquifer stands above the top of the confined aquifer and can be higher or lower than the water table that may be present in the material above it. In some cases the water level can rise above the ground surface, yielding a flowing well.

Contents is the volume of water in a reservoir or lake. Unless otherwise indicated, volume is computed on the basis of a level pool and does not include bank storage.

Continuous-record station is a site that meets either of the following conditions:

1. Stage or streamflow are recorded at some interval on a continuous basis. The recording interval is usually 15 minutes, but may be less or more frequent.
2. Water-quality, sediment, or other hydrologic measure-ments are recorded at least daily.

Control designates a feature in the channel downstream from a gaging station that physically influences the water-surface elevation and thereby determines the stage-discharge relation at the station. This feature may be a constriction of the channel, a bedrock outcrop, a gravel bar, an artificial structure, or a uniform cross section over a long reach of the channel.

Control structure as used in this report is a structure on a stream or canal that is used to regulate the flow or stage of the stream or to prevent the intrusion of saltwater.

Cubic foot per second (CFS, ft^3/s) is the rate of discharge representing a volume of 1 cubic foot passing a given point in 1 second. It is equivalent to approximately 7.48 gallons per second, 448.8 gallons per minute, or 0.02832 cubic meters per second.

Cubic foot per second-day (CFS-DAY, Cfs-day, [(ft^3/s)/d]) is the volume of water represented by a flow of 1 cubic foot per second for 24 hours. It is equivalent to 86,400 cubic feet, 1.9835 acre-feet, 646,317 gallons, or 2,447 cubic meters.

Daily record is a summary of streamflow, sediment, or water-quality values computed from data collected with sufficient frequency to obtain reliable estimates of daily mean values.

Daily record station is a site for which daily records of streamflow, sediment, or water-quality values are computed.

Datum, as used in this report, is an elevation above mean sea level to which all gage height readings are referenced.

Discharge, or flow, is the volume of water (or more broadly, volume of fluid including solid- and dissolved-phase material), that passes a given point in a given period of time.

Annual 7-day minimum is the lowest mean discharge for 7 consecutive days in a year. Note that most low-flow frequency analyses of annual 7-day minimum flows use a climatic year (April 1-March 31). The date shown in the summary statistics table is the initial date of the 7-day period. (This value should not be confused with the 7-day 10-year low-flow statistic.)

Instantaneous discharge is the discharge at a particular instant of time.

Mean discharge (MEAN) is the arithmetic mean of individual daily mean discharges during a specific period.

Dissolved refers to that material in a representative water sample that passes through a 0.45-micrometer membrane filter. This is a convenient operational definition used by Federal agencies that collect water data. Determinations of "dissolved" constituents are made on subsamples of the filtrate.

Dissolved oxygen (DO) content of water in equilibrium with air is a function of atmospheric pressure, temperature, and dissolved-solids concentration of the water. The ability of water to retain oxygen decreases with increasing temperature or dissolved solids, with small temperature changes having the more significant offset. Photosynthesis and respiration may cause diurnal variations in dissolved-oxygen concentration in water from some streams.

Dissolved-solids concentration of water is determined either analytically by the "residue-on-evaporation" method, or mathematically by totaling the concentrations of individual constituents reported in a comprehensive chemical analysis. During that analytical determination of dissolved solids, the bicarbonate (generally a major dissolved component of water) is converted to carbonate. Therefore, in the mathematical calculation of dissolved-solids concentration, the bicarbonate value, in milligrams per liter, is multiplied by 0.4926 to reflect the change. Alternatively, alkalinity concentration (as mg/L $CaCO_3$) can be converted to carbonate concentration by multiplying by 0.60.

Drainage area of a site on a stream is that area, measured in a horizontal plane, that has a common outlet at the site for its surface runoff. Figures of drainage area given herein include all closed basins, or noncontributing areas, within the area unless otherwise specified.

Drainage basin is a part of the Earth's surface that is occupied by a drainage system with a common outlet for its surface runoff (see "Drainage area").

Flow-duration percentiles are values on a scale of 100 that indicate the percentage of time for which a flow is not exceeded. For example, the 90th percentile of river flow is greater than or equal to 90 percent of all recorded flow rates.

Gage datum is the elevation of the zero point of the reference gage from which gage height is determined as compared to sea level (see "Datum"). This elevation is established by a system of levels from known benchmarks, by approximation from topographic maps, or by geographical positioning system.

Gage height (G.H.) is the water-surface elevation referenced to the gage datum. Gage height is often used interchangeably with the more general term "stage," although gage height is more appropriate when used with a reading on a gage.

Gaging station is a site on a stream, canal, lake, or reservoir where systematic observations of stage, discharge, or other hydrologic data are obtained. When used in connection with a discharge record, the term is applied only to those gaging stations where a continuous record of discharge is computed.

Ground-water level is the elevation of the water table or another potentiometric surface at a particular location.

Hardness of water is a physical-chemical characteristic that is commonly recognized by the increased quantity of soap required to produce lather. It is attributable to the presence of alkaline earths (principally calcium and magnesium) and is expressed as the equivalent concentration of calcium carbonate ($CaCO_3$).

Hydrologic benchmark station is one that provides hydrologic data for a basin in which the hydrologic regimen will likely be governed solely by natural conditions. Data collected at a benchmark station may be used to separate effects of natural from human-induced changes in other basins that have been developed and in which the physiography, climate, and geology are similar to those in the undeveloped benchmark basin.

Hydrologic unit is a geographic area representing part or all of a surface drainage basin or distinct hydrologic feature as defined by the former Office of Water Data Coordination and delineated on the State Hydrologic Unit Maps by the U.S. Geological Survey. Each hydrologic unit is identified by an 8-digit number.

Land-surface datum (lsd) is a datum plane that is approximately at land surface at each ground-water observation well.

Measuring point (MP) is an arbitrary permanent reference point from which the distance to water surface in a well is measured to obtain water level.

Membrane filter is a thin microporous material of specific pore size used to filter bacteria, algae, and other very small particles from water.

Micrograms per gram (UG/G, µg/g) is a unit expressing the concentration of a chemical constituent as the mass (micrograms) of the element per unit mass (gram) of material analyzed.

Micrograms per kilogram (UG/KG, µg/kg) is a unit expressing the concentration of a chemical constituent as the mass (micrograms) of the constituent per unit mass (kilogram) of the material analyzed. One microgram per kilogram is equivalent to 1 part per billion.

Micrograms per liter (UG/L, µg/L) is a unit expressing the concentration of chemical constituents in water as mass (micrograms) of constituent per unit volume (liter) of water. One thousand micrograms per liter is equivalent to 1 milligram per liter.

Microsiemens per centimeter (US/CM, µS/cm) is a unit expressing the amount of electrical conductivity of a solution as measured between opposite faces of a centimeter cube of solution at a specified temperature. Siemens is the International System of Units nomenclature. It is synonymous with mhos and is the reciprocal of resistance in ohms.

Milligrams per liter (MG/L, mg/L) is a unit for expressing the concentration of chemical constituents in water as the mass (milligrams) of constituent per unit volume (liter) of water. Concentration of suspended sediment also is expressed in mg/L and is based on the mass of dry sediment per liter of water-sediment mixture.

Miscellaneous site, or miscellaneous station, is a site where streamflow, sediment, and/or water-quality data are collected once, or more often on a random or discontinuous basis.

National Geodetic Vertical Datum of 1929 (NGVD of 1929) is a geodetic datum derived from a general adjustment of the first order level nets of the United States and Canada. It was formerly called "Sea Level Datum of 1929" or "mean sea level" in this series of reports. Although the datum was derived from the average sea level over a period of many years at 26 tide stations along the Atlantic, Gulf of Mexico, and Pacific Coasts, it does not necessarily represent local mean sea level at any particular place. *See NOAA web site: http://www.ngs.noaa.gov/faq.shtml#WhatVD29VD88*

Nephelometric turbidity unit (NTU) is the measurement for reporting turbidity that is based on use of a standard suspension of Formazin. Turbidity measured in NTU uses nephelometric methods that depend on passing specific light of a specific wavelength through the sample.

Open or screened interval is the length of unscreened opening or of well screen through which water enters a well, in feet below land surface.

Organic carbon (OC) is a measure of organic matter present in aqueous solution, suspension, or bottom sediments. May be reported as dissolved organic carbon (DOC), suspended organic carbon (SOC), or total organic carbon (TOC).

Organism is any living entity.

Organochlorine compounds are any chemicals that contain carbon and chlorine. Organochlorine compounds that are important in investigations of water, sediment, and biological quality include certain pesticides and industrial compounds.

Parameter Code is a 5-digit number used in the U.S. Geological Survey computerized data system, National Water Information System (NWIS), to uniquely identify a specific constituent or property.

Partial-record station is a site where discrete measurements of one or more hydrologic parameters are obtained over a period of time without continuous data being recorded or computed. A common example is a crest-stage gage partial-record station at which only peak stages and flows are recorded.

Particle size is the diameter, in millimeters (mm), of a particle determined by sieve or sedimentation methods. The sedimentation method utilizes the principle of Stokes Law to calculate sediment particle sizes. Sedimentation methods (pipet, bottom-withdrawal tube, visual-accumulation tube, Sedigraph) determine fall diameter of particles in either distilled water (chemically dispersed) or in native water (the river water at the time and point of sampling).

Particle-size classification used in this report agrees with the recommendation made by the American Geophysical Union Subcommittee on Sediment Terminology. The classification is as follows:

Classification	Size (mm)	Method of analysis
Clay	0.00024 - 0.004	Sedimentation
Silt	0.004 - 0.062	Sedimentation
Sand	0.062 - 2.0	Sedimentation/sieve
Gravel	2.0 - 64.0	Sieve

The particle-size distributions given in this report are not necessarily representative of all particles in transport in the stream. Most of the organic matter is removed, and the sample is subjected to mechanical and chemical dispersion before analysis in distilled water. Chemical dispersion is not used for native water analysis.

Percent composition or **percent of total** is a unit for expressing the ratio of a particular part of a sample or population to the total sample or population, in terms of types, numbers, weight, or volume.

Periodic station is a site where stage, discharge, sediment, chemical, or other hydrologic measurements are made one or more times during a year, but at a frequency insufficient to develop a daily record.

Pesticides are chemical compounds used to control undesirable organisms. Major categories of pesticides include insecticides, miticides, fungicides, herbicides, and rodenticides.

pH of water is the negative logarithm of the hydrogen-ion activity. Solutions with pH less than 7 are termed "acidic," and solutions with a pH greater than 7 are termed "basic." Solutions with a pH of 7 are neutral. The presence and concentration of many dissolved chemical constituents found in water are, in part, influenced by the hydrogen-ion activity of water. Biological processes including growth, distribution of organisms, and toxicity of the water to organisms are also influenced, in part, by the hydrogen-ion activity of water.

Picocurie (PC, pCi) is one trillionth (1×10^{-12}) of the amount of radioactivity represented by a curie (Ci). A curie is the amount of radioactivity that yields 3.7×10^{10} radioactive disintegrations per second. A picocurie yields 2.22 dpm (disintegrations per minute).

Polychlorinated biphenyls (PCB's) are industrial chemicals that are mixtures of chlorinated biphenyl compounds having various percentages of chlorine. They are similar in structure to organochlorine insecticides.

Polychlorinated naphthalenes (PCN's) are industrial chemicals that are mixtures of chlorinated naphthalene compounds. They have properties and applications similar to polychlorinated biphenyls (PCB's) and have been identified in commercial PCB preparations.

Radioisotopes are isotopic forms of an element that exhibit radioactivity. Isotopes are varieties of a chemical element that differ in atomic weight, but are very nearly alike in chemical properties. The difference arises because the atoms of the isotopic forms of an element differ in the number of neutrons in the nucleus; for example, ordinary chlorine is a mixture of isotopes having atomic weights of 35 and 37, and the natural mixture has an atomic weight of about 35.453. Many of the elements similarly exist as mixtures of isotopes, and a great many new isotopes have been produced in the operation of nuclear devices such as the cyclotron. There are 275 isotopes of the 81 stable elements, in addition to more than 800 radioactive isotopes.

Recoverable from bottom material is the amount of a given constituent that is in solution after a representative sample of bottom material has been digested by a method (usually using an acid or mixture of acids) that results in dissolution of readily soluble substances. Complete dissolution of all bottom material is not achieved by the digestion treatment and thus the determination represents less than the total amount (that is, less than 95 percent) of the constituent in the sample. To achieve comparability of analytical data, equivalent digestion procedures would be required of all laboratories performing such analyses because different digestion procedures are likely to produce different analytical results.

Recurrence interval, also referred to as return period, is the average time, usually expressed in years, between occurrences of hydrologic events of a specified type (such as exceedances of a specified high flow or non-exceedance of a specified low flow). The terms "return period" and "recurrence interval" do not imply regular cyclic occurrence. The actual

times between occurrences vary randomly, with most of the times being less than the average and a few being substantially greater than the average. For example, the 100-year flood is the flow rate that is exceeded by the annual maximum peak flow at intervals whose average length is 100 years (that is, once in 100 years, on average); almost two-thirds of all exceedances of the 100-year flood occur less than 100 years after the previous exceedance, half occur less than 70 years after the previous exceedance, and about one-eighth occur more than 200 years after the previous exceedance. Similarly, the 7-day 10-year low flow ($7Q_{10}$) is the flow rate below which the annual minimum 7-day-mean flow dips at intervals whose average length is 10 years (that is, once in 10 years, on average); almost two-thirds of the non-exceedances of the $7Q_{10}$ occur less than 10 years after the previous non-exceedance, half occur less than 7 years after, and about one-eighth occur more than 20 years after the previous non-exceedance. The recurrence interval for annual events is the reciprocal of the annual probability of occurrence. Thus, the 100-year flood has a 1-percent chance of being exceeded by the maximum peak flow in any year, and there is a 10-percent chance in any year that the annual minimum 7-day-mean flow will be less than the $7Q_{10}$.

Replicate samples are a group of samples collected in a manner such that the samples are thought to be essentially identical in composition.

River mile is the distance of a point on a river measured in miles from the river's mouth along the low-water channel.

River mileage is the linear distance along the meandering path of a stream channel determined in accordance with Bulletin No. 14 (October 1968) of the Water Resources Council.

Runoff in inches (IN., in.) is the depth, in inches, to which the drainage area would be covered if all the runoff for a given time period were uniformly distributed on it.

Sea level refers to the National Geodetic Vertical Datum of 1929 (NGVD of 1929)—a geodetic datum derived from a general adjustment of the first-order level nets of the United States and Canada, formerly called Sea Level Datum of 1929. *See: http://www.co-ops.nos.noaa.gov/ glossary/gloss_n.html#NGVD*

Sediment is solid material that is transported by, suspended in, or deposited from water. It originates mostly from disintegrated rocks; it also includes chemical and biochemical precipitates and decomposed organic material, such as humus. The quantity, characteristics, and cause of the occurrence of sediment in streams are influenced by environmental factors. Some major factors are degree of slope, length of slope, soil characteristics, land usage, and quantity and intensity of precipitation.

Bed load is the sediment that is transported in a stream by rolling, sliding, or skipping along or very close to the bed. In this report, bed load is considered to consist of particles in transit from the bed to an elevation equal to the top of the bed-load sampler nozzle (usually within 0.25 ft of the streambed).

Bed-load discharge (tons per day) is the quantity of sediment moving as bed load, reported as dry weight, that passes a cross section in a given time.

Suspended sediment is the sediment that is maintained in suspension by the upward components of turbulent currents or that exists in suspension as a colloid.

Suspended-sediment concentration is the velocity-weighted concentration of suspended sediment in the sampled zone (from the water surface to a point approximately 0.3 ft above the bed) expressed as milligrams of dry sediment per liter of water-sediment mixture (mg/L). The entire sample is used for the analysis.

Mean concentration of suspended sediment is the time-weighted concentration of suspended sediment passing a stream section during a 24-hour day.

Suspended-sediment discharge (tons/day) is the quantity of sediment moving in suspension, reported as dry weight, that passes a cross section in a given time. It is calculated in units of tons per day as follows: concentration (mg/L) x discharge (ft^3/s) x 0.0027.

Suspended-sediment load is a term that refers to material in suspension. The term needs to be qualified, such as "annual suspended-sediment load" or "sand-size suspended-sediment load," and so on. It is not synonymous with either suspended-sediment discharge or concentration.

Seven-day 10-year low flow (7Q10, $7Q_{10}$) is the minimum flow averaged over 7 consecutive days that is expected to occur on average, once in any 10-year period. The 7Q10 has a 10-percent chance of occurring in any given year.

Sodium adsorption ratio (SAR) is the expression of relative activity of sodium ions in exchange reactions within soil and is an index of sodium or alkali hazard to the soil. Waters range in respect to sodium hazard from those which can be used for irrigation on almost all soils to those which are generally unsatisfactory for irrigation.

Solute is any substance that is dissolved in water.

Specific conductance is a measure of the ability of a water to conduct an electrical current. It is expressed in microsiemens per centimeter at 25 °C. Specific conductance is related to the type and concentration of ions in solution and can be used for approximating the dissolved-solids content of the water. Commonly, the concentration of dissolved solids (in milligrams per liter) is from 55 to 75 percent of the specific conductance (in microsiemens). This relation is not constant from stream to stream, and it may vary in the same source with changes in the composition of the water.

Stage: See "Gage height."

Stage-discharge relation is the relation between the water-surface elevation, termed stage (gage height), and the volume of water flowing in a channel per unit time.

Streamflow is the discharge that occurs in a natural channel. Although the term "discharge" can be applied to the flow of a canal, the word "streamflow" uniquely describes the discharge in a surface stream course. The term "streamflow" is more general than "runoff" as streamflow may be applied to discharge whether or not it is affected by diversion or regulation.

Surface area of a lake or impoundment is that area encompassed by the boundary of the lake or impoundment as shown on USGS topographic maps, or on other available maps or photographs. The computed surface areas reflect the water levels of the lakes or impoundments at the times when the information for the maps or photographs was obtained.

Suspended (as used in tables of chemical analyses) refers to the amount (concentration) of undissolved material in a water-sediment mixture. It is associated with the material retained on a 0.45-micrometer filter.

Suspended, recoverable is the amount of a given constituent that is in solution after the part of a representative suspended-sediment sample that is retained on a 0.45-micrometer membrane filter has been digested by a method (usually using a dilute acid solution) that results in dissolution of only readily soluble substances. Complete dissolution of all the particulate matter is not achieved by the digestion treatment and thus the determination represents something less than the "total" amount (that is, less than 95 percent) of the constituent present in the sample. To achieve comparability of analytical data, equivalent digestion procedures are required of all laboratories performing such analyses because different digestion procedures are likely to produce different analytical results.

Determinations of "suspended, recoverable" constituents are made either by analyzing portions of the material collected on the filter or, more commonly, by difference, based on determinations of (1) dissolved and (2) total recoverable concentrations of the constituent.

Suspended, total is the total amount of a given constituent in the part of a representative suspended-sediment sample that is retained on a 0.45-micrometer membrane filter. This term is used only when the analytical procedure assures measurement of at least 95 percent of the constituent determined. Knowledge of the expected form of the constituent in the sample, as well as the analytical methodology used, is required to determine when the results should be reported as "suspended, total."

Determinations of "suspended, total" constituents are made either by analyzing portions of the material collected on the filter or, more commonly, by difference, based on determinations of (1) dissolved and (2) total concentrations of the constituent.

Synoptic Studies are short-term investigations of specific water-quality conditions during selected seasonal or hydrologic periods to provide improved spatial resolution for critical water-quality conditions. For the period and conditions sampled, they assess the spatial distribution of selected water-quality conditions in relation to causative factors, such as land use and contaminant sources.

Tons per acre-foot is the dry mass of dissolved solids in 1 acre-foot of water. It is computed by multiplying the concentration of the constituent, in milligrams per liter, by 0.00136.

Tons per day (T/DAY, tons/d) is the rate representing a mass of 1 ton of a constituent in streamflow passing a cross section in 1 day. It is equivalent to 2,000 pounds per day, or 0.9072 metric tons per day.

Total is the total amount of a given constituent in a representative suspended-sediment sample, regardless of the constituent's physical or chemical form. This term is used only when the analytical procedure assures measurement of at least 95 percent of the constituent present in both the dissolved and suspended phases of the sample. A knowledge of the expected form of the constituent in the sample, as well as the analytical methodology used, is required to judge when the results should be reported as "total." (Note that the word "total" does double duty here, indicating both that the sample consists of a suspended-sediment mixture and that the analytical method determined all of the constituent in the sample.)

Total discharge is the quantity of a given constituent, measured as dry mass or volume, that passes a stream cross section per unit of time. When referring to constituents other than water, this term needs to be qualified, such as "total sediment discharge," "total chloride discharge," and so on.

Total in bottom material is the total amount of a given constituent in a representative sample of bottom material. This term is used only when the analytical procedure assures measurement of at least 95 percent of the constituent determined.. A knowledge of the expected form of the constituent in the sample, as well as the analytical methodology used, is required to judge when the results should be reported as "total in bottom material."

Total load refers to all of a constituent in transport. When referring to sediment, it includes suspended load plus bed load.

Total recoverable is the amount of a given constituent that is in solution after a representative suspended-sediment sample has been digested by a method (usually using a dilute acid solution) that results in dissolution of only readily soluble substances. Complete dissolution of all particulate matter is not achieved by the digestion treatment, and thus the determination represents something less than the "total" amount (that is, less than 95 percent) of the constituent present in the dissolved and suspended phases of the sample. To achieve comparability of analytical data, equivalent digestion procedures are required of all laboratories performing such analyses because different digestion procedures are likely to produce different analytical results.

Turbidity is a measurement of the collective optical properties of a water sample that cause light to be scattered and absorbed rather than transmitted in straight lines; the higher the intensity of scattered light, the higher the turbidity. Turbidity is expressed in nephelometric turbidity units (NTU) or Formazin turbidity units (FTU) depending on the method and equipment used.

Volatile organic compounds (VOC's) are organic compounds that can be isolated from the water phase of a sample by purging the water sample with inert gas, such as helium, and subsequently analyzed by gas chromatography. Many VOC's are manmade chemicals that are used and produced in the manufacture of paints, adhesives, petroleum products, pharmaceuticals, and refrigerants. They are often components of fuels, solvents, hydraulic fluids, paint thinners, and dry cleaning agents commonly used in urban settings. VOC contamination of drinking-water supplies is a human health concern because many are toxic and are known or suspected human carcinogens (U.S. Environmental Protection Agency, 1996).

Water level is the water-surface elevation or stage of the free surface of a body of water above or below any datum (see "Gage height"), or the surface of water standing in a well, usually indicative of the position of the water table or other potentiometric surface.

Water table is the surface of a ground-water body at which the water is at atmospheric pressure.

Water-table aquifer is an unconfined aquifer within which is found the water table.

Water year in U.S. Geological Survey reports dealing with surface-water supply is the 12-month period October 1 through September 30. The water year is designated by the calendar year in which it ends and which includes 9 of the 12 months. Thus, the year ending September 30, 1999, is called the "1999 water year."

WDR is used as an abbreviation for "Water-Data Report" in the REVISED RECORDS paragraph to refer to State annual hydrologic-data reports. (WRD was used as an abbreviation for "Water-Resources Data" in reports published prior to 1976.)

Weighted average is used in this report to indicate discharge-weighted average. It is computed by multiplying the discharge for a sampling period by the concentrations of individual constituents for the corresponding period and dividing the sum of the products by the sum of the discharges. A discharge-weighted average approximates the composition of water that would be found in a reservoir containing all the water passing a given location during the water year after thorough mixing in the reservoir.

Well is an excavation (pit, hole, tunnel), generally cylindrical in form and often walled in, drilled, dug, driven, bored, or jetted into the ground to such a depth as to penetrate water-yielding geologic material and allow the water to flow or to be pumped to the surface.

Wet weight refers to the weight of animal tissue or other substance including its contained water.

WSP is used as an abbreviation for "Water-Supply Paper" in reference to previously published reports

PUBLICATIONS ON TECHNIQUES OF WATER-RESOURCES INVESTIGATIONS OF THE U.S. GEOLOGICAL SURVEY

The U.S.G.S. publishes a series of manuals describing procedures for planning and conducting specialized work in water-resources investigations. The material is grouped under major subject headings called books and is further divided into sections and chapters. For example, section A of book 3 (Applications of Hydraulics) pertains to surface water. The chapter, the unit of publication, is limited to a narrow field of subject matter. This format permits flexibility in revision and publication as the need arises.

The reports listed below are for sale by the U.S.G.S., Information Services, Box 25286, Federal Center, Denver, Colorado 80225 (authorized agent of the Superintendent of Documents, Government Printing Office). Prepayment is required. Remittance should be made in the form of a check or money order payable to the "U.S. Geological Survey." Prices are not included because they are subject to change. Current prices can be obtained by writing to the above address. When ordering or inquiring about prices for any of these publications, please give the title, book number, chapter number, and mention the "U.S. Geological Survey Techniques of Water-Resources Investigations."

Book 1. Collection of Water Data by Direct Measurement

Section D. Water Quality

1-D1. *Water temperature—influential factors, field measurement, and data presentation*, by H. H. Stevens, Jr., J.F. Ficke, and G. F. Smoot: USGS–TWRI book 1, chap. D1. 1975. 65 pages.

1-D2. *Guidelines for collection and field analysis of ground-water samples for selected unstable constituents*, by W.W. Wood: USGS–TWRI book 1, chap. D2. 1976. 24 pages.

Book 2. Collection of Environmental Data

Section D. Surface Geophysical Methods

2-D1. *Application of surface geophysics to ground-water investigations*, by A.A. R. Zohdy, G.P. Eaton, and D.R. Mabey: USGS–TWRI book 2, chap. D1. 1974. 116 pages.

2-D2. *Application of seismic-refraction techniques to hydrologic studies*, by F.P. Haeni: USGS–TWRI book 2, chap. D2. 1988. 86 pages.

Section E. Subsurface Geophysical Methods

2-E1. *Application of borehole geophysics to water-resources investigations*, by W.S. Keys and L.M. MacCary: USGS–TWRI book 2, chap. E1. 1971. 126 pages.

2-E2. *Borehole geophysics applied to ground-water investigations*, by W.S. Keys: USGS–TWRI book 2, chap. E2. 1990. 150 pages.

Section F. Drilling and Sampling Methods

2-F1. *Application of drilling, coring, and sampling techniques to test holes and wells*, by Eugene Shuter and W.E. Teasdale: USGS–TWRI book 2, chap. F1. 1989. 97 pages.

Book 3. Applications of Hydraulics

Section A. Surface-Water Techniques

3-A1. *General field and office procedures for indirect discharge measurements*, by M.A. Benson and Tate Dalrymple: USGS–TWRI book 3, chap. A1. 1967. 30 pages.

3-A2. *Measurement of peak discharge by the slope-area method*, by Tate Dalrymple and M.A. Benson: USGS–TWRI book 3, chap. A2. 1967. 12 pages.

3-A3. *Measurement of peak discharge at culverts by indirect methods*, by G.L. Bodhaine: USGS–TWRI book 3, chap. A3. 1968. 60 pages.

3-A4. *Measurement of peak discharge at width contractions by indirect methods*, by H.F. Matthai: USGS-TWRI book 3, chap. A4. 1967. 44 pages.

3-A5. *Measurement of peak discharge at dams by indirect methods*, by Harry Hulsing: USGS–TWRI book 3. chap. A5. 1967. 29 pages.

3-A6. *General procedure for gaging streams,* by R.W. Carter and Jacob Davidian: USGS–TWRI book 3, chap. A6. 1968. 13 pages.

3-A7. *Stage measurement at gaging stations,* by T.J. Buchanan and W.P. Somers: USGS–TWRI book 3, chap. A7. 1968. 28 pages.

3-A8. *Discharge measurements at gaging stations,* by T.J. Buchanan and W.P. Somers: USGS–TWRI book 3, chap. A8. 1969. 65 pages.

3-A9. *Measurement of time of travel in streams by dye tracing,* by F.A. Kilpatrick and J.F. Wilson, Jr.: USGS–TWRI book 3, chap. A9. 1989. 27 pages.

3-A10. *Discharge ratings at gaging stations,* by E.J. Kennedy: USGS–TWRI book 3, chap. A10. 1984. 59 pages.

3-A11. *Measurement of discharge by the moving-boat method,* by G.F. Smoot and C.E. Novak: USGS–TWRI book 3, chap. A11. 1969. 22 pages.

3-A12. *Fluorometric procedures for dye tracing*, Revised, by J.F. Wilson, Jr., E.D. Cobb, and F.A. Kilpatrick: USGS–TWRI book 3, chap. A12. 1986. 34 pages.

3-A13. *Computation of continuous records of streamflow*, by E.J. Kennedy: USGS–TWRI book 3, chap. A13. 1983. 53 pages.

3-A14. *Use of flumes in measuring discharge,* by F.A. Kilpatrick and V.R. Schneider: USGS–TWRI book 3, chap. A14. 1983. 46 pages.

3-A15. *Computation of water-surface profiles in open channels,* by Jacob Davidian: USGS–TWRI book 3, chap. A15. 1984. 48 pages.

3-A16. *Measurement of discharge using tracers*, by F.A. Kilpatrick and E.D. Cobb: USGS–TWRI book 3, chap. A16. 1985. 52 pages.

3-A17. *Acoustic velocity meter systems,* by Antonius Laenen: USGS–TWRI book 3, chap. A17. 1985. 38 pages.

3-A18. *Determination of stream reaeration coefficients by use of tracers,* by F.A. Kilpatrick, R.E. Rathbun, Nobuhiro Yotsukura, G.W. Parker, and L.L. DeLong: USGS–TWRI book 3, chap. A18. 1989. 52 pages.

3-A19. *Levels at streamflow gaging stations*, by E.J. Kennedy: USGS–TWRI book 3, chap. A19. 1990. 31 pages.

3-A20. *Simulation of soluable waste transport and buildup in surface waters using tracers*, by F.A. Kilpatrick: USGS–TWRI book 3, chap. A20. 1993. 38 pages.

3-A21 *Stream-gaging cableways,* by C. Russell Wagner: USGS–TWRI book 3, chap. A21. 1995. 56 pages.

Section B. Ground-Water Techniques

3-B1. *Aquifer-test design, observation, and data analysis,* by R.W. Stallman: USGS–TWRI book 3, chap. B1. 1971. 26 pages.

3-B2. *Introduction to ground-water hydraulics, a programed text for self-instruction,* by G.D. Bennett: USGS–TWRI book 3, chap. B2. 1976. 172 pages.

3-B3. *Type curves for selected problems of flow to wells in confined aquifers*, by J.E. Reed: USGS–TWRI book 3, chap. B3. 1980. 106 pages.

3-B4. *Regression modeling of ground-water flow,* by R.L. Cooley and R.L. Naff: USGS–TWRI book 3, chap. B4. 1990. 232 pages.

3-B4. *Supplement 1. Regression modeling of ground-water flow --Modifications to the computer code for nonlinear regression solution of steady-state ground-water flow problems,* by R.L. Cooley: USGS–TWRI book 3, chap. B4. 1993. 8 pages.

3-B5. *Definition of boundary and initial conditions in the analysis of saturated ground-water flow systems—An introduction*, by O.L. Franke, T.E. Reilly, and G.D. Bennett: USGS–TWRI book 3, chap. B5. 1987. 15 pages.

3-B6. *The principle of superposition and its application in ground-water hydraulics,* by T.E. Reilly, O.L. Franke, and G.D. Bennett: USGS–TWRI book 3, chap. B6. 1987. 28 pages.

3-B7. *Analytical solutions for one-, two-, and three-dimensional solute transport in ground-water systems with uniform flow,* by E.J. Wexler: USGS–TWRI book 3, chap. B7. 1992. 190 pages.

Section C. Sedimentation and Erosion Techniques

3-C1. *Fluvial sediment concepts,* by H.P. Guy: USGS–TWRI book 3, chap. C1. 1970. 55 pages.

3-C2. *Field methods for measurement of fluvial sediment,* by H.P. Guy and V.W. Norman: USGS–TWRI book 3, chap. C2. 1970. 59 pages.

3-C3. Computation of fluvial-sediment discharge, by George Porterfield: USGS–TWRI book 3, chap. C3. 1972. 66 pages.

Book 4. Hydrologic Analysis and Interpretation

Section A. Statistical Analysis

4-A1. *Some statistical tools in hydrology,* by H.C. Riggs: USGS–TWRI book 4, chap. A1. 1968. 39 pages.

4-A2. *Frequency curves,* by H.C. Riggs: USGS–TWRI book 4, chap. A2. 1968. 15 pages.

Section B. Surface Water

4-B1. *Low-flow investigations,* by H.C. Riggs: USGS–TWRI book 4, chap. B1. 1972. 18 pages.

4-B2. *Storage analyses for water supply,* by H.C. Riggs and C.H. Hardison: USGS–TWRI book 4, chap. B2. 1973. 20 pages.

4-B3. *Regional analyses of streamflow characteristics,* by H.C. Riggs: USGS–TWRI book 4, chap. B3. 1973. 15 pages.

Section D. Interrelated Phases of the Hydrologic Cycle

4-D1. *Computation of rate and volume of stream depletion by wells,* by C.T. Jenkins: USGS–TWRI book 4, chap. D1. 1970. 17 pages.

Book 5. Laboratory Analysis

Section A. Water Analysis

5-A1. *Methods for determination of inorganic substances in water and fluvial sediments,* by M.J. Fishman and L.C. Friedman, editors: USGS–TWRI book 5, chap. A1. 1989. 545 pages.

5-A2. *Determination of minor elements in water by emission spectroscopy,* by P.R. Barnett and E.C. Mallory, Jr.: USGS–TWRI book 5, chap. A2. 1971. 31 pages.

5-A3. *Methods for the determination of organic substances in water and fluvial sediments,* edited by R.L. Wershaw, M.J. Fishman, R.R. Grabbe, and L.E. Lowe: USGS–TWRI book 5, chap. A3. 1987. 80 pages.

5-A4. *Methods for collection and analysis of aquatic biological and microbiological samples,* by L.J. Britton and P.E. Greeson, editors: USGS–TWRI book 5, chap. A4. 1989. 363 pages.

5-A5. *Methods for determination of radioactive substances in water and fluvial sediments,* by L.L. Thatcher, V.J. Janzer, and K.W. Edwards: USGS–TWRI book 5, chap. A5. 1977. 95 pages.

5-A6. *Quality assurance practices for the chemical and biological analyses of water and fluvial sediments,* by L.C. Friedman and D.E. Erdmann: USGS–TWRI book 5, chap. A6. 1982. 181 pages.

Section C. Sediment Analysis

5-C1. *Laboratory theory and methods for sediment analysis,* by H.P. Guy: USGS–TWRI book 5, chap. C1. 1969. 58 pages.

Book 6. Modeling Techniques

Section A. Ground Water

6-A1. *A modular three-dimensional finite-difference ground-water flow model,* by M.G. McDonald and A.W. Harbaugh: USGS–TWRI book 6, chap. A1. 1988. 586 pages.

6-A2. *Documentation of a computer program to simulate aquifer-system compaction using the modular finite-difference ground-water flow model,* by S.A. Leake and D.E. Prudic: USGS–TWRI book 6, chap. A2. 1991. 68 pages.

6-A3. *A modular finite-element model (MODFE) for areal and axisymmetric ground-water-flow problems, Part 1: Model Description and User's Manual,* by L.J. Torak: USGS–TWRI book 6, chap. A3. 1993. 136 pages.

6-A4. *A modular finite-element model (MODFE) for areal and axisymmetric ground-water-flow problems, Part 2: Derivation of finite-element equations and comparisons with analytical solutions,* by R.L. Cooley: USGS–TWRI book 6, chap. A4. 1992. 108 pages.

6-A5. *A modular finite-element model (MODFE) for areal and axisymmetric ground-water-flow problems, Part 3: Design philosophy and programming details,* by L.J. Torak: USGS–TWRI book 6, chap. A5, 1993. 243 pages.

6-A6. A coupled surface-water and ground-water flow model (MODBRANCH) for simulation of stream-aquifer interaction, by Eric D. Swain and Eliezer J. Wexler. 1996. 125 pages.

Book 7. Automated Data Processing and Computations

Section C. Computer Programs

7-C1. *Finite difference model for aquifer simulation in two dimensions with results of numerical experiments,* by P.C. Trescott, G.F. Pinder, and S.P. Larson: USGS–TWRI book 7, chap. C1. 1976. 116 pages.

7-C2. *Computer model of two-dimensional solute transport and dispersion in ground water,* by L.F. Konikow and J.D. Bredehoeft: USGS–TWRI book 7, chap. C2. 1978. 90 pages.

7-C3. *A model for simulation of flow in singular and interconnected channels,* by R.W. Schaffranek, R.A. Baltzer, and D.E. Goldberg: USGS–TWRI book 7, chap. C3. 1981. 110 pages.

Book 8. Instrumentation

Section A. Instruments for Measurement of Water Level

8-A1. *Methods of measuring water levels in deep wells,* by M.S. Garber and F.C. Koopman: USGS–TWRI book 8, chap. A1. 1968. 23 pages.

8-A2. *Installation and service manual for U.S. Geological Survey manometers,* by J.D. Craig: USGS–TWRI book 8, chap. A2. 1983. 57 pages.

Section B. Instruments for Measurement of Discharge

8-B2. *Calibration and maintenance of vertical-axis type current meters,* by G.F. Smoot and C.E. Novak: USGS–TWRI book 8, chap. B2. 1968. 15 pages.

Book 9. Handbooks for Water-Resources Investigations

Section A. National Field Manual for the Collection of Water-Quality Data

9-A1. *National Field Manual for the Collection of Water-Quality Data: Preparations for Water Sampling,* by F.D. Wilde, D.B. Radtke, Jacob Gibs, and R.T. Iwatsubo: USGS–TWRI book 9, chap. A1. 1998. 47 p.

9-A2. *National Field Manual for the Collection of Water-Quality Data: Selection of Equipment for Water Sampling,* edited by F.D. Wilde, D.B. Radtke, Jacob Gibs, and R.T. Iwatsubo: USGS–TWRI book 9, chap. A2. 1998. 94 p.

9-A3. *National Field Manual for the Collection of Water-Quality Data: Cleaning of Equipment for Water Sampling,* edited by F.D. Wilde, D.B. Radtke, Jacob Gibs, and R.T. Iwatsubo: USGS–TWRI book 9, chap. A3. 1998. 75 p.

9-A4. *National Field Manual for the Collection of Water-Quality Data: Collection of Water Samples,* edited by F.D. Wilde, D.B. Radtke, Jacob Gibs, and R.T. Iwatsubo: USGS–TWRI book 9, chap. A4. 1999. 156 p.

9-A5. *National Field Manual for the Collection of Water-Quality Data: Processing of Water Samples,* edited by F.D. Wilde, D.B. Radtke, Jacob Gibs, and R.T. Iwatsubo: USGS–TWRI book 9, chap. A5. 1999, 149 p.

9-A6. *National Field Manual for the Collection of Water-Quality Data: Field Measurements,* edited by F.D. Wilde and D.B. Radtke: USGS–TWRI book 9, chap. A6. 1998. Variously paginated.

9-A7. *National Field Manual for the Collection of Water-Quality Data: Biological Indicators,*edited by D.N. Myers and F.D. Wilde: USGS–TWRI book 9, chap. A7. 1997 and 1999. Variously paginated.

9-A8. *National Field Manual for the Collection of Water-Quality Data: Bottom-material samples,* by D.B. Radtke: USGS–TWRI book 9, chap. A8. 1998. 48 pages.

9-A9. *National Field Manual for the Collection of Water-Quality Data: Safety in Field Activities,* by S.L. Lane and R.G. Fay: USGS–TWRI book 9, chap. A9. 1998. 60 pages.

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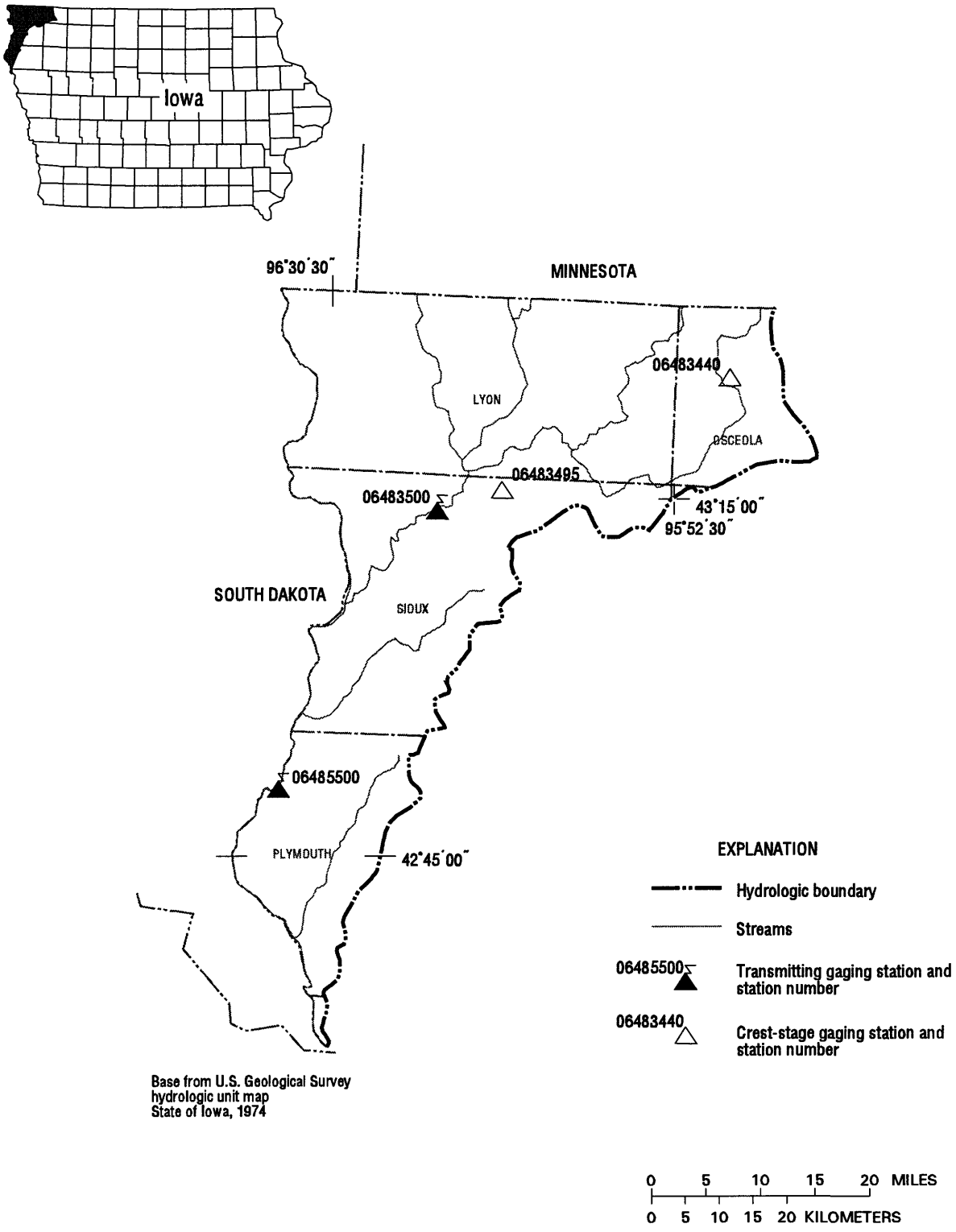

Iowa
96°30'30"
MINNESOTA
LYON
OSCEOLA
06483440
06483495
06483500
43°15'00"
95°52'30"
SOUTH DAKOTA
SIOUX
06485500
PLYMOUTH
42°45'00"
EXPLANATION
Hydrologic boundary
Streams
06485500 Transmitting gaging station and station number
06483440 Crest-stage gaging station and station number
Base from U.S. Geological Survey
hydrologic unit map
State of Iowa, 1974
0 5 10 15 20 MILES
0 5 10 15 20 KILOMETERS

Gaging Stations

Crest Stage Gaging Stations

06483500 ROCK RIVER NEAR ROCK VALLEY, IA

LOCATION.--Lat 43°12'52", long 96°17'39", in $SW^1/_4$ $SW^1/_4$ sec.16, T.97 N., R.46 W., Sioux County, Hydrologic Unit 10170204, on left bank 3 ft upstream from bridge on county highway K30, 0.3 mi north of Rock Valley, and at mile 19.1.

DRAINAGE AREA.--1,592 mi^2.

PERIOD OF RECORD.--June 1948 to current year.

REVISED RECORDS.--WSP 1439: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,222.54 ft above sea level. Prior to Aug. 13, 1952, nonrecording gage with supplementary water-stage recorder operating above 6.2 ft gage height. June 4, 1949 to Aug. 12, 1952 and Aug. 13, 1952 to May 4, 1976, water-stage recorder, at site 3.2 mi downstream at datum 10.73 ft lower.

REMARKS.--Records good except those for estimated daily discharges, which are poor. Periodic observations of water temperature and specific conductance are published in this report as miscellaneous water quality data. U.S. Army Corps of Engineers rain gage and satellite data collection platform at station.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in 1897 reached a stage of 17.0 ft, former site and datum, discharge not determined, from information by State Highway Commission.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	92	746	1060	e270	e420	547	654	1550	957	960	313	96
2	96	650	1000	e340	e460	608	638	1390	1120	964	292	99
3	105	588	944	e320	e500	553	624	1300	1220	997	275	100
4	148	538	902	e250	e600	503	617	1250	1180	1000	261	115
5	229	500	864	e230	e550	530	640	1240	1100	1070	247	129
6	271	471	825	e200	e600	484	958	1210	1100	982	227	112
7	290	448	786	e213	e700	425	1560	1210	1040	855	216	105
8	271	436	740	e210	e750	303	1720	1270	964	762	203	100
9	238	448	711	e180	e1200	e270	2270	1280	908	682	191	95
10	204	e600	684	e195	e1600	362	4430	1250	1270	612	180	90
11	187	e800	651	e200	e2500	474	4330	1210	1390	560	168	88
12	173	1060	643	e200	e3100	454	3940	1160	1720	519	165	88
13	164	1670	640	e180	2840	429	3280	1110	1600	481	153	84
14	162	1980	631	e190	2230	423	2730	1050	1390	449	146	82
15	157	2030	619	e180	1940	432	2590	1020	1260	438	143	81
16	160	2150	607	e210	1450	507	2350	1010	1220	404	137	80
17	202	2310	592	e250	1030	1160	2090	1010	1160	383	137	76
18	313	2320	592	e225	694	1950	1820	989	1080	381	131	75
19	417	2550	e360	e210	563	1420	1640	931	1070	466	121	74
20	425	2540	e280	e220	508	992	1490	917	1110	732	117	73
21	370	2010	e380	e250	468	854	1370	1080	1150	864	111	73
22	334	1690	e360	e240	425	770	1310	1740	1110	848	110	73
23	310	1560	e340	e250	e320	715	1250	1470	1060	839	113	75
24	291	1530	e300	e300	443	669	1180	1290	973	825	107	71
25	277	1510	e300	e270	442	625	1090	1180	894	673	104	70
26	270	1390	e320	e250	472	596	1110	1080	828	559	102	68
27	329	1310	e340	e340	488	583	1310	1010	825	487	97	69
28	401	1200	e400	e320	513	601	1830	929	922	440	92	69
29	628	1140	e360	e340	---	639	2120	874	1010	404	88	70
30	851	1100	e340	e360	---	675	1800	839	977	372	95	70
31	870	---	e320	e380	---	665	---	915	---	345	96	---
TOTAL	9235	39275	17891	7773	27806	20218	54741	35764	33608	20353	4938	2550
MEAN	298	1309	577	251	993	652	1825	1154	1120	657	159	85.0
MAX	870	2550	1060	380	3100	1950	4430	1740	1720	1070	313	129
MIN	92	436	280	180	320	270	617	839	825	345	88	68
AC-FT	18320	77900	35490	15420	55150	40100	108600	70940	66660	40370	9790	5060
CFSM	.19	.82	.36	.16	.62	.41	1.15	.72	.70	.41	.10	.05
IN.	.22	.92	.42	.18	.65	.47	1.28	.84	.79	.48	.12	.06

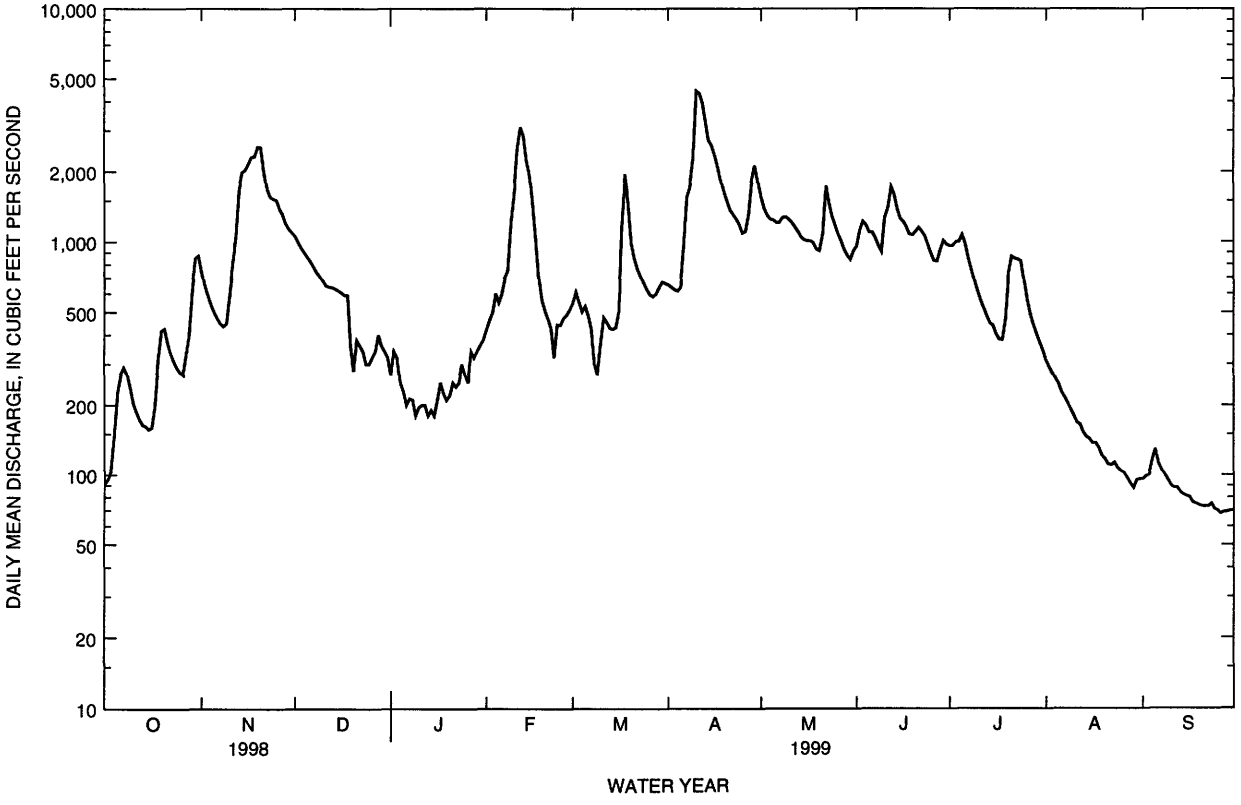
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1949 - 1999, BY WATER YEAR (WY)

MEAN	240	268	147	82.2	228	1042	1296	697	953	610	271	240
MAX	1232	2039	676	434	1059	4646	6507	3728	6495	9088	2251	2135
(WY)	1993	1980	1983	1996	1966	1997	1969	1993	1993	1993	1993	1986
MIN	2.39	9.70	3.22	.037	.30	35.1	35.9	44.4	46.3	21.9	6.79	3.26
(WY)	1959	1959	1959	1977	1959	1959	1959	1968	1964	1976	1976	1955

06483500 ROCK RIVER NEAR ROCK VALLEY, IA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1949 - 1999	
ANNUAL TOTAL	188989		274152			
ANNUAL MEAN	518		751		506	
HIGHEST ANNUAL MEAN					2656	1993
LOWEST ANNUAL MEAN					31.0	1968
HIGHEST DAILY MEAN	2550	Nov 19	4430	Apr 10	35400	Apr 7 1969
LOWEST DAILY MEAN	50	Jan 13	68	Sep 26	.00	Feb 20 1959b
ANNUAL SEVEN-DAY MINIMUM	59	Jan 12	70	Sep 24	.00	Feb 27 1959
INSTANTANEOUS PEAK FLOW			5000	Apr 10	40400	Apr 7 1969
INSTANTANEOUS PEAK STAGE			10.10	Apr 10	17.32	Apr 7 1969
INSTANTANEOUS LOW FLOW			67	Sep 25a		
ANNUAL RUNOFF (AC-FT)	374900		543800		366700	
ANNUAL RUNOFF (CFSM)	.33		.47		.32	
ANNUAL RUNOFF (INCHES)	4.42		6.41		4.32	
10 PERCENT EXCEEDS	1290		1560		1150	
50 PERCENT EXCEEDS	340		563		135	
90 PERCENT EXCEEDS	95		105		16	

a Also Sep 26-30
b Many days during winter periods in 1959 & 1977
e Estimated



06485500 BIG SIOUX RIVER AT AKRON, IA

LOCATION.--Lat 42°50'14", long 96°33'41", in SW$^1/_4$ SE$^1/_4$ SW$^1/_4$ sec.30, T.93 N., R.48 W., Plymouth County, Hydrologic Unit 10170203, on left bank 15 ft downstream from Iowa Highway 403 bridge, 0.5 mi northwest of Akron, and 2.9 mi upstream from Union Creek.

DRAINAGE AREA.--8,424 mi^2, of which 1,487 mi^2 usually is noncontributing (213 mi^2 of the noncontributing area contributed runoff in the 1994-99 water years).

PERIOD OF RECORD.--October 1928 to current year.

REVISED RECORDS.--WSP 1309: 1929(M), 1931-33(M), 1936(M), 1938(M), 1940(M). WSP 1389: Drainage area. WDR SD-84-1: Drainage area. WDR SD-94-1 only: Drainage area.

GAGE.--Water-stage recorder and crest-stage gage. Datum of gage is 1,118.90 ft above sea level. Prior to Dec. 3, 1934, nonrecording gage at bridge 0.5 mi downstream at same datum. From Dec. 3, 1934, to Oct. 31, 1985, water-stage recorder at site 0.6 mi downstream at same datum.

REMARKS.--Records good except those for estimated daily discharges, which are poor. U.S. Army Corps of Engineers satellite data-collection platform at station. Water temperature and specific conductance measured during the year are compiled in the Miscellaneous Temperature Measurements and Field Determinations section.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	429	2050	3320	e850	e800	1910	2370	4730	3230	2850	1520	751
2	461	1940	3260	e820	e810	1950	2360	4470	3380	3560	1430	769
3	455	1790	3180	e800	e870	2090	2350	4220	3500	3990	1350	718
4	497	1690	3070	e780	e950	2110	2340	4040	3500	3510	1290	724
5	627	1620	2970	e760	e1000	1990	2370	3930	3410	3390	1240	742
6	791	1540	2850	e740	e1040	e2090	2620	3900	3680	3300	1250	763
7	1100	1470	2720	e730	e1100	e2170	3210	4160	3220	3160	1260	769
8	1030	1440	2600	e720	e1230	e2020	4150	4700	2970	2910	1210	733
9	1020	1420	2490	e710	e1600	e1780	5000	4620	2770	2700	1160	754
10	959	1670	2380	e700	e2000	e1520	5930	4500	3080	2480	1110	808
11	883	1950	2300	e690	e3000	e1470	7910	4460	3480	2260	1060	871
12	820	2250	2180	e690	e3500	1620	9790	4540	3470	2080	1040	884
13	797	2080	2070	e680	e3500	1700	10300	4620	3620	1930	995	824
14	756	2550	2060	e680	e3400	1710	10100	4520	3710	1800	950	775
15	723	3060	2090	e670	e3300	1710	8430	4290	3830	1690	917	727
16	700	3420	2070	e660	3180	1840	7600	4060	3830	1640	897	695
17	721	3830	2050	e670	2790	e2120	7310	3880	3630	1590	866	675
18	785	4260	2020	e690	2510	3220	7060	3770	3350	1700	854	647
19	1130	4600	1950	e710	2280	4860	6430	3600	3180	1580	816	630
20	1270	4870	e1500	e730	2050	4640	5830	3450	3070	3450	792	606
21	1340	4910	e1200	e730	1900	3950	5370	3420	3080	3920	775	611
22	1270	4450	e900	e730	1830	3680	5020	3920	3110	3200	764	609
23	1240	4020	e1000	e740	1420	3420	4770	4500	3090	3100	762	584
24	1250	3850	e1200	e750	1410	3090	4590	4120	3000	3270	757	576
25	1230	3900	e1280	e740	1700	2820	4410	3800	2890	3530	748	584
26	1180	3950	e1300	e740	1790	2620	4200	3580	2740	2870	732	582
27	1200	3810	e1250	e740	1740	2470	4100	3400	2960	2460	716	568
28	1230	3670	e1200	e760	1840	2380	4310	3240	2870	2170	701	568
29	1460	3560	e1150	e760	---	2330	4770	3080	2850	1930	695	555
30	1610	3440	e1050	e770	---	2360	4980	2900	2890	1770	775	548
31	1920	---	e950	e780	---	2380	---	3160	---	1640	724	---
TOTAL	30884	89060	61610	22720	54540	76020	159980	123580	97390	81430	30156	20650
MEAN	996	2969	1987	733	1948	2452	5333	3986	3246	2627	973	688
MAX	1920	4910	3320	850	3500	4860	10300	4730	3830	3990	1520	884
MIN	429	1420	900	660	800	1470	2340	2900	2740	1580	695	548
AC-FT	61260	176700	122200	45070	108200	150800	317300	245100	193200	161500	59810	40960

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1929 - 1999, BY WATER YEAR (WY)

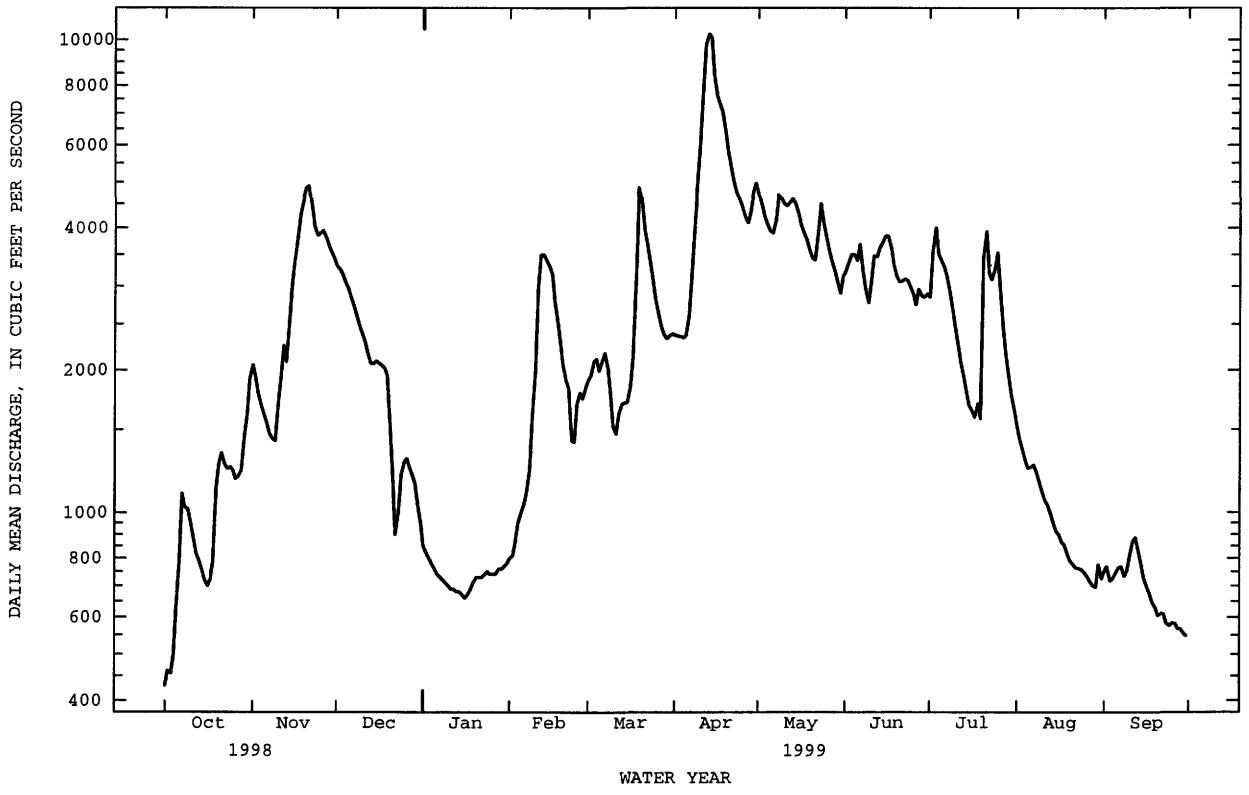
MEAN	536	528	353	209	518	2419	3294	1793	2157	1490	763	680
MAX	4039	3022	1987	920	2399	8866	20690	9499	15820	21740	6200	7313
(WY)	1987	1980	1999	1996	1966	1983	1969	1993	1984	1993	1993	1986
MIN	32.9	47.9	32.1	6.68	12.1	124	139	73.3	100	50.7	45.2	36.4
(WY)	1959	1959	1977	1977	1936	1931	1931	1934	1933	1931	1976	1976

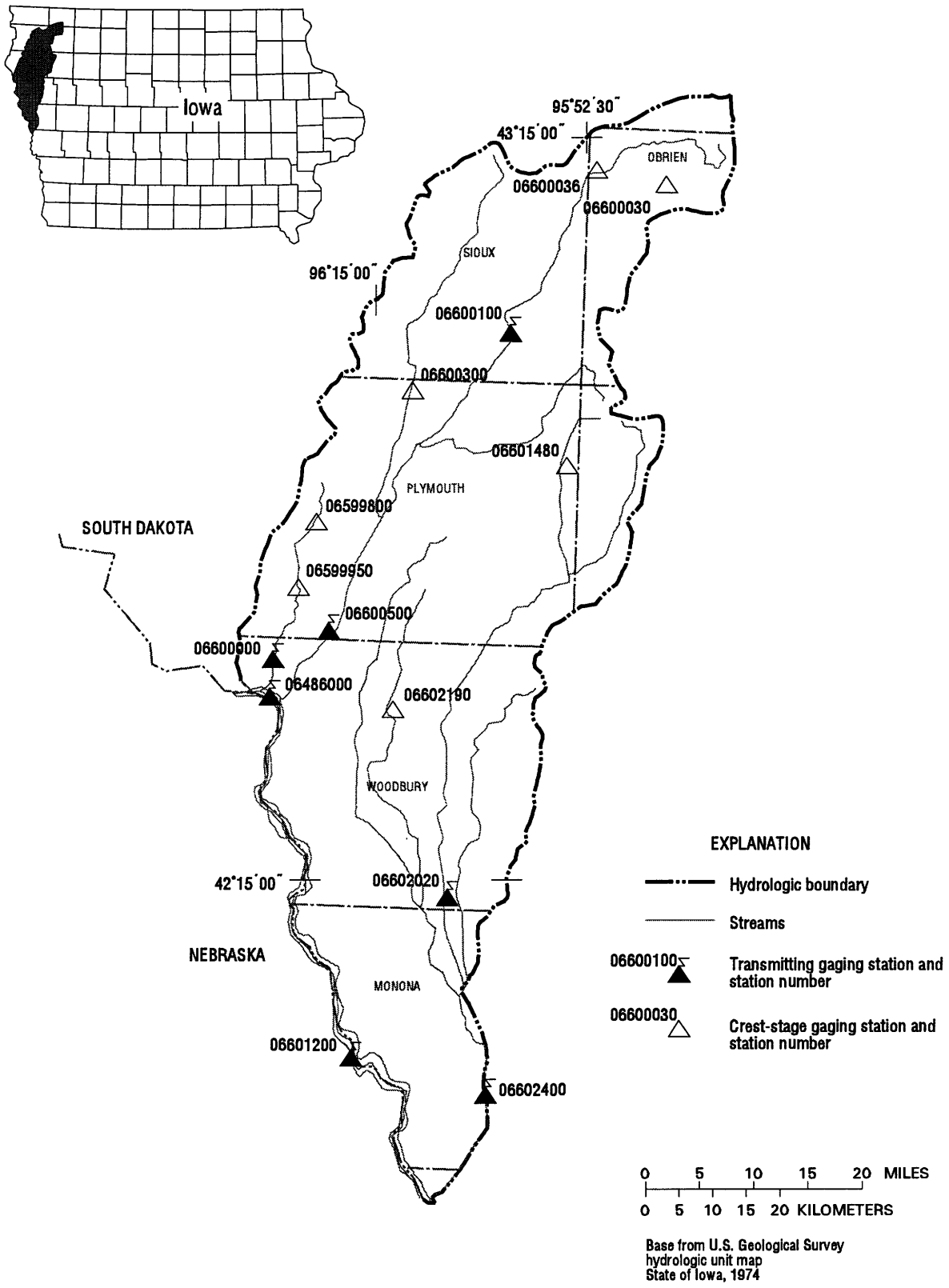
e Estimated

06485500 BIG SIOUX RIVER AT AKRON, IA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1929 - 1999	
ANNUAL TOTAL	635448		848020			
ANNUAL MEAN	1741		2323		1229a	
HIGHEST ANNUAL MEAN					6271	1993
LOWEST ANNUAL MEAN					120	1931
HIGHEST DAILY MEAN	6850	Apr 10	10300	Apr 13	77500	Apr 9 1969
LOWEST DAILY MEAN	300	Feb 5	429	Oct 1	4.0	Jan 17 1977
ANNUAL SEVEN-DAY MINIMUM	311	Feb 1	569	Sep 24	4.4	Jan 15 1977
INSTANTANEOUS PEAK FLOW			10400	Apr 13	80800	Apr 9 1969b
INSTANTANEOUS PEAK STAGE			17.90	Apr 13	23.05	May 10 1993c
ANNUAL RUNOFF (AC-FT)	1260000		1682000		890300	
10 PERCENT EXCEEDS	3820		4300		2920	
50 PERCENT EXCEEDS	1410		1950		390	
90 PERCENT EXCEEDS	430		719		70	

a Median of annual mean discharges, 820 ft^3/s
b Gage height, 22.99 ft
c From floodmark; discharge, 66,700 ft^3/s




Iowa
95°52'30"
43°15'00"
OBRIEN
06600036
06600030
SIOUX
96°15'00"
06600100
06600300
06601480
PLYMOUTH
06599800
SOUTH DAKOTA
06599950
06600500
06600900
06486000
06602190
WOODBURY
42°15'00"
06602020
NEBRASKA
MONONA
06601200
06602400
EXPLANATION
Hydrologic boundary
Streams
06600100 Transmitting gaging station and station number
06600030 Crest-stage gaging station and station number
0 5 10 15 20 MILES
0 5 10 15 20 KILOMETERS
Base from U.S. Geological Survey
hydrologic unit map
State of Iowa, 1974

Gaging Stations

Crest Stage Gaging Stations

06486000 MISSOURI RIVER AT SIOUX CITY, IA

LOCATION.--Lat. 42°29'09", long 96°24'49", in NW$^1/_4$ SE$^1/_4$ sec.16, T.29 N., R.9 E., sixth prinicipal meridian, Dakota County, Nebraska, Hydrologic Unit 10230001, on right bank on upstream side of bridge on U.S. Highway 20 and 77 at South Sioux City, Nebraska, 1.9 mi downstream from Big Sioux River, and at mile 732.2.

DRAINAGE.--314,600 mi^2, approximately. The 3,959 mi^2 in Great Divide basin are not included.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1897 to current year in reports of the U.S. Geological Survey. Prior to October 1928 and October 1931 to September 1938, monthly discharges only, published in WSP 1310. January 1879 to December 1890, monthly discharges only, in House Document 238, 73rd Congress, 2d session, Missouri River. Gage height records collected in this vicinity September 1878 to December 1899 are contained in reports of Missouri River Commission and since July 1889 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 716: 1929-30. WSP 876: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,056.98 ft above sea level. Sept. 2, 1878 to Dec. 31, 1905, nonrecording gages at various locations within 1.7 mi of present site and at various datums. Jan. 1, 1906 to Feb. 14, 1935, nonrecording gage, and Feb. 15, 1935 to Sept. 30, 1969, water-stage recorder at site 227 ft downstream at datum 19.98 ft higher, and Oct. 1, 1969 to Sept. 30, 1970 at datum 20.00 ft higher. Oct. 1, 1970 to Jan. 30, 1981, water-stage recorder at site 227 ft downstream at present datum.

REMARKS.--Records good. Flow regulated by upstream main-stem reservoirs. Fort Randall Dam was completed in July 1952, with storage beginning in December 1952. Gavins Point Dam was completed in July 1955, with storage beginning in December 1955. Periodic observations of water temperature and specific conductance are published in this report as miscellaneous water quality data. U.S. Army Corps of Engineers rain gage and satellite data collection platform at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 441,000 ft^3/s Apr. 14, 1952, gage height, 24.28 ft, datum then in use; minimum, 2,500 ft^3/s Dec. 29, 1941; minimum gage height, 7.02 ft Jan. 19, 1996.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	33000	40000	46000	25000	26700	30100	36000	34300	48100	39200	44700	48300
2	32700	40400	45800	24400	28400	30200	36100	35700	48000	43300	44400	48200
3	33000	40400	45800	23700	29400	31200	35800	36000	42600	46400	44000	48200
4	33500	40100	44000	22600	29600	32500	36300	36200	42700	45500	42500	48600
5	34900	40000	42500	23800	29100	32600	36400	36600	46300	46800	43300	48500
6	32000	41200	40200	25700	29300	32400	37700	35600	44000	49000	44600	49000
7	29500	42900	38400	24500	29300	32500	37000	33200	43300	49600	45200	49700
8	30300	42800	36900	23800	29500	32500	37100	33600	45800	50000	42500	49700
9	30600	42400	36400	23800	30000	33600	37400	33900	44900	49800	39500	49600
10	32800	45400	36000	23700	30200	34100	36800	33600	46000	48700	40700	49100
11	33500	43200	35600	23800	30700	33900	34900	33100	48400	47700	41600	48800
12	33600	42200	35200	25700	29800	33500	35800	32200	39800	47000	42400	48800
13	33100	43200	34700	24100	29700	33400	37200	34600	37400	46100	42500	48500
14	33000	43600	34400	23200	31600	33500	38600	35000	40400	45200	42900	48200
15	33100	44300	34200	24500	31100	33800	40800	35800	45500	44300	43100	48000
16	33400	45100	34100	27000	31100	34200	38900	37300	40900	43900	43600	48200
17	33700	45600	33800	28000	30800	35500	32600	39200	42000	43400	43200	48500
18	33600	46500	33700	26000	30700	35700	31500	38800	45800	43600	42800	48300
19	33300	47300	33400	24900	30700	36500	33300	36200	42100	42400	42700	48100
20	33600	47600	32600	25400	30500	33100	34400	37400	42900	43800	42400	48000
21	35400	48300	29100	25400	29900	38600	36200	40400	45900	53300	41900	48100
22	35800	48600	24100	25700	29500	37200	35000	42000	46000	54500	41200	48100
23	36000	48200	20600	26500	29200	36700	31900	44700	45800	48200	40900	48300
24	36000	47800	20500	27200	30000	35800	28900	45200	46200	46700	40800	48600
25	36000	47900	21700	26400	30000	35600	32500	44300	45700	47000	39700	48500
26	36300	47400	24000	27200	30200	35200	35700	43700	45200	47600	41900	48400
27	36100	47100	24300	27600	30600	35200	36300	43600	49500	46500	44300	48200
28	36700	46700	25200	27200	30300	35600	35400	43400	51800	46100	46800	48000
29	38700	46500	24800	26900	---	35100	32700	44300	41900	45900	47800	48200
30	40100	46200	24100	26500	---	35000	31700	45800	37200	45600	48100	48200
31	39500	---	24800	26400	---	35500	---	45900	---	45200	48000	---
TOTAL	1062800	1338900	1016900	786600	837900	1060300	1060900	1191600	1332100	1442300	1340000	1454900
MEAN	34280	44630	32800	25370	29920	34200	35360	38440	44400	46530	43230	48500
MAX	40100	48600	46000	28000	31600	38600	40800	45900	51800	54500	48100	49700
MIN	29500	40000	20500	22600	26700	30100	28900	32200	37200	39200	39500	48000
AC-FT	2108000	2656000	2017000	1560000	1662000	2103000	2104000	2364000	2642000	2861000	2658000	2886000
CFSM	.11	.14	.10	.08	.10	.11	.11	.12	.14	.15	.14	.15
IN.	.13	.16	.12	.09	.10	.13	.13	.14	.16	.17	.16	.17

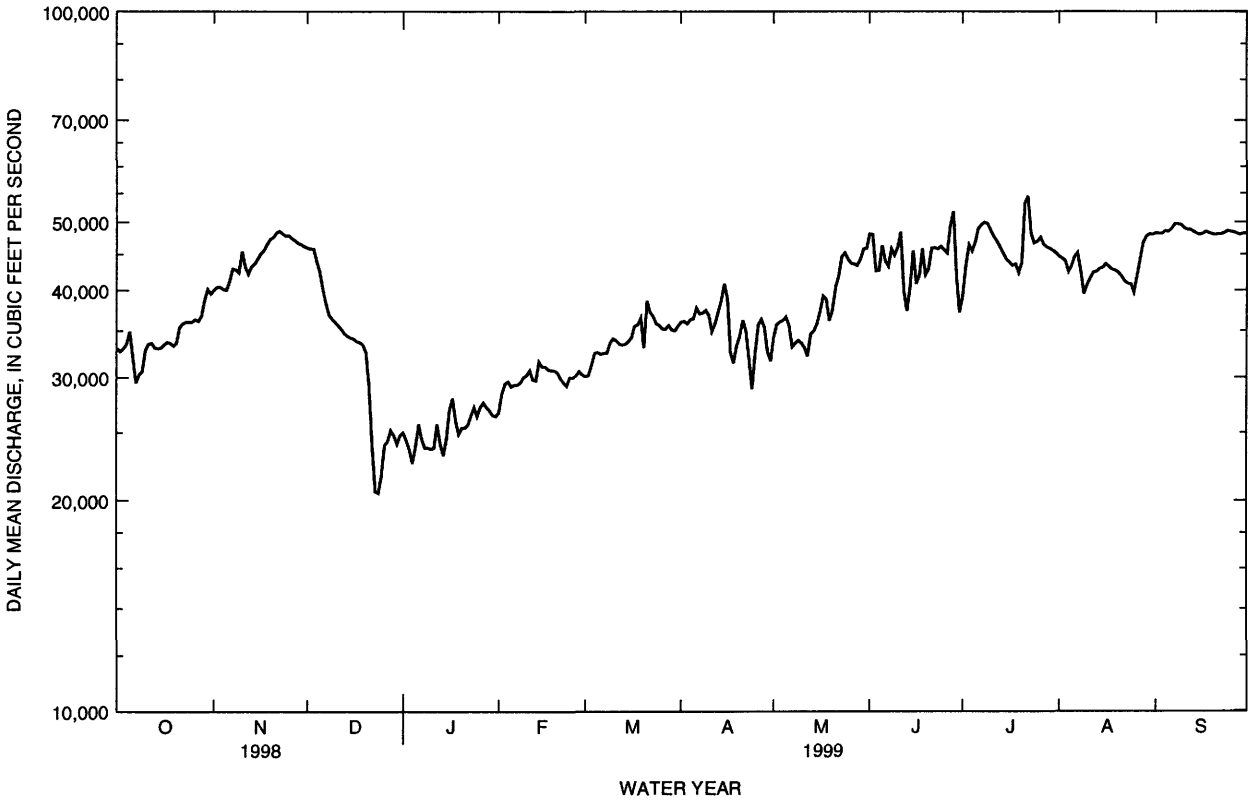
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1953 - 1999, BY WATER YEAR (WY)

MEAN	36110	31090	18850	16040	17340	23440	33400	34010	35840	36490	36890	37040
MAX	69300	71600	39880	27720	31120	47020	88040	78720	66400	65550	65360	66400
(WY)	1998	1998	1998	1987	1997	1997	1997	1997	1997	1997	1997	1997
MIN	14350	6951	8271	7316	6293	9135	17450	23820	23270	26890	24270	25790
(WY)	1962	1962	1962	1964	1963	1957	1957	1962	1960	1958	1993	1962

06486000 MISSOURI RIVER AT SIOUX CITY, IA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1953 - 1999a	
ANNUAL TOTAL	11942600		13925200			
ANNUAL MEAN	32720		38150		29750	
HIGHEST ANNUAL MEAN					55890	1997
LOWEST ANNUAL MEAN					19770	1957
HIGHEST DAILY MEAN	48600	Nov 22	54500	Jul 22	105000	Jun 25 1953
LOWEST DAILY MEAN	20500	Dec 24	20500	Dec 24	3000	Dec 11 1961
ANNUAL SEVEN-DAY MINIMUM	22900	Dec 22	22900	Dec 22	5430	Feb 22 1963
INSTANTANEOUS PEAK FLOW			55400	Jul 22	101000	Apr 3 1960
INSTANTANEOUS PEAK STAGE			20.93	Jul 22	30.65	Feb 19 1971
INSTANTANEOUS LOW FLOW			19800	Jan 4		
ANNUAL RUNOFF (AC-FT)	23690000		27620000		21560000	
ANNUAL RUNOFF (CFSM)	.10		.12		.095	
ANNUAL RUNOFF (INCHES)	1.41		1.65		1.29	
10 PERCENT EXCEEDS	40000		48200		46800	
50 PERCENT EXCEEDS	32400		37200		30200	
90 PERCENT EXCEEDS	27500		27000		11500	

a Post regulation, revised



06486000 MISSOURI RIVER AT SIOUX CITY, IA--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--October 1971 to current year. Daily sediment loads October 1954 to September 1971 in reports of U.S. Army Corps of Engineers.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1972 to September 1976, November 1977 to September 1981, October 1991 to current year.
WATER TEMPERATURES: October 1971 to September 1976, November 1977 to September 1981, October 1991 to current year.
SUSPENDED-SEDIMENT DISCHARGE: October 1971 to September 1976, October 1991 to current year.

REMARKS.--Records of specific conductance are obtained from suspended-sediment samples at time of analysis.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 985 microsiemens Apr. 19, 1999; minimum daily, 410 microsiemens Mar. 22, 1978.
WATER TEMPERATURES: Maximum daily, 28.0°C July 30, 1976, Aug. 7, 1979, and July 28, 1997; minimum daily, 0.0°C on many days during winter periods.
SEDIMENT CONCENTRATIONS: Maximum daily mean, 1,690 mg/L July 17, 1996; minimum daily mean, 42 mg/L Dec. 29, 1975.
SEDIMENT LOADS: Maximum daily, 370,000 tons July 17, 1996; minimum daily, 2,150 tons Nov. 20, 1991.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum daily, 985 microsiemens Apr. 19; minimum daily, 745 microsiemens Oct. 5.
WATER TEMPERATURES: Maximum daily, 27.5°C July 26; minimum daily, 0.0°C Jan. 19.
SEDIMENT CONCENTRATIONS: Maximum daily mean, 1,440 mg/L Apr. 21; minimum daily mean, 102 mg/L Aug. 9.
SEDIMENT LOADS: Maximum daily, 141,000 tons Apr. 21; minimum daily, 9,540 tons Oct. 19.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	TIME	NUMBER OF SAMPLING POINTS (COUNT) (00063)	BED MAT. SIEVE DIAM. % FINER THAN .125 MM (80165)	BED MAT. SIEVE DIAM. % FINER THAN .250 MM (80166)	BED MAT. SIEVE DIAM. % FINER THAN .500 MM (80167)	BED MAT. SIEVE DIAM. % FINER THAN 1.00 MM (80168)	BED MAT. SIEVE DIAM. % FINER THAN 2.00 MM (80169)	BED MAT. SIEVE DIAM. % FINER THAN 4.00 MM (80170)	BED MAT. SIEVE DIAM. % FINER THAN 8.00 MM (80171)	BED MAT. SIEVE DIAM. % FINER THAN 16.0 MM (80172)
OCT										
05...	0905	3	0	13	81	95	98	99	100	--
NOV										
02...	1110	3	0	12	88	97	97	97	98	100
JAN										
19...	1100	3	0	4	40	76	91	97	100	--
FEB										
02...	1205	3	0	18	92	100	--	--	--	--
MAR										
02...	0915	3	0	3	43	69	85	92	97	100
APR										
02...	1200	3	0	6	63	84	94	98	99	100
MAY										
03...	1125	3	0	5	61	86	95	99	100	--
JUN										
07...	0920	3	0	4	65	96	99	100	--	--
JUL										
06...	1220	3	0	8	74	97	99	100	--	--
AUG										
02...	0936	3	0	9	73	96	99	100	--	--
SEP										
10...	1050	2	0	16	85	98	99	100	--	--

06486000 MISSOURI RIVER AT SIOUX CITY, IA--Continued

SPECIFIC CONDUCTANCE MICROSIEMENS/CM AT 25 DEG C, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY INSTANTANEOUS VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	---	---	---	923	---	934	---
2	775	791	---	---	792	794	799	---	---	933	---	---
3	---	---	---	---	---	---	---	891	952	---	---	856
4	---	---	---	---	---	---	---	---	---	---	---	---
5	745	776	---	---	---	---	---	---	---	---	---	---
6	---	---	---	---	---	---	---	---	---	936	935	---
7	---	---	---	---	---	---	---	910	941	---	---	826
8	---	---	---	---	789	---	---	---	940	952	---	---
9	766	772	---	---	---	---	---	---	---	---	929	---
10	---	---	---	---	---	789	---	928	---	---	---	815
11	---	---	---	---	---	---	---	---	876	---	---	---
12	---	---	---	---	---	---	914	---	---	975	---	---
13	750	653	---	---	---	---	---	---	---	---	921	820
14	---	---	---	---	---	---	---	930	940	---	---	---
15	---	---	836	---	---	---	---	---	---	---	---	---
16	751	790	---	---	763	801	908	---	---	975	906	---
17	---	---	---	---	---	---	---	910	945	---	---	830
18	---	---	---	---	---	---	---	---	---	---	---	---
19	770	---	---	851	---	---	985	---	---	960	---	---
20	---	818	---	---	---	---	---	---	---	---	897	816
21	---	---	---	---	---	801	---	896	936	---	---	---
22	---	---	---	---	---	---	---	---	---	---	---	---
23	765	819	---	---	---	---	963	---	---	883	889	---
24	---	---	---	---	---	---	---	912	---	---	---	818
25	---	814	---	---	776	---	---	---	935	---	---	---
26	785	---	---	---	---	812	940	---	---	848	883	---
27	---	---	---	---	---	---	---	---	---	---	---	813
28	---	---	---	---	---	---	---	905	866	---	---	---
29	---	---	---	---	---	---	---	---	---	---	---	---
30	788	823	---	---	---	805	923	---	---	915	868	---
31	---	---	---	---	---	---	---	---	---	---	---	---

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY INSTANTANEOUS VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	---	---	---	17.0	---	25.0	---
2	17.0	8.0	---	---	.5	3.0	9.0	---	---	21.5	---	---
3	---	---	---	---	---	---	---	12.0	18.5	---	---	25.0
4	---	---	---	---	---	---	---	---	---	---	---	---
5	15.0	9.5	---	---	---	---	---	---	---	---	---	---
6	---	---	---	---	---	---	---	---	---	24.0	23.5	---
7	---	---	---	---	---	---	---	11.5	22.5	---	---	23.0
8	---	---	---	---	3.0	---	---	---	22.0	25.5	---	---
9	13.0	5.0	---	---	---	---	---	---	---	---	25.0	---
10	---	---	---	---	---	1.0	---	16.5	---	---	---	20.0
11	---	---	---	---	---	---	---	---	21.0	---	---	---
12	---	---	---	---	---	---	8.5	---	---	23.5	---	---
13	14.5	4.5	---	---	---	---	---	---	---	---	22.5	18.0
14	---	---	---	---	---	---	---	15.5	22.5	---	---	---
15	---	---	4.0	---	---	---	---	---	---	---	---	---
16	16.0	4.5	---	---	1.0	4.5	7.0	---	---	25.0	23.0	---
17	---	---	---	---	---	---	---	16.0	17.0	---	---	17.0
18	---	---	---	---	---	---	---	---	---	---	---	---
19	14.0	---	---	.0	---	---	11.0	---	---	26.5	---	---
20	---	5.0	---	---	---	---	---	---	---	---	24.0	18.0
21	---	---	---	---	---	1.0	---	17.0	21.0	---	---	---
22	---	---	---	---	---	---	---	---	---	---	---	---
23	13.0	6.0	---	---	---	---	9.0	---	---	27.0	23.5	---
24	---	---	---	---	---	---	---	17.0	---	---	---	19.0
25	---	5.0	---	---	1.5	---	---	---	23.5	---	---	---
26	15.0	---	---	---	---	7.5	10.5	---	---	27.5	24.0	---
27	---	---	---	---	---	---	---	---	---	---	---	17.0
28	---	---	---	---	---	---	---	18.0	22.0	---	---	---
29	---	---	---	---	---	---	---	---	---	---	---	---
30	14.0	7.5	---	---	---	8.0	14.5	---	---	26.5	25.5	---
31	---	---	---	---	---	---	---	---	---	---	---	---

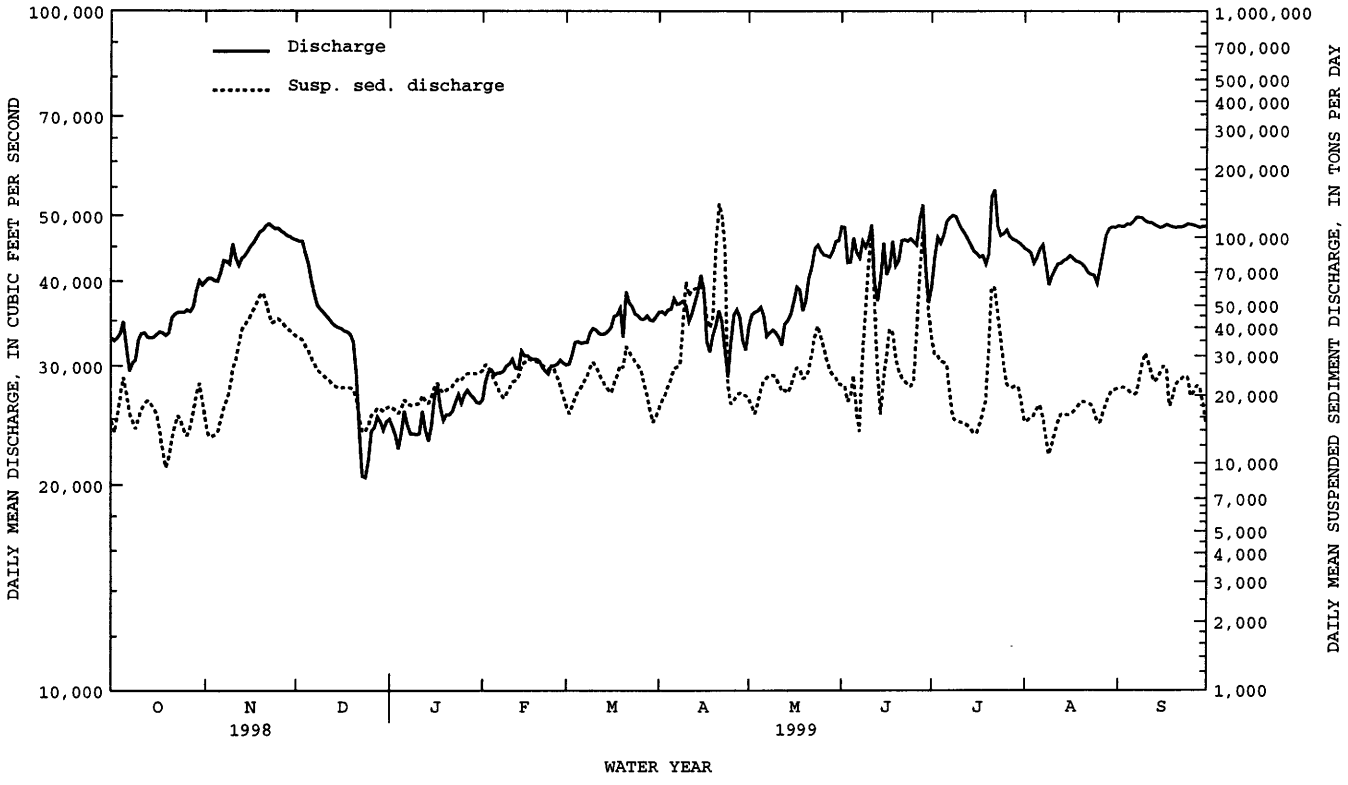
06486000 MISSOURI RIVER AT SIOUX CITY, IA--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DAY	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS/ DAY)	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS/ DAY)	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS/ DAY)	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS/ DAY)	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS/ DAY)	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS/ DAY)
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	172	15300	143	15500	296	36700	265	17800	358	25800	219	17800
2	155	13600	121	13200	291	36000	267	17600	358	27400	203	16600
3	181	16200	120	13100	286	35400	269	17200	337	26800	211	17800
4	220	20000	123	13300	281	33300	271	16600	315	25200	223	19500
5	255	24100	127	13700	276	31600	273	17500	294	23100	235	20800
6	236	20400	138	15400	271	29400	275	19100	275	21800	249	21700
7	210	16700	151	17500	266	27600	277	18300	257	20300	263	23100
8	187	15300	165	19100	262	26000	279	18000	244	19400	278	24400
9	172	14200	183	21000	257	25200	282	18100	252	20400	294	26700
10	179	15900	213	26200	253	24500	284	18200	264	21500	306	28100
11	190	17200	249	29000	248	23900	286	18400	276	22900	292	26700
12	202	18400	291	33200	244	23200	288	20000	289	23300	275	24900
13	212	18900	333	38900	240	22500	290	18900	303	24300	260	23400
14	205	18300	348	41000	236	21900	293	18400	318	27100	245	22100
15	196	17600	359	43000	233	21500	295	19600	333	28000	231	21000
16	184	16500	372	45300	234	21500	297	21700	347	29100	222	20500
17	152	13900	390	48100	236	21500	300	22600	346	28800	236	22600
18	124	11300	410	51500	238	21600	302	21200	344	28500	255	24600
19	106	9540	431	55200	239	21600	304	20400	342	28300	276	27200
20	117	10600	441	56700	241	21200	308	21100	339	27900	298	26600
21	134	12800	398	51900	243	19100	312	21400	337	27200	317	33000
22	153	14800	353	46400	245	15900	316	21900	334	26600	311	31200
23	168	16300	322	41800	247	13700	320	22900	332	26200	301	29800
24	156	15100	330	42600	249	13800	324	23800	329	26600	292	28200
25	142	13900	339	43900	251	14700	328	23400	323	26200	283	27200
26	135	13200	332	42600	253	16400	332	24400	295	24100	270	25700
27	150	14600	324	41200	255	16700	336	25000	267	22100	238	22600
28	170	16900	316	39900	257	17500	340	25000	242	19800	207	19900
29	193	20200	309	38800	259	17300	345	25000	---	---	180	17000
30	209	22600	301	37600	261	16900	349	24900	---	---	160	15100
31	176	18800	---	---	263	17600	353	25200	---	---	168	16100
TOTAL	---	503140	---	1036600	---	705700	---	643600	---	698700	---	721900

DAY	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS/ DAY)	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS/ DAY)	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS/ DAY)	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS/ DAY)	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS/ DAY)	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS/ DAY)
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	180	17500	210	19400	171	22200	342	36000	126	15200	165	21500
2	194	18900	186	17900	170	22100	259	30300	129	15500	166	21600
3	208	20100	170	16500	163	18800	240	30100	135	16000	166	21600
4	224	22000	188	18400	170	19800	231	28400	142	16300	162	21200
5	242	23700	213	21000	195	24500	222	28100	148	17400	157	20600
6	259	26400	241	23100	141	16700	206	27300	151	18100	152	20200
7	267	26700	267	24000	117	13800	156	20900	132	16200	152	20400
8	274	27500	270	24500	241	29800	118	15900	114	13200	175	23600
9	406	41300	268	24600	393	47600	114	15400	102	10900	206	27700
10	639	63700	265	24100	623	77800	116	15200	109	12000	232	30800
11	586	55200	252	22500	822	108000	118	15100	120	13500	214	28100
12	605	58500	238	20800	485	52400	119	15000	132	15200	191	25200
13	591	59300	226	21100	255	25800	117	14600	143	16400	176	23000
14	573	59700	217	20500	151	16400	115	14100	142	16500	183	23800
15	556	61200	227	21900	191	23400	114	13600	140	16300	195	25200
16	536	56300	240	24200	271	29900	114	13600	139	16400	207	27000
17	503	44300	251	26500	346	39300	126	14800	144	16800	199	26100
18	470	39900	248	26000	307	38000	141	16600	151	17400	137	17900
19	485	43700	243	23800	262	29800	166	19000	158	18200	150	19500
20	992	92600	238	24000	224	25900	269	32000	164	18700	172	22200
21	1440	141000	238	26000	195	24100	417	60200	165	18600	178	23200
22	1320	124000	266	30200	186	23100	405	59600	165	18400	182	23700
23	1020	88600	303	36500	180	22300	358	46600	164	18100	187	24400
24	284	22000	333	40700	175	21800	282	35600	154	16900	183	24000
25	208	18200	306	36600	187	23000	219	27800	142	15300	151	19800
26	196	18900	274	32400	300	36600	175	22500	134	15200	158	20700
27	204	20000	245	28900	504	68100	172	21600	139	16700	170	22100
28	214	20500	221	25900	761	106000	174	21700	147	18600	167	21700
29	226	19900	206	24700	628	71400	177	22000	155	20000	141	18300
30	233	19900	193	23900	463	46500	174	21500	162	21100	116	15100
31	---	---	181	22400	---	---	148	18000	164	21300	---	---
TOTAL	---	1351500	---	773000	---	1124900	---	773100	---	516400	---	680200
YEAR		9528740										

06486000 MISSOURI RIVER AT SIOUX CITY, IA--Continued



06600000 PERRY CREEK AT 38th STREET, SIOUX CITY, IA

LOCATION.--Lat 42°32'08", long 96°24'39", in $SE^1/_4$ $SE^1/_4$ sec.8, T.89 N., R.47 W., Woodbury County, Hydrologic Unit 10230001, on left bank at downstream side of bridge on 38th Street in Sioux City, 1.9 mi downstream from West Branch, and 4.2 mi. upstream from mouth.

DRAINAGE AREA.--65.1 mi^2.

PERIOD OF RECORD.--October 1945 to September 1969, June 1981 to current year.

REVISED RECORDS.--WSP 1440: Drainage area. WDR IA-95-1: River mile.

GAGE.--Water-stage recorder. Datum of gage is 1,112.04 ft above sea level (City of Sioux City benchmark). Prior to May 20, 1954, nonrecording gage with supplementary water-stage recorder in operation above 5.0 ft gage height and May 20, 1954 to Sept. 30, 1969, water-stage recorder at present site at datum 5.0 ft higher.

REMARKS.--Records good except those for estimated daily discharges, which are poor. Periodic observations of water temperature and specific conductance are published in this report as miscellaneous water quality data. U.S. Army Corps of Engineers rain gage and satellite data collection platform at station.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of July 7, 1944 reached a stage of about 30.5 ft from floodmarks, present datum, discharge, 9,600 ft^3/s, on basis of contracted-opening measurement of peak flow by U.S. Army Corps of Engineers.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16	19	26	e21	23	51	22	28	138	41	19	16
2	21	19	26	e21	25	42	21	28	86	110	19	15
3	26	18	26	e20	56	27	21	29	47	77	19	14
4	69	18	25	e16	70	27	21	48	81	45	18	18
5	52	18	26	e21	35	26	35	54	47	38	18	16
6	22	e17	25	e27	52	24	39	38	41	35	19	15
7	19	e17	23	e26	39	24	28	35	36	33	21	16
8	18	e18	23	e25	51	e23	54	33	36	33	20	17
9	17	25	23	e25	34	e18	92	31	34	31	19	15
10	16	109	23	e26	32	25	48	32	57	28	18	15
11	16	43	e27	e29	32	24	40	34	47	28	19	15
12	17	54	e28	e26	e23	23	33	30	38	27	20	15
13	17	39	e27	e22	e19	23	33	29	34	26	18	14
14	17	40	e25	e24	26	24	40	28	31	25	18	14
15	17	49	e25	e25	25	29	52	29	91	24	18	14
16	18	45	25	e28	22	48	43	32	87	25	18	14
17	20	36	25	32	22	33	40	29	55	24	17	14
18	18	e35	26	30	22	27	36	26	48	47	17	14
19	18	33	23	e24	21	25	34	25	50	26	17	13
20	18	30	e16	e25	21	25	34	31	47	29	17	14
21	19	29	e14	26	e19	24	35	30	43	128	17	14
22	18	30	e20	26	e18	24	39	48	41	44	17	14
23	18	28	e19	24	e20	24	34	67	48	33	19	15
24	19	28	e18	23	e19	23	32	30	37	29	17	14
25	19	28	e19	e20	e26	23	32	26	35	26	17	14
26	22	26	e19	e21	23	25	34	25	33	25	16	14
27	31	26	e22	e22	28	23	35	24	159	24	15	14
28	22	27	e21	e21	44	25	33	23	72	23	15	14
29	29	28	e20	e20	---	22	30	22	47	21	26	14
30	20	26	e18	e20	---	22	28	24	43	21	64	15
31	19	---	e17	e21	---	22	---	27	---	20	19	---
TOTAL	688	958	700	737	847	825	1098	995	1689	1146	611	440
MEAN	22.2	31.9	22.6	23.8	30.2	26.6	36.6	32.1	56.3	37.0	19.7	14.7
MAX	69	109	28	32	70	51	92	67	159	128	64	18
MIN	16	17	14	16	18	18	21	22	31	20	15	13
AC-FT	1360	1900	1390	1460	1680	1640	2180	1970	3350	2270	1210	873
CFSM	.34	.49	.35	.37	.46	.41	.56	.49	.86	.57	.30	.23
IN.	.39	.55	.40	.42	.48	.47	.63	.57	.97	.65	.35	.25

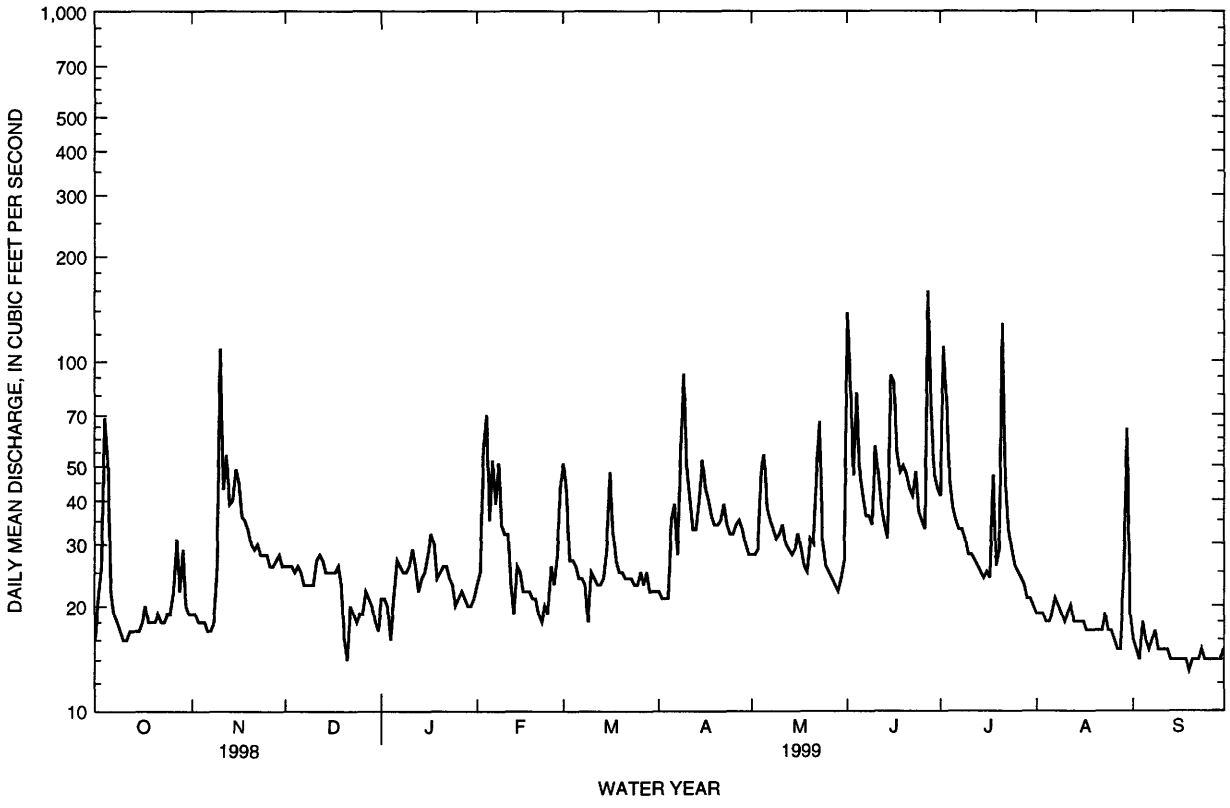
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1946 - 1999, BY WATER YEAR (WY)

MEAN	8.46	8.46	6.81	7.20	20.3	45.0	25.9	24.1	32.1	22.8	13.6	13.0
MAX	29.5	31.9	22.6	47.5	78.4	188	123	140	125	99.6	85.5	147
(WY)	1993	1997	1999	1952	1948	1962	1985	1990	1984	1952	1951	1949
MIN	.38	.81	.48	.33	1.31	2.62	2.30	2.91	.94	.35	.30	.083
(WY)	1959	1982	1959	1982	1959	1964	1959	1968	1956	1946	1965	1958

06600000 PERRY CREEK AT 38th STREET, SIOUX CITY, IA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1946 - 1999	
ANNUAL TOTAL	9564.5		10734			
ANNUAL MEAN	26.2		29.4		19.0	
HIGHEST ANNUAL MEAN					38.6	1984
LOWEST ANNUAL MEAN					2.38	1968
HIGHEST DAILY MEAN	296	May 30	159	Jun 27	2260	May 19 1990
LOWEST DAILY MEAN	5.2	Jan 13	13	Sep 19	.00	Jul 14 1946a
ANNUAL SEVEN-DAY MINIMUM	6.9	Jan 12	14	Sep 13	.00	Sep 24 1958
INSTANTANEOUS PEAK FLOW			390	Jul 21	8670	May 19 1990b
INSTANTANEOUS PEAK STAGE			9.34	Jul 21	28.54	May 19 1990
INSTANTANEOUS LOW FLOW			10	Feb 11		
ANNUAL RUNOFF (AC-FT)	18970		21290		13790	
ANNUAL RUNOFF (CFSM)	.40		.45		.29	
ANNUAL RUNOFF (INCHES)	5.47		6.13		3.97	
10 PERCENT EXCEEDS	44		47		33	
50 PERCENT EXCEEDS	19		25		6.6	
90 PERCENT EXCEEDS	8.9		16		.90	

a Many days 1946, 1958-1960
b From rating curve extended above 1,700 ft^3/s on basis of slope-area measurement of peak flow
e Estimated



06600100 FLOYD RIVER AT ALTON, IA

LOCATION.--Lat 42°58'55", long 96°00'03", in NE$^1/_4$ NE$^1/_4$ sec.11, T.94 N., R.44 W., Sioux County, Hydrologic Unit 10230002, on left bank 270 ft downstream from South County Road at east edge of Alton, 34.3 mi upstream from West Branch Floyd River, and at mile 58.1.

DRAINAGE AREA.--268 mi^2.

PERIOD OF RECORD.--October 1955 to current year. Prior to December 1955, monthly discharge only, published in WSP 1730.

REVISED RECORDS.--WDR IA-82-1: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,269.55 ft above sea level.

REMARKS.--Records good except those for estimated daily discharges, which are poor. Periodic observations of water temperature and specific conductance are published in this report as miscellaneous water quality data. U.S. Army Corps of Engineers rain gage and satellite data collection platform at station.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in June 1953 reached a discharge of about 45,500 ft^3/s, from information by U. S. Army Corps of Engineers.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e12	e16	39	e17	e23	55	61	203	147	176	57	7.6
2	e12	e15	38	e17	e30	65	56	189	222	195	51	7.0
3	e14	14	38	e16	e41	44	52	182	237	186	46	7.6
4	e20	13	38	e14	e39	58	52	180	216	176	41	11
5	e18	13	37	e17	e50	55	64	174	225	159	36	15
6	e16	13	34	e20	e70	50	163	169	309	144	32	14
7	e16	13	31	e18	76	42	212	166	307	134	29	12
8	e14	14	27	e16	84	26	205	173	258	127	27	11
9	e14	17	e28	e16	93	25	273	180	226	115	27	e9.0
10	e13	88	e27	e17	104	71	338	180	434	101	24	e8.0
11	e13	130	e31	e21	e100	62	290	176	403	91	21	e7.5
12	e12	192	e32	e19	e75	49	249	164	315	83	20	e7.5
13	e13	140	e31	e16	e55	44	223	156	290	82	18	e7.5
14	e12	123	28	e17	e70	44	212	153	256	59	19	e7.0
15	e12	130	27	e20	e65	46	203	152	242	59	16	e7.0
16	e13	130	26	e23	e55	64	194	149	240	56	15	e6.8
17	e14	112	24	e25	e55	98	187	148	224	52	13	e6.7
18	e13	97	26	e23	e60	107	181	143	208	56	12	e6.5
19	e13	88	16	e22	e50	87	176	138	201	65	11	e6.5
20	e14	75	15	e22	e50	78	169	142	191	160	11	e6.3
21	e13	65	e20	e23	e46	75	165	145	182	311	11	e6.2
22	e13	65	e19	e22	e46	71	163	141	175	310	10	e6.4
23	e13	61	e17	e21	e50	67	154	142	170	237	10	e6.4
24	e14	53	e16	e20	e48	64	145	138	161	187	11	e6.4
25	e14	52	e18	e18	e65	60	142	134	152	154	9.5	e6.3
26	e16	48	e18	e20	e58	57	157	130	146	134	9.1	e6.3
27	e23	46	e20	e21	e57	56	196	128	161	113	8.4	e6.2
28	e19	45	e19	e20	e55	67	249	123	215	98	7.8	e6.2
29	e16	45	e17	e20	---	63	246	117	209	85	8.3	e6.0
30	e21	43	e16	e20	---	57	220	113	186	74	9.4	e6.0
31	e17	---	e15	e21	---	62	---	113	---	66	8.5	---
TOTAL	457	1956	788	602	1670	1869	5397	4741	6908	4045	629.0	233.9
MEAN	14.7	65.2	25.4	19.4	59.6	60.3	180	153	230	130	20.3	7.80
MAX	23	192	39	25	104	107	338	203	434	311	57	15
MIN	12	13	15	14	23	25	52	113	146	52	7.8	6.0
AC-FT	906	3880	1560	1190	3310	3710	10700	9400	13700	8020	1250	464
CFSM	.06	.24	.09	.07	.22	.22	.67	.57	.86	.49	.08	.03
IN.	.06	.27	.11	.08	.23	.26	.75	.66	.96	.56	.09	.03

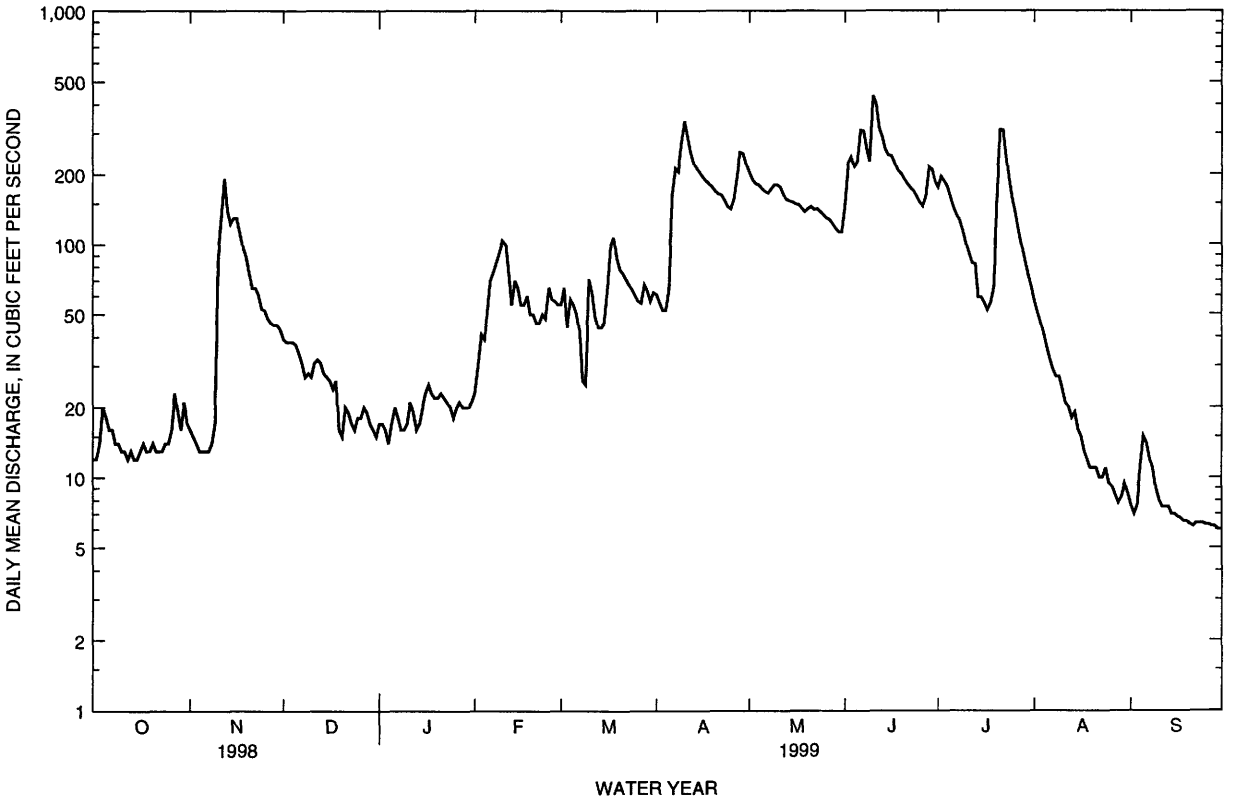
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1956 - 1999, BY WATER YEAR (WY)

MEAN	43.6	43.2	28.2	18.7	46.2	172	182	119	185	91.8	45.6	31.2
MAX	234	287	128	109	252	605	906	454	973	878	369	175
(WY)	1993	1980	1983	1973	1971	1979	1969	1995	1984	1993	1995	1993
MIN	.058	.30	.074	.048	.15	1.77	3.67	2.92	2.36	3.29	.37	.080
(WY)	1957	1959	1959	1959	1977	1959	1959	1968	1968	1958	1968	1958

06600100 FLOYD RIVER AT ALTON, IA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1956 - 1999	
ANNUAL TOTAL	23551.5		29295.9			
ANNUAL MEAN	64.5		80.3		84.0	
HIGHEST ANNUAL MEAN					323	1993
LOWEST ANNUAL MEAN					2.66	1968
HIGHEST DAILY MEAN	355	Apr 16	434	Jun 10	7160	Apr 4 1969
LOWEST DAILY MEAN	7.5	Sep 30	6.0	Sep 29,30	.00	Oct 14 1956a
ANNUAL SEVEN-DAY MINIMUM	8.4	Sep 16	6.2	Sep 24	.00	Oct 27 1956
INSTANTANEOUS PEAK FLOW			532	Jun 10	16300	Jun 20 1983b
INSTANTANEOUS PEAK STAGE			8.34	Jun 10	18.54	Jun 20 1983c
ANNUAL RUNOFF (AC-FT)	46710		58110		60860	
ANNUAL RUNOFF (CFSM)	.24		.30		.31	
ANNUAL RUNOFF (INCHES)	3.27		4.07		4.26	
10 PERCENT EXCEEDS	178		198		191	
50 PERCENT EXCEEDS	27		50		23	
90 PERCENT EXCEEDS	11		11		1.4	

a No flow at times in 1956, 1958-59, 1965, 1968, 1977
b From rating curve extended above 8,500 ft^3/s
c From floodmark
e Estimated



06600500 FLOYD RIVER AT JAMES, IA

LOCATION.--Lat 42°34'36", long 96°18'43", in $SE^1/_4$ $SE^1/_4$ sec.30, T.90 N., R.46 W., Plymouth County, Hydrologic Unit 10230002, on left bank at upstream side of bridge on county highway C70, 0.2 mi east of James, 14.3 mi downstream from West Branch Floyd River, and at mile 7.5.

DRAINAGE AREA.--886 mi^2.

PERIOD OF RECORD.--December 1934 to current year.

REVISED RECORDS.--WSP 1240: 1935 (M), 1936, 1937-38 (M), 1942, 1945. WSP 1440: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,092.59 ft above sea level. Prior to Sept. 11, 1938, June 9 to Nov. 5, 1953, and Oct. 1, 1955, to May 22, 1957, nonrecording gage and May 23, 1957, to Sept. 30, 1970, water-stage recorder at same site at datum 10.0 ft higher.

REMARKS.--Records good except those for estimated daily discharges, which are poor. Periodic observations of water temperature and specific conductance are published in this report as miscellaneous water quality data. U.S. Army Corps of Engineers rain gage and satellite data collection platform at station.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage and discharge since 1892, that of June 8, 1953, from information by U. S. Army Corps of Engineers.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	100	192	324	e115	e187	e310	269	e781	458	773	417	143
2	109	184	319	e109	e225	e340	263	e586	631	975	397	138
3	123	177	314	e101	e275	e270	250	e572	725	1780	379	134
4	143	175	308	e107	e330	e308	244	e570	743	1060	360	136
5	192	174	303	e130	e368	e320	263	e565	700	920	333	143
6	173	171	294	e156	e387	e300	333	542	1130	823	315	134
7	149	171	284	e146	e418	e270	486	523	1060	758	303	132
8	138	174	275	e137	e475	e230	592	510	938	716	292	129
9	131	178	271	e129	e588	e220	884	510	845	666	278	119
10	126	320	269	e143	e475	e260	965	514	1280	606	268	117
11	121	423	265	e164	e425	e341	988	517	1750	568	257	117
12	117	524	265	e139	349	e327	901	499	1290	537	252	115
13	116	576	264	e130	261	e270	830	470	1160	503	237	111
14	115	545	262	e150	355	e270	795	456	1050	473	222	109
15	113	564	257	e170	382	e270	783	455	1030	439	213	106
16	113	593	254	e191	334	e303	732	453	1090	412	206	105
17	126	553	251	e188	293	e340	692	453	1010	393	197	104
18	125	514	251	e165	308	e376	664	437	934	400	191	102
19	121	481	e230	e159	280	e360	642	419	891	395	183	102
20	125	431	e92.0	e172	271	e337	630	413	847	556	179	99
21	124	405	e140	e178	260	314	613	430	809	1360	171	98
22	125	417	e125	e174	275	303	623	425	767	1260	167	99
23	124	401	e111	e175	e290	298	608	435	743	977	171	100
24	124	393	e105	e173	e280	292	585	413	700	910	164	98
25	124	e380	e110	e162	e270	280	e550	402	659	783	159	97
26	127	e360	e118	e173	e340	275	e530	390	623	667	156	94
27	153	e360	e128	e171	e320	272	e550	380	868	609	151	94
28	176	e361	e141	e170	e320	273	e572	375	993	557	145	94
29	228	344	e130	e175	---	270	e595	365	891	518	155	90
30	229	331	e119	e179	---	266	e638	354	831	481	196	91
31	207	---	e105	e178	---	263	---	362	---	443	152	---
TOTAL	4317	10872	6684.0	4809	9341	9128	18070	14576	27446	22318	7266	3350
MEAN	139	362	216	155	334	294	602	470	915	720	234	112
MAX	229	593	324	191	588	376	988	781	1750	1780	417	143
MIN	100	171	92	101	187	220	244	354	458	393	145	90
MED	125	370	254	164	320	292	610	453	880	609	206	106
AC-FT	8560	21560	13260	9540	18530	18110	35840	28910	54440	44270	14410	6640
CFSM	.16	.41	.24	.18	.38	.33	.68	.53	1.03	.81	.26	.13
IN.	.18	.46	.28	.20	.39	.38	.76	.61	1.15	.94	.31	.14

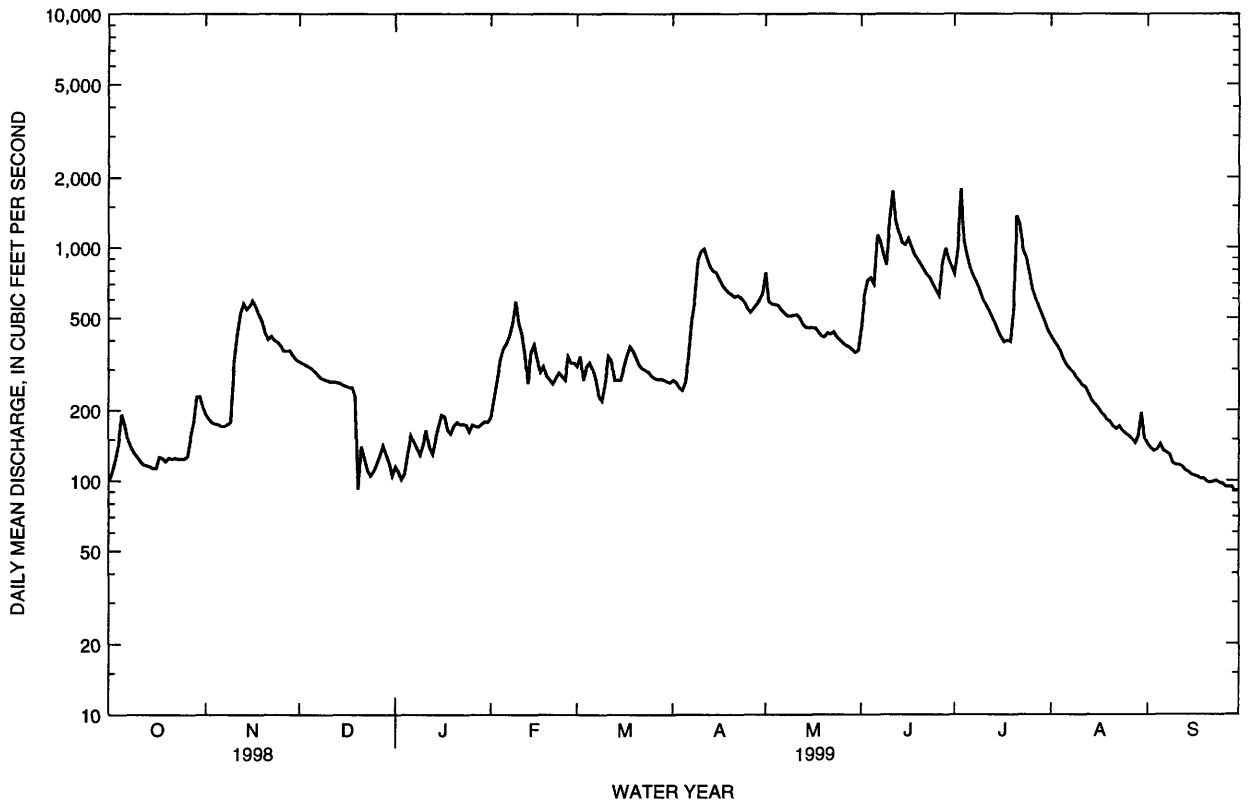
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1936 - 1999, BY WATER YEAR (WY)

MEAN	113	111	82.5	60.2	174	541	448	331	535	310	165	138
MAX	617	804	366	359	970	2080	2715	1393	2897	2196	1151	1353
(WY)	1993	1980	1980	1973	1952	1979	1969	1984	1984	1993	1951	1951
MIN	4.55	4.54	3.05	1.63	1.62	21.5	18.7	15.1	14.4	7.32	6.12	3.40
(WY)	1959	1959	1959	1959	1959	1964	1959	1968	1968	1936	1958	1958

06600500 FLOYD RIVER AT JAMES, IA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1936 - 1999	
ANNUAL TOTAL	121336.0		138177.0			
ANNUAL MEAN	332		379		251	
HIGHEST ANNUAL MEAN					958	1983
LOWEST ANNUAL MEAN					19.9	1956
HIGHEST DAILY MEAN	1430	Apr 27	1780	Jul 3	32400	Jun 8 1953
LOWEST DAILY MEAN	65	Jan 13	90	Sep 29	.90	Jan 10 1977a
ANNUAL SEVEN-DAY MINIMUM	72	Jan 12	94	Sep 24	.90	Jan 10 1977
INSTANTANEOUS PEAK FLOW			2430	Jul 3	71500	Jun 8 1953b
INSTANTANEOUS PEAK STAGE			14.41	Jul 3	35.30	Jun 8 1953c
INSTANTANEOUS LOW FLOW			89	Sep 29,30		
ANNUAL RUNOFF (AC-FT)	240700		274100		181600	
ANNUAL RUNOFF (CFSM)	.38		.43		.28	
ANNUAL RUNOFF (INCHES)	5.09		5.80		3.84	
10 PERCENT EXCEEDS	688		783		550	
50 PERCENT EXCEEDS	216		293		83	
90 PERCENT EXCEEDS	106		117		12	

a Also Jan 11-22, 1977
b From rating curve extended above 16,000 ft^3/s on basis on contracted-opening and flow-over-embankment measurement of peak flow
c From floodmarks, current datum
e Estimated



06601200 MISSOURI RIVER AT DECATUR, NE

LOCATION.--Lat 42°00'26", long 96°14'29", in NE$^1/_4$ SW$^1/_4$ sec.36, T.24 N., R.10 E., Burt County, Hydrologic Unit 10230001, on right bank 0.1 mi upstream from Iowa Highway 175 bridge at Decatur, and at mile 691.0.

DRAINAGE AREA.--316,200 mi^2, approximately. The 3,959 mi^2 in Great Divide basin are not included.

PERIOD OF RECORD.--October 1987 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,010.00 ft above sea level, supplementary adjustment of 1954.

REMARKS.--Records good except those for estimated daily discharges, which are poor. Flow regulated by upstream main-stem reservoirs. Fort Randall Dam was completed in July 1952, with storage beginning in December 1952. Gavins Point Dam was completed in July 1955, with storage beginning in December 1955. Periodic observations of water temperature and specific conductance are published in this report as miscellaneous water quality data. U.S. Army Corps of Engineers rain gage and satellite data collection platform at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

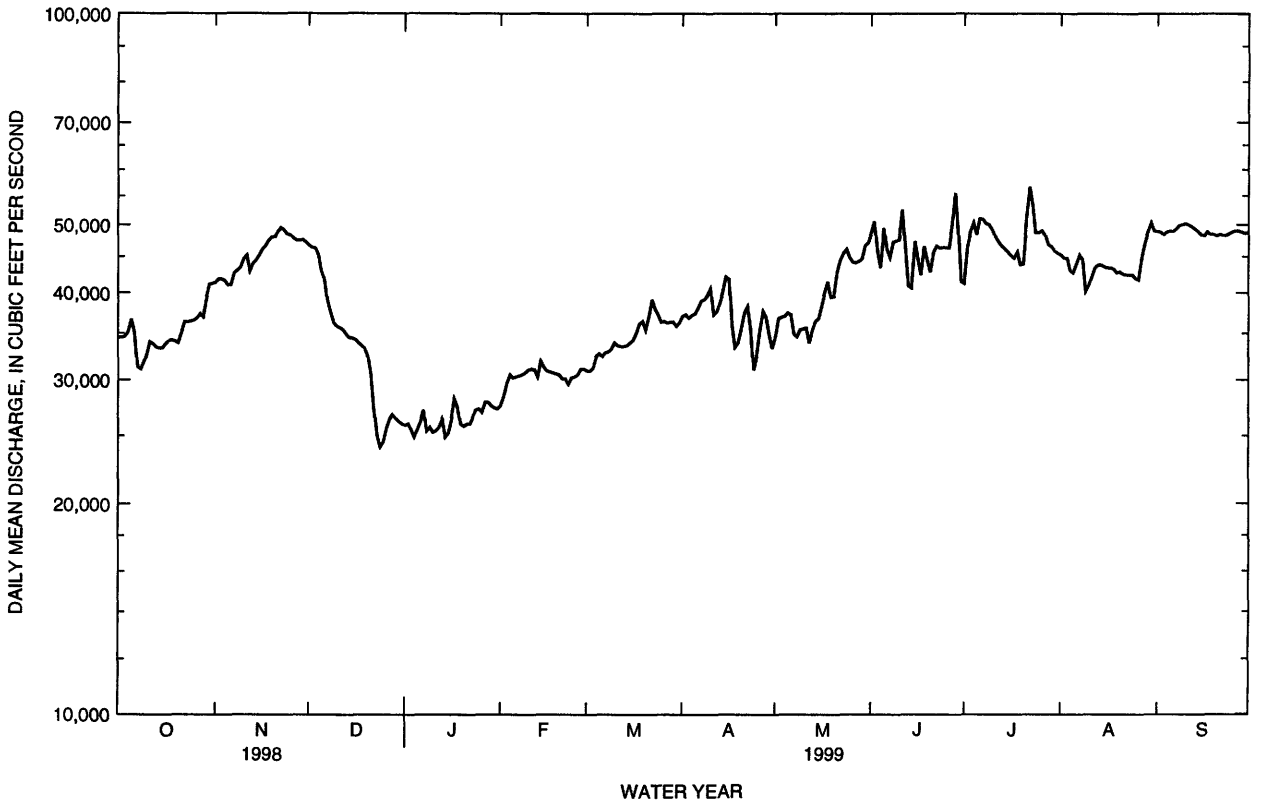
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	34500	41300	46700	25900	27600	30900	37000	34500	48600	41200	45300	48900
2	34500	41800	46400	26000	28400	30900	37200	36700	50500	46500	44800	48800
3	34600	41800	46300	25500	29700	31200	36800	36900	45800	48900	44800	48400
4	35100	41600	45300	24900	30500	32400	37100	37000	43400	50300	43000	48800
5	36600	41000	42900	25500	30200	32700	37300	37400	49400	48400	42700	49000
6	35100	41000	41800	26200	30300	32400	38000	37200	46100	51000	43900	48900
7	31300	42600	38900	27200	30400	32800	38900	34900	44900	50900	45200	49300
8	31100	43000	37400	25400	30500	32900	39100	34600	47200	50200	44500	49900
9	31900	43400	36200	25700	30700	33200	39600	35400	47400	50000	40200	50000
10	32500	44700	35800	25300	31000	33900	40500	35500	47500	49200	41000	50200
11	34000	45200	35600	25400	31100	33600	37200	35600	52500	48000	42100	50000
12	33800	42900	35400	25700	31000	33500	37500	33900	45900	47200	43400	49700
13	33400	44000	34900	26400	30300	33500	38600	35300	40900	46600	43800	49300
14	33300	44500	34500	24900	e31900	33600	40000	36400	40600	46200	43800	48900
15	33300	45200	34400	25200	31300	33900	42100	36700	47300	45700	43500	48300
16	33800	46100	34300	26300	30900	34200	41800	38300	44700	45200	43400	48200
17	34100	46700	33900	28200	30800	35000	35900	40000	42400	44800	43400	e48800
18	34200	47500	33600	27500	30700	36100	33400	41400	46500	45700	43200	48400
19	34100	48000	33300	26000	30600	36400	33900	39400	44400	43800	42700	48400
20	33900	48000	32500	25800	30500	35400	35500	39500	42800	43900	42800	48200
21	35000	48800	30600	26000	30100	36900	37400	42800	45700	51000	42500	48400
22	36300	49500	27400	26000	30100	39100	38200	44500	46600	56600	42400	48300
23	36300	49200	25000	26600	29600	37900	35400	45500	46300	53300	42400	48300
24	36400	48500	24100	27200	30200	37200	31000	46100	46400	48700	42400	48500
25	36500	48300	24500	27300	30300	36300	32500	44900	46400	48700	41900	48800
26	36800	47800	25600	27000	30500	36400	35300	44200	46300	49000	41700	49000
27	37300	47500	26400	27900	31100	36200	37600	44100	49900	48200	44800	49000
28	36900	47500	26800	27900	31100	36300	36900	44300	55500	46800	47100	48800
29	39200	47600	26500	27600	---	36300	34900	44700	48700	46500	48900	48600
30	41100	47200	26200	27400	---	35800	33300	46700	41400	45900	50300	48700
31	41200	---	26000	27300	---	36200	---	47100	---	45500	49000	---
TOTAL	1088100	1362200	1049200	817200	851400	1073100	1109900	1231500	1392000	1483900	1360900	1466800
MEAN	35100	45410	33850	26360	30410	34620	37000	39730	46400	47870	43900	48890
MAX	41200	49500	46700	28200	31900	39100	42100	47100	55500	56600	50300	50200
MIN	31100	41000	24100	24900	27600	30900	31000	33900	40600	41200	40200	48200
AC-FT	2158000	2702000	2081000	1621000	1689000	2128000	2201000	2443000	2761000	2943000	2699000	2909000
CFSM	.11	.14	.11	.08	.10	.11	.12	.13	.15	.15	.14	.15
IN.	.13	.16	.12	.10	.10	.13	.13	.14	.16	.17	.16	.17

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1988 - 1999, BY WATER YEAR (WY)

MEAN	38090	32440	22210	19140	21140	26340	37230	38840	40060	40590	38350	39870
MAX	70150	72350	41350	26850	32380	49450	90050	80690	67970	66520	66170	67290
(WY)	1998	1998	1998	1998	1997	1997	1997	1997	1997	1997	1997	1997
MIN	24250	10470	12070	12360	12210	11580	24410	26130	28240	27680	25700	26750
(WY)	1993	1991	1991	1990	1991	1991	1991	1991	1991	1991	1993	1993

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1988 - 1999	
ANNUAL TOTAL	12236100		14286200			
ANNUAL MEAN	33520		39140		32900	
HIGHEST ANNUAL MEAN					57440	1997
LOWEST ANNUAL MEAN					21450	1991
HIGHEST DAILY MEAN	49500	Nov 22	56600	Jul 22	99900	Apr 15 1997
LOWEST DAILY MEAN	23600	Jan 11	24100	Dec 24	7130	Dec 22 1990
ANNUAL SEVEN-DAY MINIMUM	24700	Jan 10	25500	Jan 9	9660	Dec 12 1990
INSTANTANEOUS PEAK FLOW			57000	Jul 22	100000	Apr 15 1997
INSTANTANEOUS PEAK STAGE			28.21	Jul 22	32.31	Jul 18 1996
INSTANTANEOUS LOW FLOW			24000	Dec 24		
ANNUAL RUNOFF (AC-FT)	24270000		28340000		23830000	
ANNUAL RUNOFF (CFSM)	.11		.12		.10	
ANNUAL RUNOFF (INCHES)	1.44		1.68		1.41	
10 PERCENT EXCEEDS	41000		48800		56200	
50 PERCENT EXCEEDS	33200		39100		31000	
90 PERCENT EXCEEDS	27800		27500		14000	

e Estimated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DAILY MEAN DISCHARGE, IN CUBIC FEET PER SECOND
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WATER YEAR

06602020 WEST FORK DITCH AT HORNICK, IA

LOCATION.--Lat 42°13'37", long 96°04'40", in $SW^1/_4$ $SW^1/_4$ sec.27, T.86 N., R.45 W., Woodbury County, Hydrologic Unit 10230004, on left bank at upstream side of State Highway 141 bridge, 1.0 mi east of Hornick, 9.2 mi upstream from Wolf Creek, and 13.5 mi north of Onawa.

DRAINAGE AREA.--403 mi^2.

PERIOD OF RECORD.-- April 1939 to September 1969 (published as "Holly Springs"), July 1974 to current year (revised).

GAGE.--Water-stage recorder. Datum of gage is 1,045.82 ft above sea level.

REMARKS.--Records good except those for estimated daily discharges, which are poor. West Fork ditch is a dredged channel which diverts flow of West Fork Little Sioux River at Hornick 5.5 mi south, then southeast 6.5 mi to a point 1.2 mi west of Kennebec, where Wolf Creek enters from left. From this point, ditch roughly parallels the Little Sioux River and is known as Monona-Harrison ditch. Periodic observations of water temperature and specific conductance are published in this report as miscellaneous water quality data. U.S. Army Corps of Engineers rain gage and satellite data collection platform at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	73	97	122	e85	e135	132	116	209	188	338	157	86
2	75	97	118	e80	e135	139	114	206	216	686	151	75
3	83	97	119	e75	e190	143	114	205	212	656	147	73
4	91	95	118	e70	151	134	115	204	743	351	142	77
5	100	95	117	e105	150	130	117	202	527	286	137	85
6	100	95	117	e110	158	125	144	194	279	258	138	77
7	92	97	116	e100	167	122	185	188	237	240	146	73
8	88	99	115	e98	185	119	185	186	222	232	135	e70
9	87	100	115	e95	224	106	226	179	210	245	130	e68
10	86	123	117	e105	214	134	281	176	600	216	125	e67
11	84	151	115	e120	204	133	256	173	895	199	120	66
12	84	161	115	e100	172	121	235	167	411	192	122	66
13	83	178	114	e90	121	117	224	162	335	185	115	66
14	84	169	113	e105	161	116	220	160	299	178	111	64
15	84	173	112	e120	181	119	231	160	316	172	108	64
16	84	169	110	e140	142	128	219	183	433	176	103	62
17	84	159	109	e130	127	162	212	198	374	169	100	61
18	86	151	110	e120	131	181	204	171	337	342	101	61
19	84	146	e95	e110	124	153	199	160	323	280	95	60
20	84	141	e60	e125	121	143	195	164	315	205	92	60
21	84	140	e100	e130	117	139	223	166	296	210	90	59
22	84	137	e90	e125	116	136	382	202	281	325	88	60
23	84	135	e83	e130	e75	133	218	212	275	335	87	59
24	84	133	e75	e135	106	130	202	167	256	499	86	58
25	83	129	e80	e110	133	127	194	158	239	256	84	59
26	83	128	e85	e120	132	126	197	153	226	221	82	57
27	90	127	e90	e125	125	127	218	150	394	207	80	57
28	104	126	e105	e125	125	125	227	147	585	194	77	58
29	108	125	e93	e120	---	124	227	144	438	184	81	57
30	104	123	e90	e130	---	125	217	141	366	174	358	58
31	99	---	e75	e130	---	119	---	141	---	166	166	---
TOTAL	2723	3896	3193	3463	4122	4068	6097	5428	10828	8377	3754	1963
MEAN	87.8	130	103	112	147	131	203	175	361	270	121	65.4
MAX	108	178	122	140	224	181	382	212	895	686	358	86
MIN	73	95	60	70	75	106	114	141	188	166	77	57
AC-FT	5400	7730	6330	6870	8180	8070	12090	10770	21480	16620	7450	3890
CFSM	.22	.32	.26	.28	.37	.33	.50	.43	.90	.67	.30	.16
IN.	.25	.36	.29	.32	.38	.38	.56	.50	1.00	.77	.35	.18

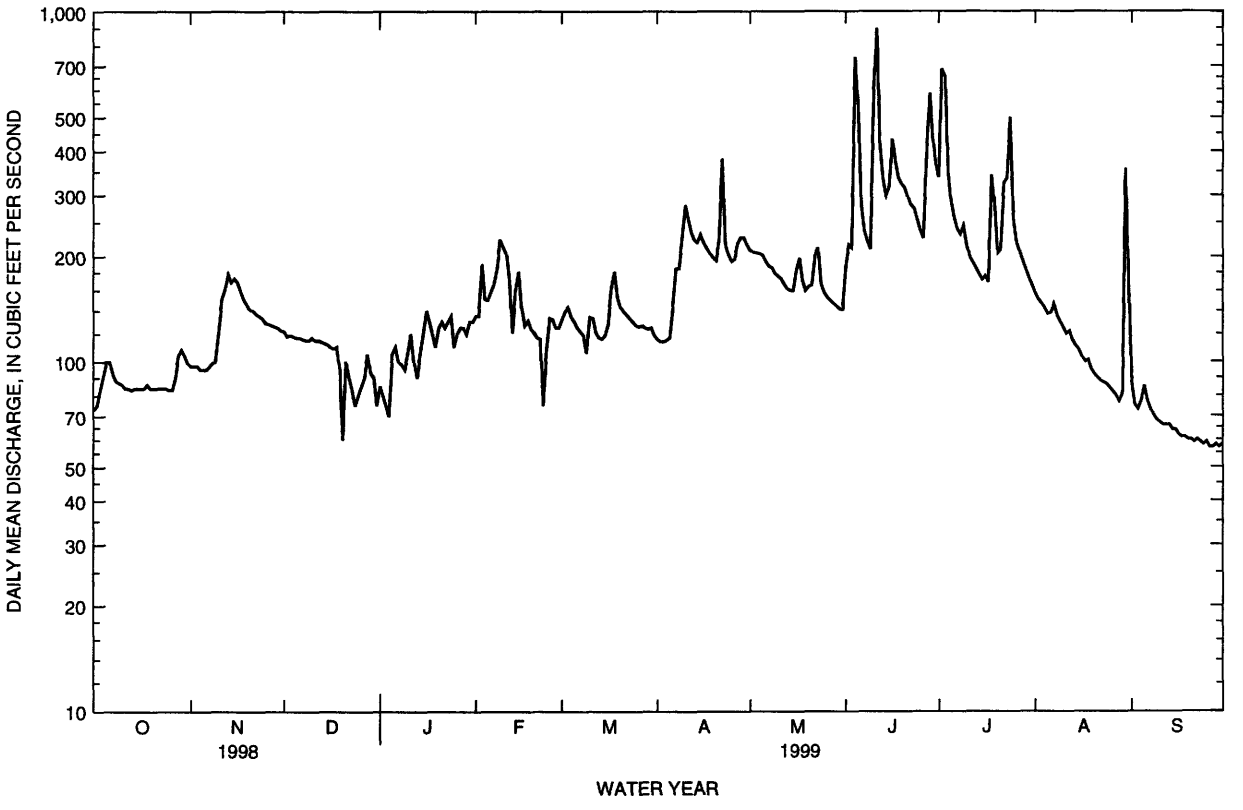
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1940 - 1999, BY WATER YEAR (WY)

MEAN	62.0	55.8	45.3	36.5	109	226	180	157	283	152	105	71.2
MAX	369	281	199	127	522	813	837	585	2131	561	605	422
(WY)	1993	1980	1985	1952	1994	1962	1969	1983	1984	1993	1951	1951
MIN	2.08	4.06	2.60	2.26	2.41	8.41	9.80	11.5	7.71	11.5	2.92	2.23
(WY)	1957	1959	1959	1959	1940	1957	1957	1943	1956	1956	1956	1956

06602020 WEST FORK DITCH AT HORNICK, IA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1940 - 1999a	
ANNUAL TOTAL	58618		57912			
ANNUAL MEAN	161		159		124	
HIGHEST ANNUAL MEAN					367	1984
LOWEST ANNUAL MEAN					9.28	1956
HIGHEST DAILY MEAN	1310	Jun 24	895	Jun 11	9000	Mar 28 1962
LOWEST DAILY MEAN	30	Mar 12	57	Sep 26c	.20	Jul 30 1956b
ANNUAL SEVEN-DAY MINIMUM	35	Mar 10	58	Sep 24	.53	Aug 23 1956
INSTANTANEOUS PEAK FLOW			1350	Jun 11	12400	Mar 28 1962
INSTANTANEOUS PEAK STAGE			12.88	Jun 11	25.87	Jun 22 1996
INSTANTANEOUS LOW FLOW			56	Sep 24d		
ANNUAL RUNOFF (AC-FT)	116300		114900		89600	
ANNUAL RUNOFF (CFSM)	.40		.39		.31	
ANNUAL RUNOFF (INCHES)	5.41		5.35		4.17	
10 PERCENT EXCEEDS	290		256		250	
50 PERCENT EXCEEDS	117		129		46	
90 PERCENT EXCEEDS	65		77		10	

a Revised
b Also Aug 17, 1956
c Also Sep 27, 29
d Also Sep 25-30
e Estimated



06602400 MONONA-HARRISON DITCH NEAR TURIN, IA

LOCATION.--Lat 41°57'52", long 95°59'30", in NW¼ NE¼ sec.32, T.83 N., R.44 W., Monona County, Hydrologic Unit 10230004, on left bank at upstream side of bridge on county highway E54, 1.0 mi west of gaging station on Little Sioux River near Turin, 4 mi southwest of Turin, 5.2 mi northeast of Blencoe, and 12.5 mi upstream from mouth.

DRAINAGE AREA.--900 mi^2.

PERIOD OF RECORD.--May 1942 to current year. Records for May 1942 to January 1958 not equivalent owing to diversion from Little Sioux River through equalizer ditch 1.5 mi upstream. Records prior to 1950 not equivalent owing to diversion to Little Sioux River through diversion ditch 10.2 mi upstream.

REVISED RECORDS: WSP 1440: Drainage area. WSP 1560: Drainage area. WDR IA-95-1: Period of record.

GAGE.--Water-stage recorder. Datum of gage is 1,015.00 ft above sea level (U.S. Army Corps of Engineers bench mark). May 7, 1942 to Oct. 13, 1953, nonrecording gage and Oct. 14, 1953 to Sept. 30, 1975, recording gage at same site at datum 5.00 ft higher.

REMARKS.--Records good except those for estimated daily discharges, which are poor. Monona-Harrison ditch is a dug channel and is a continuation of West Fork ditch, paralleling the Little Sioux River, and discharging into the Missouri River 1.5 mi upstream from the mouth of the Little Sioux River. Periodic observations of water temperature and specific conductance are published in this report as miscellaneous water quality data. U.S. Army Corps of Engineers rain gage and satellite data collection platform at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	153	204	255	e115	191	275	214	410	527	669	285	916
2	151	198	248	e105	192	300	200	402	910	984	274	586
3	172	196	246	e100	220	293	198	408	556	2870	266	401
4	197	191	245	e95	318	269	202	407	1250	1640	256	302
5	238	189	243	e144	400	259	212	417	2650	917	248	340
6	225	188	237	e150	360	241	298	415	1460	680	255	259
7	190	188	231	e140	369	227	337	386	865	598	378	216
8	177	194	223	e135	378	216	361	365	583	548	323	188
9	175	201	226	e130	423	188	557	350	464	674	271	172
10	172	412	236	e140	422	230	546	348	649	544	245	166
11	167	664	226	e160	408	249	486	333	1320	479	236	168
12	159	465	231	e140	257	226	439	323	981	455	286	167
13	155	433	228	e120	193	213	414	307	608	440	248	162
14	161	393	228	e138	311	211	431	301	527	420	225	157
15	163	385	225	e160	349	222	817	302	517	396	217	156
16	168	375	221	e250	274	280	633	371	965	387	206	158
17	175	352	216	e220	239	336	525	616	900	400	192	157
18	167	331	220	200	238	341	460	392	692	713	221	154
19	160	313	190	186	240	288	421	339	587	1430	216	152
20	154	298	e90	182	228	262	405	336	553	821	188	146
21	157	294	e140	183	218	247	436	422	525	564	175	144
22	157	291	e130	185	210	239	3520	357	510	525	169	146
23	156	286	e115	186	134	231	1380	819	492	485	165	150
24	158	279	e105	189	199	220	591	567	480	706	160	150
25	156	269	e110	173	250	211	470	379	430	471	154	150
26	158	265	e115	177	256	206	446	333	403	407	153	145
27	193	263	e120	179	248	207	554	312	899	379	145	139
28	216	260	e140	179	243	211	599	291	1910	360	139	141
29	346	265	e130	175	---	203	495	281	1230	340	136	140
30	303	258	e120	184	---	223	440	275	767	324	929	141
31	223	---	e100	180	---	233	---	267	---	304	1310	---
TOTAL	5702	8900	5790	5000	7768	7557	17087	11831	25210	20930	8671	6569
MEAN	184	297	187	161	277	244	570	382	840	675	280	219
MAX	346	664	255	250	423	341	3520	819	2650	2870	1310	916
MIN	151	188	90	95	134	188	198	267	403	304	136	139
AC-FT	11310	17650	11480	9920	15410	14990	33890	23470	50000	41510	17200	13030
CFSM	.20	.33	.21	.18	.31	.27	.63	.42	.93	.75	.31	.24
IN.	.24	.37	.24	.21	.32	.31	.71	.49	1.04	.87	.36	.27

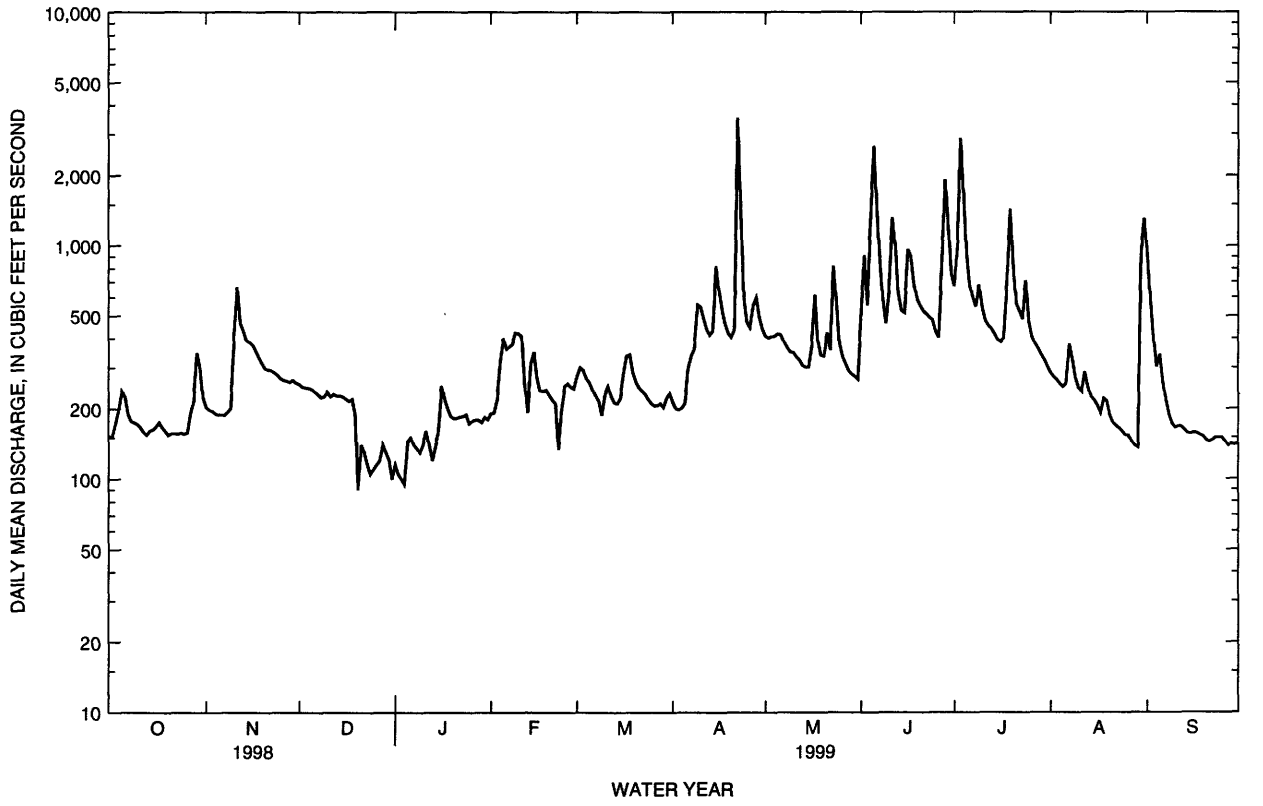
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1959 - 1999, BY WATER YEAR (WY)

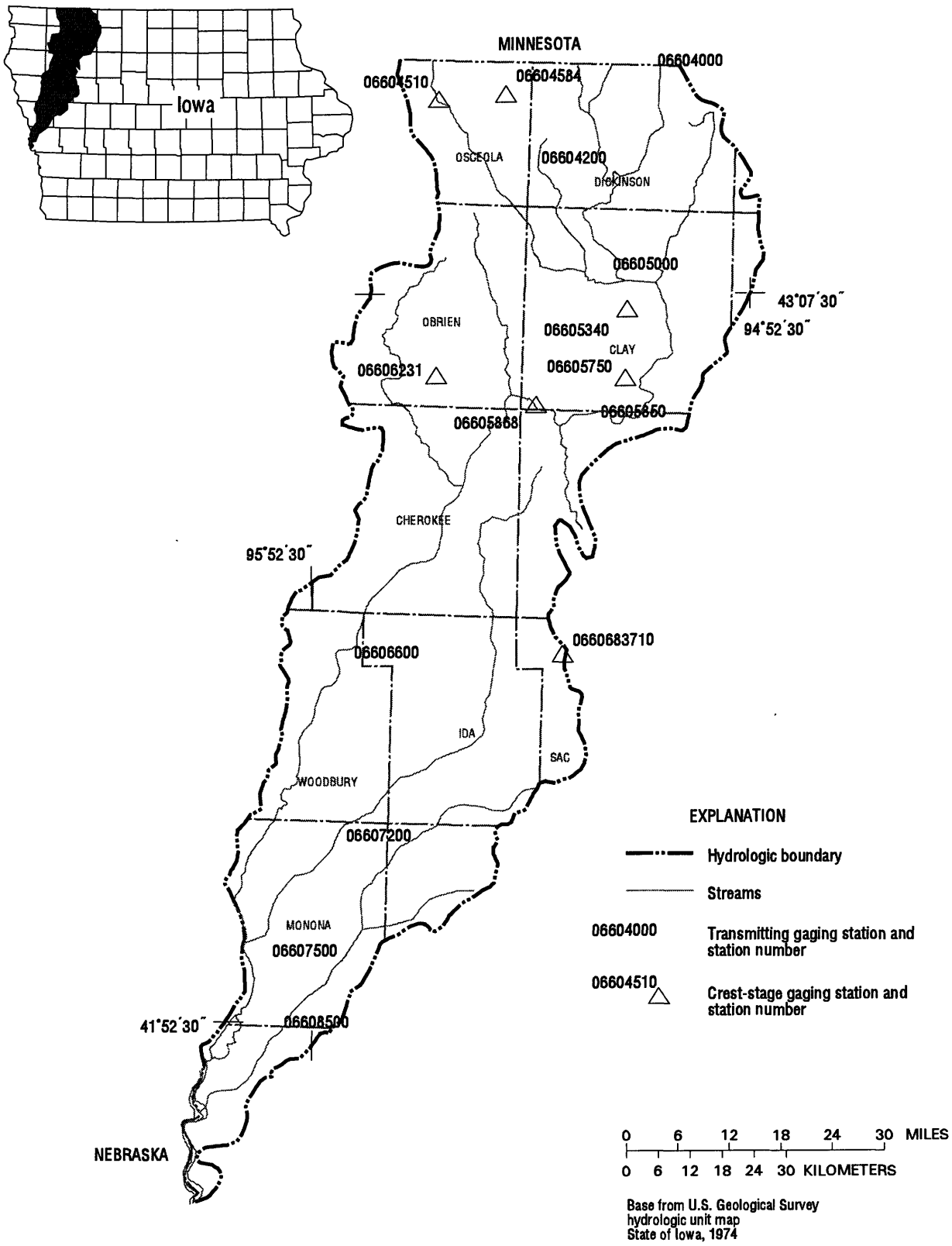
MEAN	154	138	115	95.4	231	490	452	390	604	359	194	145
MAX	831	415	421	398	1963	1707	1588	1157	3833	2107	883	576
(WY)	1993	1980	1985	1973	1971	1962	1965	1995	1984	1993	1996	1993
MIN	16.0	18.0	11.4	10.5	13.9	46.9	41.1	43.7	71.8	46.1	30.6	30.8
(WY)	1959	1959	1959	1959	1959	1968	1968	1968	1989	1976	1976	1981

06602400 MONONA-HARRISON DITCH NEAR TURIN, IA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1959 - 1999a	
ANNUAL TOTAL	131269		131015			
ANNUAL MEAN	360		359		280	
HIGHEST ANNUAL MEAN					798	1993
LOWEST ANNUAL MEAN					55.5	1968
HIGHEST DAILY MEAN	4240	Jun 24	3520	Apr 22	18000	Feb 19 1971
LOWEST DAILY MEAN	65	Mar 12	90	Dec 20	8.5	Jan 3 1959b
ANNUAL SEVEN-DAY MINIMUM	75	Mar 10	109	Dec 29	8.5	Jan 3 1959
INSTANTANEOUS PEAK FLOW			4280	Apr 22	19900	Feb 19 1971
INSTANTANEOUS PEAK STAGE			15.11	Apr 22	28.03	Feb 19 1971
ANNUAL RUNOFF (AC-FT)	260400		259900		203000	
ANNUAL RUNOFF (CFSM)	.40		.40		.31	
ANNUAL RUNOFF (INCHES)	5.43		5.42		4.23	
10 PERCENT EXCEEDS	612		611		526	
50 PERCENT EXCEEDS	238		250		129	
90 PERCENT EXCEEDS	114		148		38	

a Post closure of diversion from Little Sioux River
b Also Jan 4-11, 1959
e Estimated




Iowa
MINNESOTA
06604000
06604584
06604510
OSCEOLA
06604200
DICKINSON
06605000
43°07'30"
94°52'30"
OBRIEN
06605340
CLAY
06606231
06605750
06605850
06605868
CHEROKEE
95°52'30"
0660683710
06606600
IDA
SAC
WOODBURY
06607200
MONONA
06607500
41°52'30"
06608500
NEBRASKA
EXPLANATION
Hydrologic boundary
Streams
06604000 Transmitting gaging station and station number
06604510 Crest-stage gaging station and station number
0 6 12 18 24 30 MILES
0 6 12 18 24 30 KILOMETERS
Base from U.S. Geological Survey
hydrologic unit map
State of Iowa, 1974

Gaging Stations

Crest Stage Gaging Stations

06604000 SPIRIT LAKE NEAR ORLEANS, IA

LOCATION.--Lat 43°28'11", long 95°07'25", in $NE^1/_4$ $NW^1/_4$ sec.20, T.100N., R.36W., Dickinson County, Hydrologic Unit 10230003, 2.3 mi upstream from lake outlet, and 2.3 mi northwest of Orleans.

DRAINAGE AREA.--75.6 mi^2.

PERIOD OF RECORD.--May 1933 to September 1975 (fragmentary prior to 1951), April 1990 to current year. Prior to October 1949, published as "at Orleans".

GAGE.--Water-stage recorder. Datum of gage is 1,387.25 ft above sea level, 90.0 ft above Iowa Lake Survey datum, and 14.2 ft below crest of spillway. Prior to July 6, 1950, non-recording gage or water-stage recorder at various sites near outlet, all at present datum.

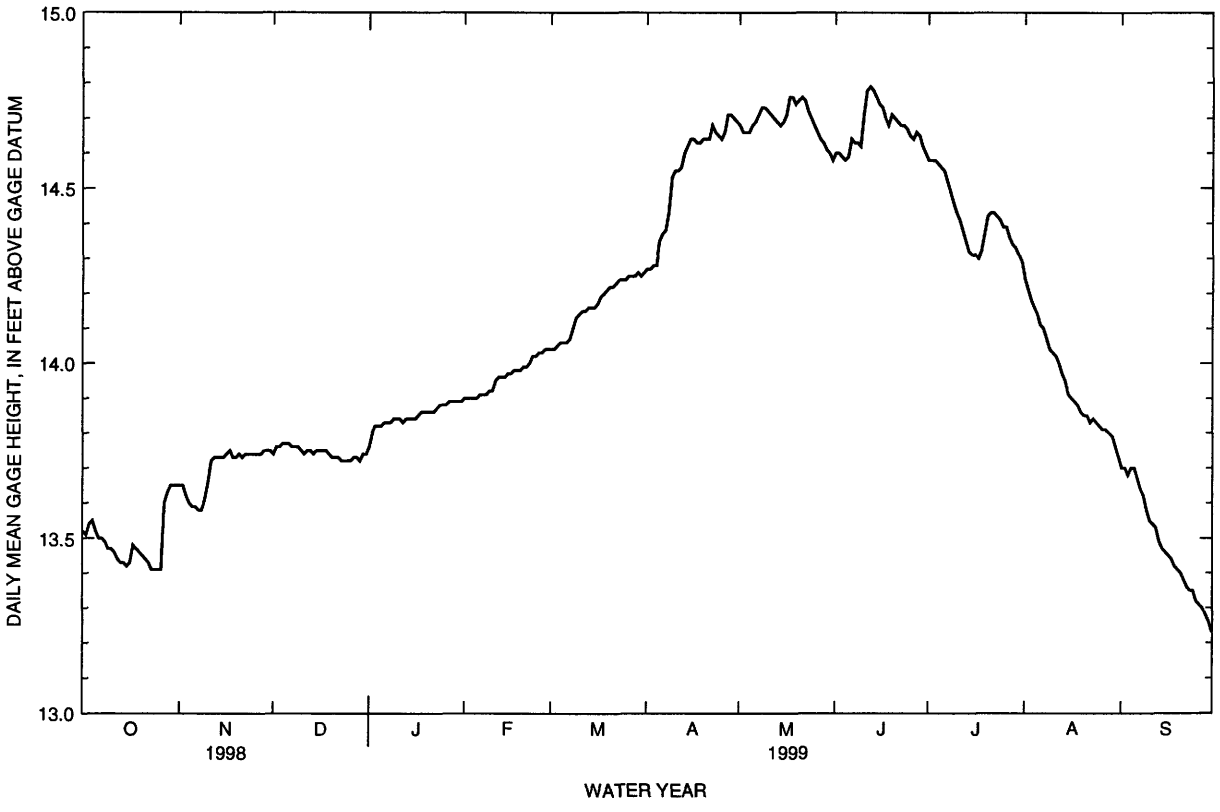
REMARKS.--A reliable record of stage was obtained for the year. Lake formed by concrete dam with ungated spillway at elevation 1,401.4 ft. above sea level. Dam constructed in 1969. A previous outlet works had been constructed in 1944. Lake is used for conservation and recreation. U.S. Geological Survey satellite data collection platform at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 18.79 ft. July 17-20, 1993; minimum observed, 6.75 ft. Oct. 20, 1935.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 14.79 ft. June 11-13; minimum, 13.22 ft. Sept. 30.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	13.52	13.65	13.74	13.76	13.90	14.04	14.27	14.68	14.60	14.58	14.24	13.70
2	13.51	13.65	13.76	13.80	13.90	14.04	14.27	14.66	14.60	14.58	14.21	13.70
3	13.54	13.62	13.76	13.82	13.90	14.05	14.28	14.66	14.59	14.58	14.18	13.68
4	13.55	13.60	13.77	13.82	13.90	14.06	14.28	14.66	14.58	14.57	14.16	13.70
5	13.52	13.59	13.77	13.82	13.90	14.06	14.35	14.68	14.59	14.56	14.14	13.70
6	13.50	13.59	13.77	13.83	13.91	14.06	14.37	14.69	14.64	14.55	14.11	13.67
7	13.50	13.58	13.76	13.83	13.91	14.07	14.38	14.71	14.63	14.52	14.10	13.64
8	13.49	13.58	13.76	13.83	13.91	14.10	14.43	14.73	14.63	14.49	14.07	13.62
9	13.47	13.61	13.76	13.84	13.92	14.13	14.53	14.73	14.62	14.46	14.04	13.58
10	13.47	13.66	13.75	13.84	13.92	14.14	14.55	14.72	14.71	14.43	14.03	13.55
11	13.46	13.72	13.74	13.84	13.95	14.15	14.55	14.71	14.78	14.41	14.02	13.54
12	13.44	13.73	13.75	13.83	13.96	14.15	14.56	14.70	14.79	14.38	14.00	13.53
13	13.43	13.73	13.75	13.84	13.96	14.16	14.60	14.69	14.78	14.35	13.97	13.49
14	13.43	13.73	13.74	13.84	13.96	14.16	14.62	14.68	14.76	14.32	13.95	13.47
15	13.42	13.73	13.75	13.84	13.97	14.16	14.64	14.69	14.74	14.31	13.91	13.46
16	13.43	13.74	13.75	13.84	13.97	14.17	14.64	14.71	14.73	14.31	13.90	13.45
17	13.48	13.75	13.75	13.85	13.98	14.19	14.63	14.76	14.70	14.30	13.89	13.44
18	13.47	13.73	13.75	13.86	13.98	14.20	14.63	14.76	14.68	14.32	13.88	13.42
19	13.46	13.73	13.74	13.86	13.98	14.21	14.64	14.74	14.71	14.37	13.86	13.41
20	13.45	13.74	13.73	13.86	13.99	14.22	14.64	14.75	14.70	14.42	13.85	13.40
21	13.44	13.73	13.73	13.86	13.99	14.22	14.64	14.76	14.69	14.43	13.85	13.38
22	13.43	13.74	13.73	13.86	14.00	14.23	14.68	14.75	14.68	14.43	13.83	13.36
23	13.41	13.74	13.72	13.87	14.02	14.24	14.66	14.72	14.68	14.42	13.84	13.35
24	13.41	13.74	13.72	13.88	14.02	14.24	14.65	14.70	14.67	14.41	13.83	13.35
25	13.41	13.74	13.72	13.88	14.03	14.24	14.64	14.68	14.65	14.39	13.82	13.32
26	13.41	13.74	13.72	13.88	14.03	14.25	14.66	14.66	14.64	14.39	13.81	13.31
27	13.60	13.74	13.73	13.89	14.04	14.25	14.71	14.64	14.66	14.36	13.81	13.30
28	13.63	13.75	13.73	13.89	14.04	14.25	14.71	14.63	14.65	14.34	13.80	13.28
29	13.65	13.75	13.72	13.89	---	14.26	14.70	14.61	14.62	14.33	13.79	13.26
30	13.65	13.75	13.74	13.89	---	14.25	14.69	14.60	14.60	14.31	13.76	13.23
31	13.65	---	13.74	13.89	---	14.26	---	14.58	---	14.29	13.73	---
MEAN	13.49	13.70	13.74	13.85	13.96	14.17	14.55	14.69	14.67	14.42	13.95	13.48
MAX	13.65	13.75	13.77	13.89	14.04	14.26	14.71	14.76	14.79	14.58	14.24	13.70
MIN	13.41	13.58	13.72	13.76	13.90	14.04	14.27	14.58	14.58	14.29	13.73	13.23


15.0
14.5
14.0
13.5
13.0
DAILY MEAN GAGE HEIGHT, IN FEET ABOVE GAGE DATUM
O
N
D
J
F
M
A
M
J
J
A
S
1998
1999
WATER YEAR

06604200 WEST OKOBOJI LAKE AT LAKESIDE LABORATORY NEAR MILFORD, IA

LOCATION.--Lat 43°22'43", long 95°10'52", in NE$^1/_4$ SW$^1/_4$ sec.23, T.99 N., R.37 W., Dickinson County, Hydrologic Unit 10230003, at pumping station of Lakeside Laboratory on west shore, 2.3 mi upstream from lake outlet, and 3.8 mi northwest of Milford.

DRAINAGE AREA.--125 mi^2.

PERIOD OF RECORD.--May 1933 to current year. Published as "Okoboji Lake at Arnold's Park" 1933-37 and as "Okoboji Lake at Lakeside Laboratory near Milford" 1937-66.

GAGE.--Water-stage recorder. Datum of gage is 1,391.76 ft above sea level, 94.51 ft above Iowa Lake Survey datum. Prior to June 17, 1938, nonrecording gage at State Pier at Arnolds Park at same datum.

REMARKS.--A reliable record of stage was obtained for the year. Lake formed by concrete dam with ungated spillway at elevation 1,395.8 ft above sea level. Lake is used for conservation and recreation. Area of lake is approximately 3,900 acres. U.S. Geological Survey satellite data collection platform at station.

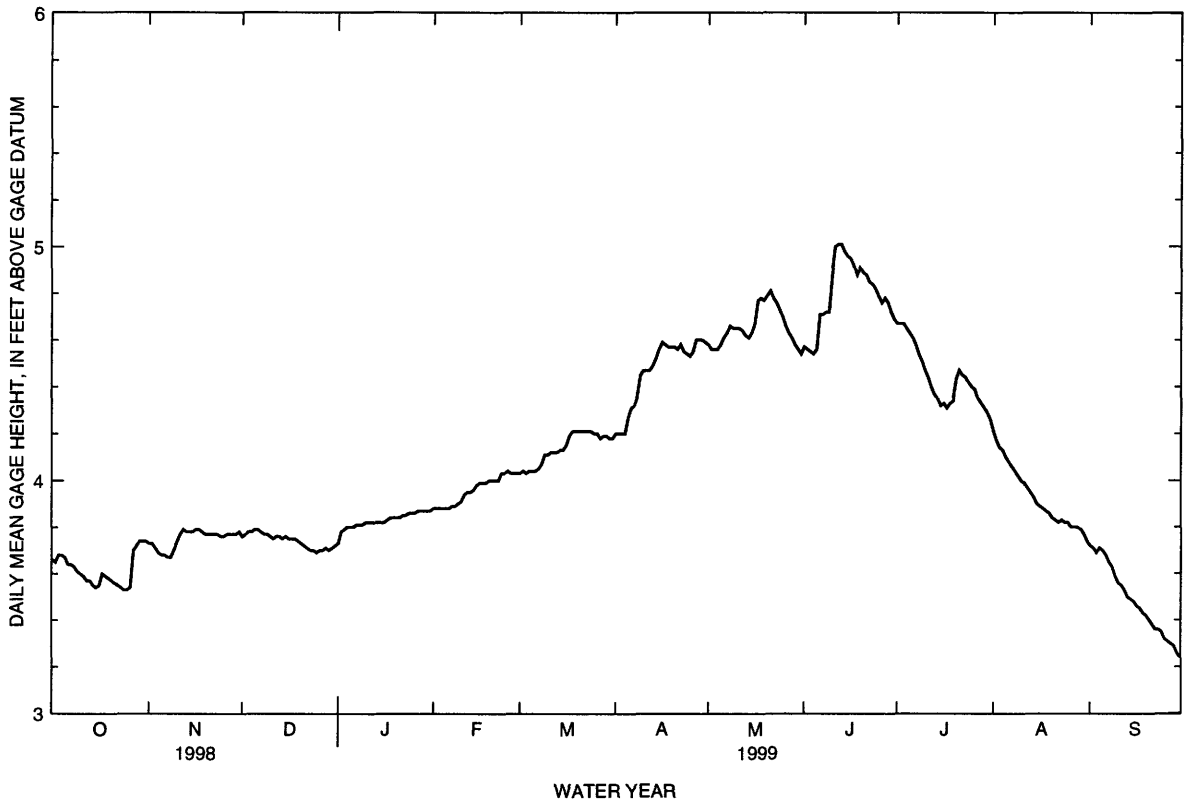
EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 8.70 ft July 17, 1993; minimum observed, 0.20 ft Sept. 20, 1959.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 5.02 ft June 11-13; minimum, 3.22 ft Sept. 30.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.66	3.73	3.76	3.73	3.88	4.03	4.20	4.58	4.57	4.67	4.21	3.72
2	3.65	3.73	3.77	3.78	3.88	4.04	4.20	4.56	4.56	4.67	4.17	3.71
3	3.68	3.71	3.78	3.79	3.88	4.03	4.20	4.56	4.55	4.67	4.14	3.69
4	3.68	3.69	3.78	3.80	3.88	4.04	4.20	4.56	4.54	4.65	4.13	3.71
5	3.67	3.68	3.79	3.80	3.88	4.04	4.27	4.58	4.56	4.63	4.10	3.70
6	3.64	3.68	3.79	3.80	3.88	4.04	4.31	4.61	4.71	4.61	4.08	3.68
7	3.64	3.67	3.78	3.81	3.89	4.05	4.32	4.63	4.71	4.58	4.06	3.65
8	3.63	3.67	3.77	3.81	3.89	4.07	4.36	4.66	4.72	4.54	4.04	3.63
9	3.61	3.70	3.77	3.81	3.90	4.11	4.45	4.65	4.72	4.51	4.02	3.59
10	3.60	3.74	3.76	3.82	3.91	4.11	4.47	4.65	4.88	4.47	4.00	3.56
11	3.59	3.77	3.75	3.82	3.94	4.12	4.47	4.65	5.00	4.44	3.99	3.55
12	3.57	3.79	3.76	3.82	3.95	4.12	4.47	4.64	5.01	4.40	3.97	3.53
13	3.57	3.78	3.76	3.82	3.95	4.12	4.49	4.62	5.01	4.37	3.95	3.50
14	3.55	3.78	3.75	3.82	3.96	4.13	4.52	4.61	4.98	4.35	3.93	3.49
15	3.54	3.78	3.76	3.82	3.98	4.13	4.56	4.63	4.96	4.32	3.90	3.48
16	3.55	3.79	3.75	3.82	3.99	4.15	4.59	4.67	4.95	4.33	3.89	3.46
17	3.60	3.79	3.75	3.83	3.99	4.19	4.58	4.77	4.92	4.31	3.88	3.45
18	3.59	3.78	3.75	3.84	3.99	4.21	4.57	4.78	4.88	4.33	3.87	3.43
19	3.58	3.77	3.74	3.84	4.00	4.21	4.57	4.77	4.91	4.34	3.86	3.42
20	3.57	3.77	3.73	3.84	4.00	4.21	4.57	4.79	4.89	4.43	3.84	3.40
21	3.56	3.77	3.72	3.84	4.00	4.21	4.56	4.81	4.88	4.47	3.83	3.38
22	3.55	3.77	3.71	3.85	4.00	4.21	4.58	4.78	4.85	4.45	3.82	3.36
23	3.54	3.77	3.70	3.85	4.03	4.21	4.55	4.76	4.84	4.44	3.83	3.36
24	3.53	3.76	3.70	3.86	4.03	4.21	4.54	4.73	4.82	4.42	3.82	3.35
25	3.53	3.76	3.69	3.86	4.04	4.20	4.53	4.70	4.79	4.40	3.82	3.32
26	3.54	3.77	3.70	3.86	4.03	4.20	4.55	4.66	4.76	4.39	3.80	3.31
27	3.70	3.77	3.70	3.87	4.03	4.18	4.60	4.63	4.78	4.35	3.80	3.30
28	3.72	3.77	3.71	3.87	4.03	4.19	4.60	4.61	4.76	4.33	3.80	3.29
29	3.74	3.77	3.70	3.87	---	4.19	4.60	4.58	4.72	4.31	3.79	3.26
30	3.74	3.78	3.71	3.87	---	4.18	4.59	4.56	4.69	4.29	3.77	3.24
31	3.74	---	3.72	3.87	---	4.18	---	4.54	---	4.26	3.74	---
MEAN	3.61	3.75	3.74	3.83	3.96	4.14	4.47	4.66	4.80	4.44	3.93	3.48
MAX	3.74	3.79	3.79	3.87	4.04	4.21	4.60	4.81	5.01	4.67	4.21	3.72
MIN	3.53	3.67	3.69	3.73	3.88	4.03	4.20	4.54	4.54	4.26	3.74	3.24

06604200 WEST OKOBOJI LAKE AT LAKESIDE LABORATORY NEAR MILFORD, IA--Continued



06605000 OCHEYEDAN RIVER NEAR SPENCER, IA

LOCATION.--Lat 43°07'44", long 95°12'37", in $SW^1/_4$ $SW^1/_4$ sec.15, T.96N., R.37W., Clay County, Hydrologic Unit 10230003, on left bank 3 ft upstream from bridge on county highway M38, 3.4 mi west by southwest of Spencer, and at mile 4.1.

DRAINAGE AREA.--426 mi^2.

PERIOD OF RECORD.--October 1977 to current year. Occasional low-flow measurements, water years 1957-61, 1964, 1966-68, 1970, 1971, 1974-77.

GAGE.--Water-stage recorder. Datum of gage is 1,311.66 ft above sea level.

REMARKS.--Records good except those for estimated daily discharges, which are poor. Periodic observations of water temperature and specific conductance are published in this report as miscellaneous water quality data. U.S. Geological Survey data collection platform at station.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of June 8, 1953 reached a stage of 12.89 ft, discharge, 26,000 ft^3/s on basis of contracted-opening measurement of peak flow.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

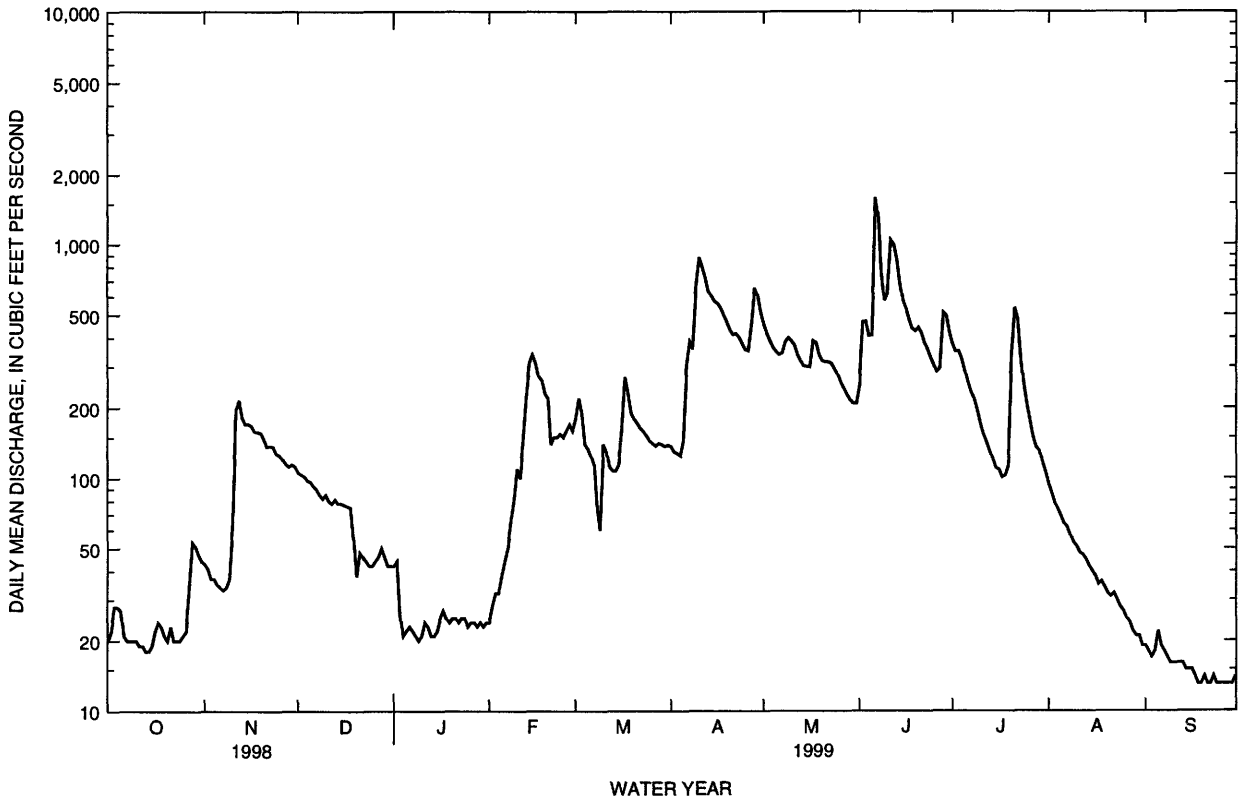
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	20	43	106	e42	e24	e180	137	457	249	376	94	19
2	22	41	104	e44	e28	e220	130	417	466	349	86	18
3	28	37	102	e26	e32	e190	128	388	468	349	78	17
4	28	37	98	e21	e32	e140	125	364	407	324	74	18
5	27	35	97	e22	e38	134	145	348	409	288	69	22
6	21	34	e93	e23	e44	124	301	338	1590	256	64	19
7	20	33	e90	e22	e50	114	383	342	1310	233	62	18
8	20	34	e85	e21	e65	e75	357	383	758	218	57	17
9	20	37	e82	e20	e80	e60	658	398	576	196	53	16
10	20	64	e85	e21	e110	e140	878	387	618	171	51	16
11	19	196	e80	e24	e100	e130	801	371	1040	154	48	16
12	19	216	e78	e23	e150	112	723	338	993	143	47	16
13	18	182	81	e21	227	108	631	317	855	131	45	16
14	18	171	78	e21	311	108	600	302	679	121	42	15
15	19	171	78	e22	338	115	570	300	572	111	40	15
16	22	168	77	e25	313	162	559	299	531	109	38	15
17	24	159	76	e27	273	270	533	387	479	101	35	14
18	23	158	e75	e25	262	229	498	380	437	103	36	13
19	21	157	e55	e24	e230	190	465	337	426	114	34	13
20	20	148	e38	e25	e220	179	432	317	440	326	32	14
21	23	137	e48	e25	e140	172	412	314	419	535	31	13
22	20	138	e46	e24	e150	164	416	314	380	e477	32	13
23	20	137	e44	e25	e150	159	400	309	357	e330	30	14
24	20	128	e42	e25	e155	153	377	292	329	e252	28	13
25	21	126	e42	e23	e150	145	355	276	305	e205	27	13
26	22	121	e44	e24	e160	141	351	255	285	e175	25	13
27	34	116	e46	e24	e170	138	457	241	294	e150	24	13
28	53	113	e50	e23	e160	141	650	227	510	136	22	13
29	51	115	e46	e24	---	140	605	215	494	131	21	13
30	47	113	e42	e23	---	137	511	208	421	117	21	14
31	44	---	e42	e24	---	139	---	208	---	106	19	---
TOTAL	784	3365	2150	763	4162	4609	13588	10029	17097	6787	1365	459
MEAN	25.3	112	69.4	24.6	149	149	453	324	570	219	44.0	15.3
MAX	53	216	106	44	338	270	878	457	1590	535	94	22
MIN	18	33	38	20	24	60	125	208	249	101	19	13
AC-FT	1560	6670	4260	1510	8260	9140	26950	19890	33910	13460	2710	910
CFSM	.06	.26	.16	.06	.35	.35	1.06	.76	1.34	.51	.10	.04
IN.	.07	.29	.19	.07	.36	.40	1.19	.88	1.49	.59	.12	.04

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1978 - 1999, BY WATER YEAR (WY)

MEAN	131	149	82.7	45.9	87.7	348	492	380	496	334	147	136
MAX	492	796	305	180	402	1019	1462	912	1973	2243	706	597
(WY)	1983	1980	1983	1983	1983	1983	1983	1993	1993	1993	1993	1979
MIN	9.23	8.11	1.91	.51	.000	14.0	20.5	54.9	33.8	33.4	15.3	14.2
(WY)	1990	1990	1990	1979	1979	1990	1990	1981	1989	1989	1989	1988

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1978 - 1999	
ANNUAL TOTAL	38730.4		65158			
ANNUAL MEAN	106		179		236	
HIGHEST ANNUAL MEAN					763	1993
LOWEST ANNUAL MEAN					33.4	1989
HIGHEST DAILY MEAN	637	Apr 27	1590	Jun 6	5620	Jul 1 1993
LOWEST DAILY MEAN	5.0	Jan 14	13	Sep 18	.00	Jan 24 1979a
ANNUAL SEVEN-DAY MINIMUM	7.1	Jan 13	13	Sep 21	.00	Jan 24 1979
INSTANTANEOUS PEAK FLOW			1920	Jun 6	6450	Jun 21 1983
INSTANTANEOUS PEAK STAGE			8.68	Jun 6	11.28	Jul 1 1993
INSTANTANEOUS LOW FLOW			11	Sep 28		
ANNUAL RUNOFF (AC-FT)	76820		129200		170800	
ANNUAL RUNOFF (CFSM)	.25		.42		.55	
ANNUAL RUNOFF (INCHES)	3.38		5.69		7.52	
10 PERCENT EXCEEDS	269		434		553	
50 PERCENT EXCEEDS	71		110		100	
90 PERCENT EXCEEDS	13		20		15	

a Also Jan 25 to Mar 9, 1979, Dec 22, 1989 to Jan 5, 1990
e Estimated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DAILY MEAN DISCHARGE, IN CUBIC FEET PER SECOND
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WATER YEAR

06605850 LITTLE SIOUX RIVER AT LINN GROVE, IA

LOCATION.--Lat 42°53'24", long 95°14'30", in $SW^1/_4$ $SW^1/_4$ sec.5, T.93 N., R.37 W., Buena Vista County, Hydrologic Unit 10230003, on right bank at downstream side of bridge on County Highway M36, in Linn Grove, and at mile 123.7.

DRAINAGE AREA.--1,548 mi^2.

PERIOD OF RECORD.--October 1972 to current year.

REVISED RECORDS.--WDR IA-80-1: 1978-79.

GAGE.--Water-stage recorder. Datum of gage is 1,223.60 ft above sea level.

REMARKS.--Records good except those for estimated daily discharges, which are poor. Periodic observations of water temperature and specific conductance are published in this report as miscellaneous water quality data. U.S. Army Corps of Engineers rain gage and satellite data collection platform at station.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of June 10, 1953, gage height 20.96 ft; discharge, 22,500 ft^3/s.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

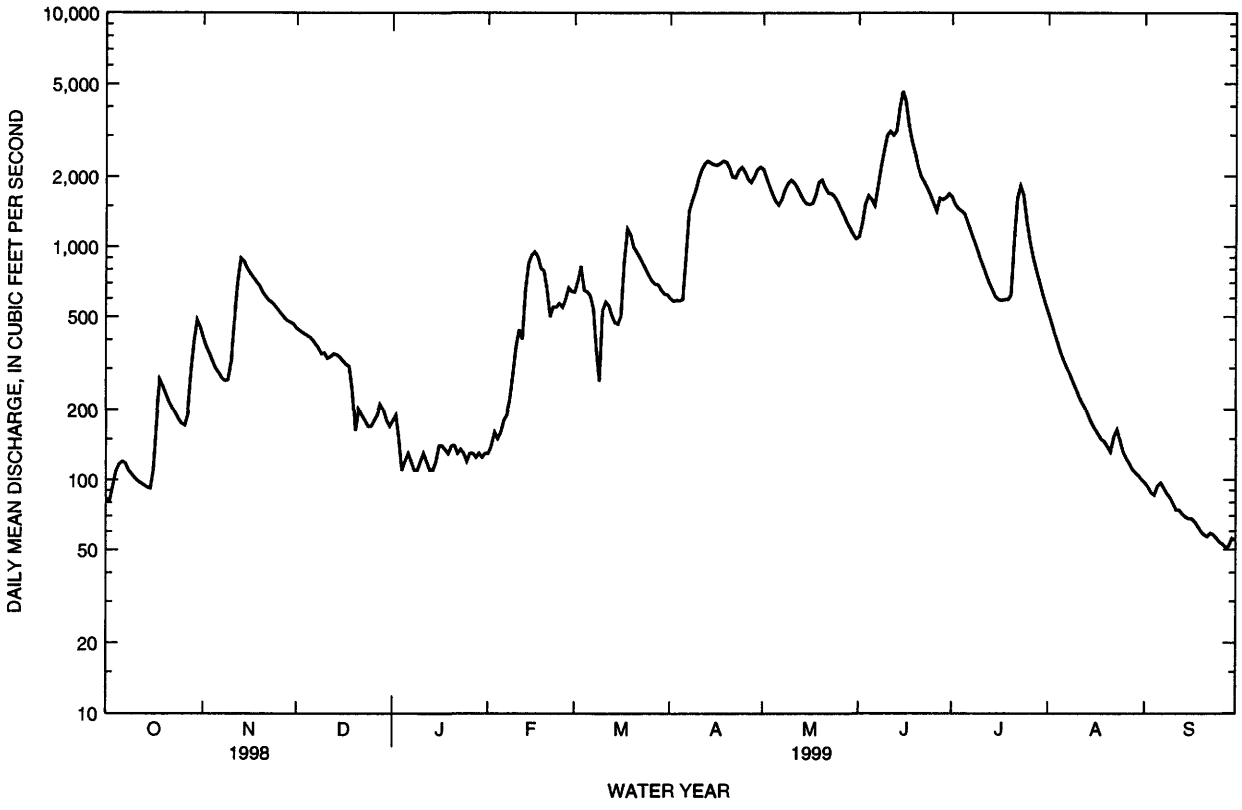
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	83	408	448	e180	e130	638	599	2150	1100	1630	520	97
2	81	373	437	e190	e140	714	584	1970	1250	1520	473	93
3	94	348	428	e150	e160	826	589	1810	1520	1450	425	88
4	109	322	419	e110	e150	649	587	1680	1650	1420	388	86
5	117	300	412	e120	e160	639	594	1570	1590	1380	351	94
6	120	288	401	e130	e180	615	913	1510	1500	1270	325	97
7	118	273	384	e120	e190	542	1420	1600	1800	1160	302	92
8	110	266	368	e110	e220	363	1580	1760	2190	1070	283	87
9	106	268	347	e110	e280	265	1740	1870	2580	988	263	84
10	102	325	350	e120	e370	532	1960	1930	3000	893	245	79
11	99	496	332	e130	e440	579	2140	1880	3120	826	227	74
12	97	717	338	e120	e400	557	2270	1790	3010	757	213	74
13	95	892	347	e110	e650	506	2330	1680	3120	698	202	71
14	93	868	344	e110	e850	472	2290	1580	3940	652	187	69
15	92	811	336	e120	918	466	2250	1530	4640	610	174	68
16	112	772	323	e140	948	504	2240	1520	4210	593	165	68
17	183	741	313	e140	908	846	2280	1540	3320	587	157	66
18	269	708	306	e135	807	1190	2330	1670	2840	592	149	63
19	252	680	243	e130	789	1130	2310	1890	2500	592	146	60
20	233	639	163	e140	e650	1000	2180	1930	2190	620	139	58
21	216	612	201	e140	e500	950	1990	1790	1990	1060	132	57
22	204	589	e190	e130	e550	905	1980	1700	1890	1610	153	59
23	194	577	e180	e135	e550	852	2130	1690	1780	1820	164	58
24	183	557	e170	e130	570	804	2190	1640	1660	1660	148	56
25	175	536	e170	e120	e550	753	2090	1560	1540	1280	132	54
26	172	516	e180	e130	595	714	1950	1460	1420	1060	124	53
27	192	497	e190	e130	665	692	1890	1370	1610	909	118	51
28	286	482	e210	e125	641	688	1990	1280	1590	805	111	52
29	387	475	e200	e130	---	652	2140	1200	1620	720	107	56
30	485	466	e180	e125	---	626	2200	1130	1680	639	104	55
31	454	---	e170	e130	---	622	---	1080	---	575	100	---
TOTAL	5513	15802	9080	4040	13961	21291	53736	50760	67850	31446	6727	2119
MEAN	178	527	293	130	499	687	1791	1637	2262	1014	217	70.6
MAX	485	892	448	190	948	1190	2330	2150	4640	1820	520	97
MIN	81	266	163	110	130	265	584	1080	1100	575	100	51
AC-FT	10940	31340	18010	8010	27690	42230	106600	100700	134600	62370	13340	4200
CFSM	.11	.34	.19	.08	.32	.44	1.16	1.06	1.46	.66	.14	.05
IN.	.13	.38	.22	.10	.34	.51	1.29	1.22	1.63	.76	.16	.05

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1973 - 1999, BY WATER YEAR (WY)

MEAN	426	464	285	186	303	1150	1661	1304	1554	1096	495	417
MAX	2070	2050	1122	859	1161	3894	4952	3233	6898	7905	2906	2171
(WY)	1983	1980	1983	1983	1983	1983	1983	1993	1993	1993	1993	1993
MIN	21.3	22.0	6.08	3.12	5.92	75.9	77.7	69.4	60.3	36.3	26.4	22.7
(WY)	1977	1977	1990	1977	1977	1990	1990	1977	1977	1977	1976	1976

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1973 - 1999	
ANNUAL TOTAL	164587		282325			
ANNUAL MEAN	451		773		779	
HIGHEST ANNUAL MEAN					2763	1993
LOWEST ANNUAL MEAN					56.3	1977
HIGHEST DAILY MEAN	1620	Jun 25	4640	Jun 15	15000	Jul 2 1993
LOWEST DAILY MEAN	27	Jan 4	51	Sep 27	.70	Feb 4 1977
ANNUAL SEVEN-DAY MINIMUM	33	Jan 13	54	Sep 24	1.1	Jan 31 1977
INSTANTANEOUS PEAK FLOW			4720	Jun 15	16100	Jul 2 1993
INSTANTANEOUS PEAK STAGE			14.62	Jun 15	20.63	Jul 2 1993
ANNUAL RUNOFF (AC-FT)	326500		560000		564600	
ANNUAL RUNOFF (CFSM)	.29		.50		.50	
ANNUAL RUNOFF (INCHES)	3.96		6.78		6.84	
10 PERCENT EXCEEDS	1150		1940		2000	
50 PERCENT EXCEEDS	322		496		340	
90 PERCENT EXCEEDS	58		97		42	

e Estimated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DAILY MEAN DISCHARGE, IN CUBIC FEET PER SECOND
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WATER YEAR

06606600 LITTLE SIOUX RIVER AT CORRECTIONVILLE, IA

LOCATION.--Lat 42°28'20", long 95°47'49", in NE$^1/_4$ NW$^1/_4$ sec.1, T.88 N., R.43 W., Woodbury County, Hydrologic Unit 10230003 on right bank 50 ft upstream from bridge on State Highway 31, 0.3 mi upstream from Bacon Creek, 0.5 mi west of Correctionville, 0.8 mi downstream from Pierson Creek, and at mile 56.0.

DRAINAGE AREA.--2,500 mi^2.

PERIOD OF RECORD.--May 1918 to July 1925, October 1928 to July 1932, June 1936 to current year. Monthly discharge only for some periods, published in WSP 1310.

REVISED RECORDS.--WSP 856: 1919. WSP 1240: 1924-25, 1931, 1932 (M), 1937, 1945 (M), 1947 (M), 1949 (M). WSP 1440: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,096.49 ft above sea level. May 28, 1918, to July 1, 1925 and Oct. 29, 1928 to July 15, 1929, nonrecording gage 0.2 mi downstream at datum 1.25 ft lower. July 16, 1929, to July 2, 1932, and June 15, 1936, to Nov. 7, 1938, nonrecording gage at present site and datum.

REMARKS.--Records good except those for estimated daily discharges, which are poor. Periodic observations of water temperature and specific conductance are published in this report as miscellaneous water quality data. U.S. Army Corps of Engineers rain gage and satellite data collection platform at station.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of June 23 or 24, 1891, reached a stage of 29.34 ft, present datum, from levels to floodmark by U.S. Soil Conservation Service (discharge not determined).

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	199	747	782	e260	318	950	995	3220	1750	2650	1160	228
2	208	727	768	e270	330	1100	984	3160	1830	2630	1070	222
3	258	681	748	e240	388	1190	967	2990	1920	2550	994	215
4	278	647	735	e220	518	1210	947	2780	2300	2430	927	226
5	312	620	727	e260	520	1170	980	2620	2390	2310	858	238
6	321	591	710	e300	597	1080	1160	2480	2370	2220	809	218
7	318	568	685	e280	599	1010	1390	2370	3350	2100	773	207
8	299	565	662	e270	673	930	1920	2350	3040	1970	728	201
9	289	564	639	e260	720	703	2600	2430	3050	1880	683	194
10	279	625	627	e280	838	706	3040	2540	4380	1730	638	186
11	264	706	597	e320	974	842	3150	2620	4860	1610	597	184
12	247	867	616	e290	898	923	3190	2590	5100	1510	570	184
13	239	1060	612	e260	996	915	3240	2460	5020	1430	533	176
14	234	1230	603	e270	1150	869	3270	2330	4780	1340	505	171
15	233	1310	605	e300	1210	834	3280	2250	4950	1270	478	167
16	240	1300	594	e340	1150	867	3250	2300	5330	1250	451	164
17	305	1240	577	e320	1100	988	3190	2410	5460	1210	423	163
18	322	1190	569	e280	1130	1260	3170	2410	5210	1210	400	161
19	355	1140	503	321	1040	1570	3170	2360	4660	1200	377	159
20	458	1090	225	310	1030	1640	3160	2530	4120	1170	359	155
21	468	1050	158	e290	943	1530	3070	2680	3670	1310	343	148
22	449	1010	280	304	855	1430	3160	2570	3340	1930	329	147
23	427	979	e260	297	736	1370	3020	2490	3120	2720	329	147
24	412	941	e240	e280	857	1300	3050	2410	2940	2700	344	143
25	401	920	e240	288	820	1230	3080	2350	2760	2590	352	140
26	392	890	e270	296	898	1170	3060	2250	2590	2230	328	136
27	433	865	e280	294	853	1120	3020	2140	2540	1880	300	133
28	474	837	e320	302	890	1100	3040	2020	2730	1660	279	131
29	497	823	e300	e290	---	1090	3160	1910	2710	1500	261	125
30	565	805	e270	319	---	1050	3200	1800	2630	1380	254	125
31	668	---	e240	319	---	1010	---	1720	---	1260	241	---
TOTAL	10844	26588	15442	8930	23031	34157	77913	75540	104900	56830	16693	5194
MEAN	350	886	498	288	823	1102	2597	2437	3497	1833	538	173
MAX	668	1310	782	340	1210	1640	3280	3220	5460	2720	1160	238
MIN	199	564	158	220	318	703	947	1720	1750	1170	241	125
AC-FT	21510	52740	30630	17710	45680	67750	154500	149800	208100	112700	33110	10300
CFSM	.14	.35	.20	.12	.33	.44	1.04	.97	1.40	.73	.22	.07
IN.	.16	.40	.23	.13	.34	.51	1.16	1.12	1.56	.85	.25	.08

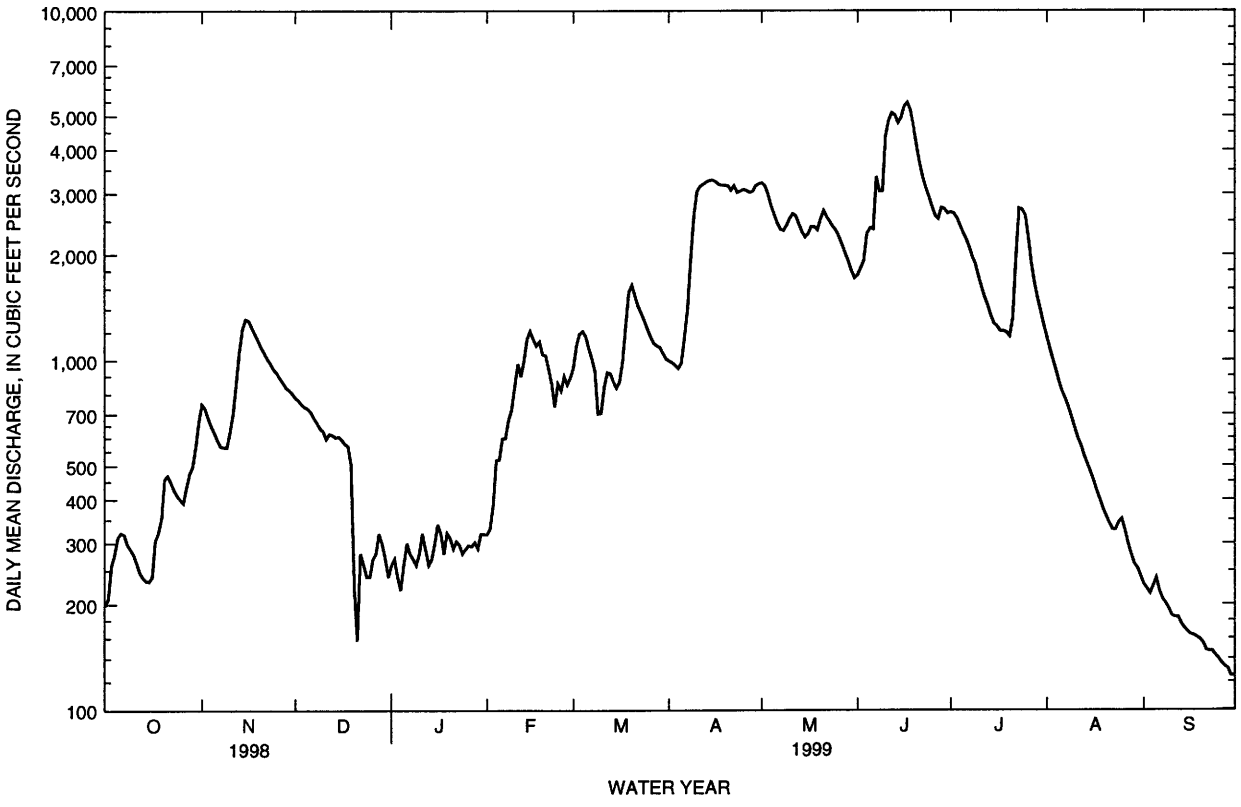
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1919 - 1999, BY WATER YEAR (WY)

MEAN	439	438	301	220	472	1480	1905	1401	1806	1243	609	511
MAX	2994	3079	1698	1323	2708	7328	8677	5002	10110	11600	4469	3671
(WY)	1983	1980	1983	1983	1971	1983	1983	1993	1993	1993	1993	1938
MIN	8.33	25.3	15.1	8.31	7.08	53.5	61.9	57.3	58.1	43.4	15.0	14.4
(WY)	1957	1959	1959	1959	1959	1931	1931	1931	1956	1956	1931	1958

06606600 LITTLE SIOUX RIVER AT CORRECTIONVILLE, IA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1919 - 1999	
ANNUAL TOTAL	309715		456062			
ANNUAL MEAN	849		1249		915	
HIGHEST ANNUAL MEAN					4304	1993
LOWEST ANNUAL MEAN					53.7	1931
HIGHEST DAILY MEAN	2930	Jun 17	5460	Jun 17	27900	Apr 7 1965
LOWEST DAILY MEAN	55	Jan 4	125	Sep 29,30	2.6	Jul 17 1936b
ANNUAL SEVEN-DAY MINIMUM	86	Jan 13	133	Sep 24	4.6	Oct 4 1956
INSTANTANEOUS PEAK FLOW			5480	Jun 17	29800	Apr 7 1965
INSTANTANEOUS PEAK STAGE			12.66	Jun 17	25.86	Apr 7 1965
INSTANTANEOUS LOW FLOW			123	Dec 20a		
ANNUAL RUNOFF (AC-FT)	614300		904600		662600	
ANNUAL RUNOFF (CFSM)	.34		.50		.37	
ANNUAL RUNOFF (INCHES)	4.61		6.79		4.97	
10 PERCENT EXCEEDS	1960		3040		2220	
50 PERCENT EXCEEDS	662		858		380	
90 PERCENT EXCEEDS	182		236		54	

a Also Sep 28-30
b Also July 25, 1956, caused by construction dam upstream
e Estimated



06607200 MAPLE RIVER AT MAPLETON, IA

LOCATION.--Lat 42°09'25", long 95°48'35", in $SE^1/_4$ $SE^1/_4$ sec.23, T.85 N., R.43 W., Monona County, Hydrologic Unit 10230005, on right bank at downstream side of bridge on State Highway 175, 1.0 mi downstream from Simmons Creek, 1.1 mi southwest of intersection of State Highways 175 and 141 in Mapleton, 2.1 mi upstream from McCleery Creek, and 16.0 mi upstream from mouth.

DRAINAGE AREA.--669 mi^2.

PERIOD OF RECORD.--October 1941 to current year.

REVISED RECORDS.--WSP 1310: 1942 (M), 1946 (M), 1948 (M). WSP 1440: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,085.86 ft above sea level. See WSP 1730 for history of changes prior to Sept. 20, 1956.

REMARKS.--Records good except those for estimated daily discharges, which are poor. Periodic observations of water temperature and specific conductance are published in this report as miscellaneous water quality data. U.S. Army Corps of Engineers rain gage and satellite data collection platform at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

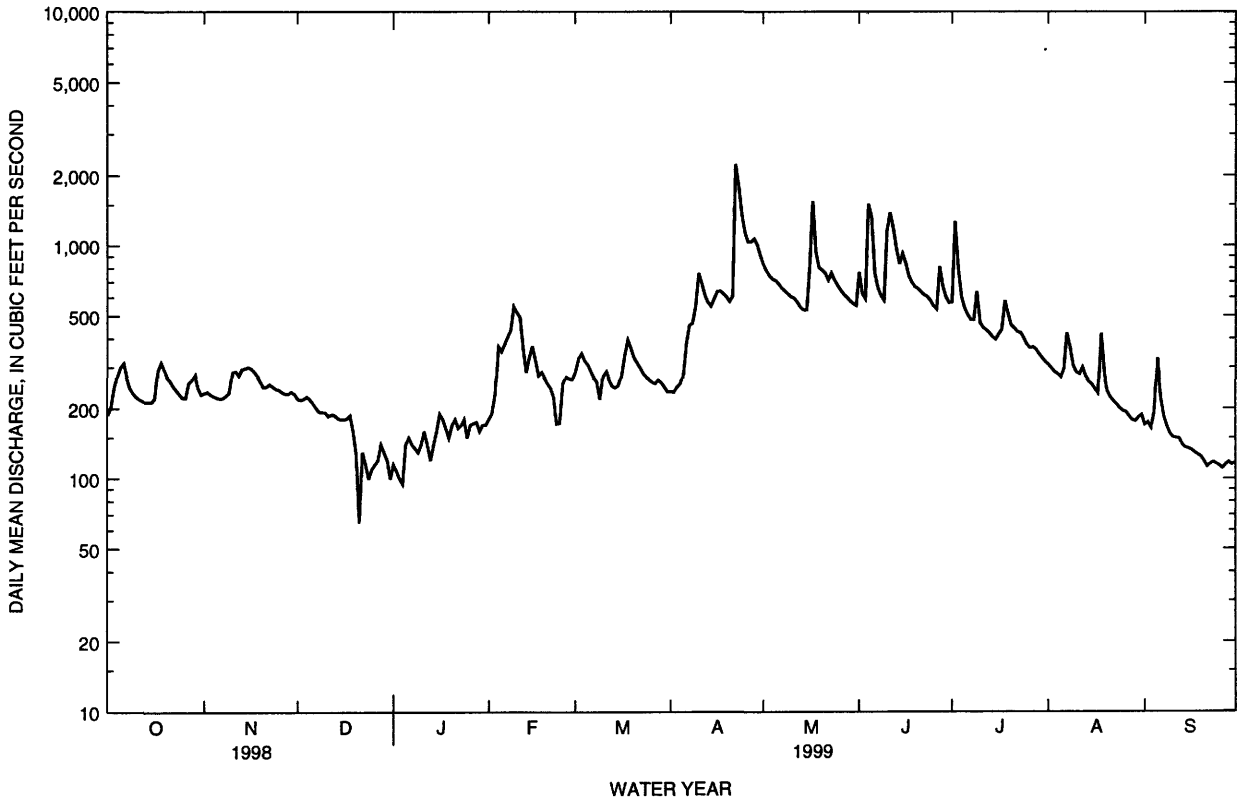
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	188	233	221	e115	e180	289	237	829	769	574	308	171
2	201	236	218	e108	e190	328	235	779	622	1270	297	175
3	243	230	220	e100	e230	344	247	743	593	795	287	166
4	275	226	225	e95	369	320	254	721	1510	604	281	194
5	301	223	219	e140	352	308	277	710	1330	543	273	328
6	313	221	211	e150	378	287	381	686	763	507	295	224
7	272	222	202	e140	406	270	456	657	661	482	422	187
8	245	227	194	e135	434	261	466	639	611	482	365	169
9	234	234	193	e130	549	219	553	620	585	634	305	157
10	225	286	193	e140	519	275	761	604	1160	467	286	151
11	220	289	186	e160	494	288	690	596	1390	445	281	150
12	216	277	189	e140	362	265	613	574	1190	436	300	149
13	213	295	188	e120	286	250	573	546	972	422	275	140
14	213	298	182	e140	332	245	552	532	835	406	262	136
15	213	301	180	e160	370	251	593	533	923	396	254	135
16	221	297	180	e190	323	276	637	829	841	417	244	133
17	292	287	181	e180	277	337	640	1550	744	436	233	130
18	315	276	187	e165	286	394	623	940	698	581	420	127
19	293	261	160	e150	270	364	603	807	668	512	282	125
20	272	247	126	e170	256	331	577	787	654	457	238	119
21	263	248	e65	e180	245	315	606	762	634	444	224	113
22	250	254	e130	e165	224	299	2230	713	615	428	215	116
23	240	249	e115	e170	172	283	1790	763	605	424	209	118
24	231	243	e100	e180	173	273	1360	713	583	404	201	116
25	223	241	e110	e150	257	266	1140	677	554	377	196	114
26	223	235	e115	e170	273	259	1040	644	536	365	194	111
27	258	232	e120	e173	268	256	1040	620	813	368	186	115
28	265	231	e140	e175	266	265	1070	600	671	359	179	118
29	279	236	e130	e160	---	258	1010	581	603	342	177	115
30	245	232	e120	e170	---	247	901	566	570	330	184	117
31	230	---	e100	e170	---	236	---	555	---	318	188	---
TOTAL	7672	7567	5100	4691	8741	8859	22155	21876	23703	15025	8061	4419
MEAN	247	252	165	151	312	286	738	706	790	485	260	147
MAX	315	301	225	190	549	394	2230	1550	1510	1270	422	328
MIN	188	221	65	95	172	219	235	532	536	318	177	111
AC-FT	15220	15010	10120	9300	17340	17570	43940	43390	47010	29800	15990	8770
CFSM	.37	.38	.25	.23	.47	.43	1.10	1.05	1.18	.72	.39	.22
IN.	.43	.42	.28	.26	.49	.49	1.23	1.22	1.32	.84	.45	.25

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1942 - 1999, BY WATER YEAR (WY)

MEAN	160	148	118	97.7	230	493	419	402	650	374	259	183
MAX	634	506	548	330	1016	1588	1889	1345	2856	1588	1230	1034
(WY)	1983	1993	1985	1983	1971	1983	1983	1984	1984	1993	1951	1951
MIN	9.36	14.6	5.74	3.25	3.64	25.6	19.9	35.9	48.5	33.3	12.6	5.48
(WY)	1957	1959	1959	1959	1959	1957	1957	1968	1955	1956	1956	1956

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1942 - 1999	
ANNUAL TOTAL	155979		137869			
ANNUAL MEAN	427		378		294	
HIGHEST ANNUAL MEAN					983	1983
LOWEST ANNUAL MEAN					24.5	1956
HIGHEST DAILY MEAN	6350	Jun 24	2230	Apr 22	14400	Jun 21 1983
LOWEST DAILY MEAN	50	Jan 4	65	Dec 21	.00	Sep 21 1945a
ANNUAL SEVEN-DAY MINIMUM	63	Mar 9	108	Dec 21	2.6	Feb 14 1959
INSTANTANEOUS PEAK FLOW			3740	Jul 2	20800	Sep 12 1978
INSTANTANEOUS PEAK STAGE			6.55	Jul 2	22.10	Jun 12 1950
ANNUAL RUNOFF (AC-FT)	309400		273500		213300	
ANNUAL RUNOFF (CFSM)	.64		.56		.44	
ANNUAL RUNOFF (INCHES)	8.67		7.67		5.98	
10 PERCENT EXCEEDS	881		716		624	
50 PERCENT EXCEEDS	263		273		144	
90 PERCENT EXCEEDS	100		140		30	

a Also Sep 22, 1945; caused by temporary dam upstream
e Estimated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DAILY MEAN DISCHARGE, IN CUBIC FEET PER SECOND
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WATER YEAR

06607500 LITTLE SIOUX RIVER NEAR TURIN, IA

LOCATION.--Lat 41°57'52", long 95°58'21", in NW$^1/_4$ NE$^1/_4$ sec.33, T.83 N., R.44 W., Monona County, Hydrologic Unit 10230003, on left bank on downstream side of bridge on county highway E54, 1.0 mi east of gaging station on Monona-Harrison Ditch near Turin, 2.5 mi downstream from Maple River, 3.8 mi south of Turin, 6.2 mi northeast of Blencoe, and at mile 13.5.

DRAINAGE AREA.--3,526 mi^2.

PERIOD OF RECORD.--May 1942 to September 1957, January 1958 to current year. June 1942 to January 1958 at site 1,200 ft east on old river channel; records not equivalent owing to diversion into Monona-Harrison Ditch through equalizer ditch 1.5 mi upstream 1923 to 1958, and diversion with Monona-Harrison Ditch through diversion ditch 8.3 miles upstream since 1958.

REVISED RECORDS: WSP 1440: Drainage area. WSP 1560: Drainage area. WDR IA-95-1: Period of record.

GAGE.--Water-stage recorder. Datum of gage is 1,019.85 ft above sea level (U.S. Army Corps of Engineers bench mark). Prior to July 15, 1958, nonrecording gages near present site at different datums. July 15 to Sept. 3, 1958, nonrecording gage at present site and datum.

REMARKS.--Records good except those for estimated daily discharges, which are poor. Periodic observations of water temperature and specific conductance are published in this report as miscellaneous water quality data. U.S. Army Corps of Engineers rain gage and and satellite data collection platform at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	464	943	1170	e440	e725	1250	1290	4420	2840	3380	1750	517
2	475	1020	1120	e420	e730	1340	1240	4360	2860	4160	1570	487
3	531	1010	1100	e400	e1400	1550	1240	4220	2750	4310	1430	472
4	610	971	1090	e380	e1700	1640	1230	4020	3620	3390	1320	527
5	636	939	1070	e547	e1400	1630	1270	3820	4860	3170	1220	759
6	652	915	1050	e600	e1600	1540	1480	3660	3640	3010	1180	609
7	630	902	1040	e550	e1400	1430	1800	3450	3630	2890	1500	509
8	600	899	1020	e520	e1400	1380	2150	3320	4220	2730	1280	441
9	585	915	1000	e500	1330	1210	2820	3310	3820	2930	1080	419
10	569	1030	986	e550	1420	1040	3610	3380	4650	2540	988	404
11	553	1110	976	e650	1530	1090	3980	3510	6280	2350	923	395
12	535	1130	957	e550	1400	1170	3970	3530	6110	2230	1010	394
13	523	1310	961	e480	1510	1220	4020	3400	6150	2120	870	394
14	525	1540	962	e550	1720	1190	4090	3240	5690	2030	810	388
15	527	1740	947	e650	1690	1170	4200	3120	5620	1950	788	374
16	542	1790	971	e750	1630	1180	4170	3200	6050	1960	746	366
17	602	1760	995	e700	1480	1240	4100	4420	6120	2000	695	368
18	631	1710	969	e650	1530	1470	4050	3780	6090	2130	908	358
19	639	1610	903	e600	1470	1850	4030	3540	5670	2110	780	356
20	646	1550	e360	e675	1400	2110	4020	3520	5120	1960	671	346
21	724	1540	e550	e700	1310	2100	4030	3770	4630	1910	623	342
22	729	1470	e500	e650	1270	1960	6040	3750	4200	2090	602	343
23	722	1390	e440	e700	1080	1870	5570	3760	3930	2790	585	343
24	701	1380	e400	e725	1050	1800	4760	3580	3750	3420	573	337
25	668	1310	e420	e600	1180	1670	4590	3440	3560	3180	574	341
26	656	1280	e440	e650	1200	1570	4520	3300	3340	2990	584	332
27	723	1250	e480	e675	1240	1510	4510	3150	3610	2650	557	319
28	751	1220	e550	e675	1200	1470	4480	3010	3560	2380	528	314
29	813	1210	e500	e650	---	1420	4470	2860	3530	2190	512	311
30	799	1170	e460	e700	---	1470	4470	2740	3390	2040	570	319
31	840	---	e400	e675	---	1380	---	2630	---	1900	534	---
TOTAL	19601	38014	24787	18562	37995	45920	106200	109210	133290	80890	27761	12184
MEAN	632	1267	800	599	1357	1481	3540	3523	4443	2609	896	406
MAX	840	1790	1170	750	1720	2110	6040	4420	6280	4310	1750	759
MIN	464	899	360	380	725	1040	1230	2630	2750	1900	512	311
AC-FT	38880	75400	49170	36820	75360	91080	210600	216600	264400	160400	55060	24170
CFSM	.18	.36	.23	.17	.38	.42	1.00	1.00	1.26	.74	.25	.12
IN.	.21	.40	.26	.20	.40	.48	1.12	1.15	1.41	.85	.29	.13

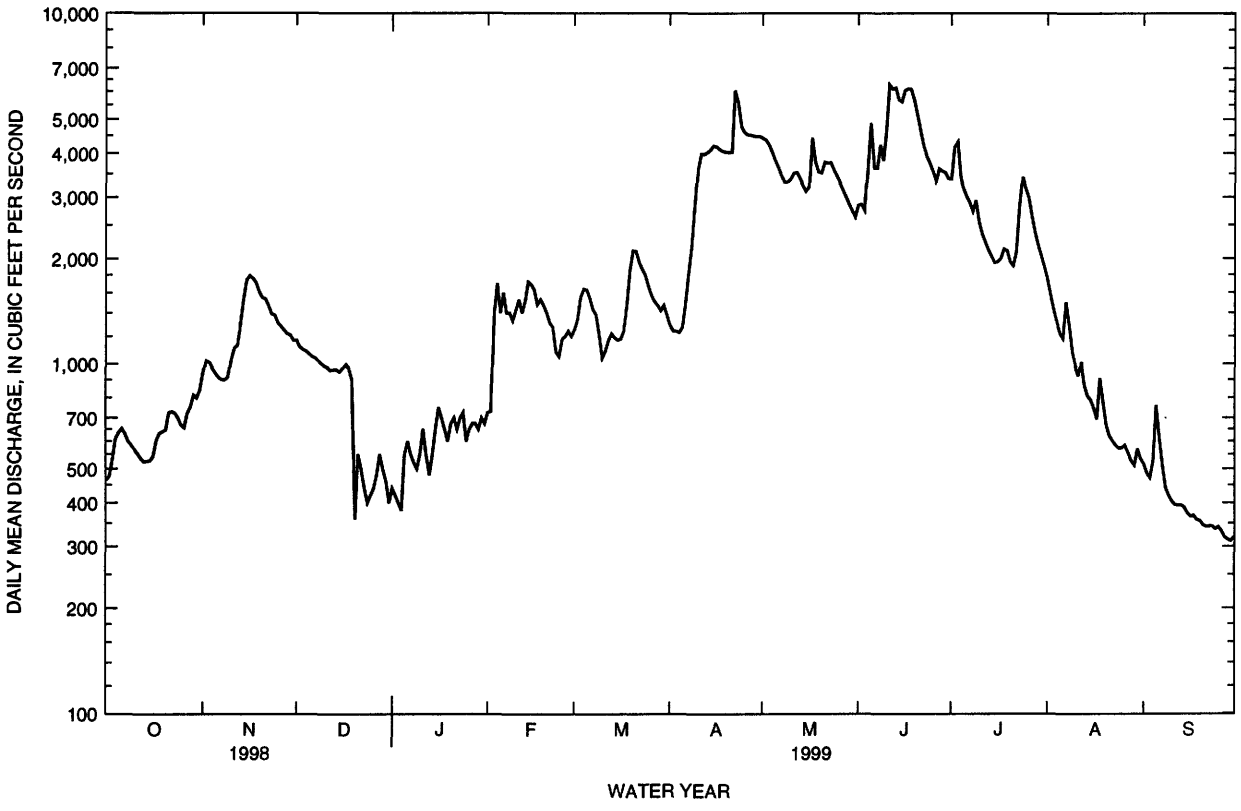
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1959 - 1999, BY WATER YEAR (WY)

MEAN	833	843	669	489	864	2407	3209	2419	3021	2102	1074	873
MAX	3625	3612	2424	2250	3353	9054	10790	7938	15080	13110	5181	3980
(WY)	1983	1980	1983	1992	1971	1983	1965	1986	1984	1993	1993	1993
MIN	37.5	48.0	31.2	18.5	25.1	171	157	118	315	181	140	90.2
(WY)	1959	1959	1959	1977	1959	1964	1968	1968	1968	1968	1976	1976

06607500 LITTLE SIOUX RIVER NEAR TURIN, IA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1959 - 1999a	
ANNUAL TOTAL	550230		654414			
ANNUAL MEAN	1507		1793		1568	
HIGHEST ANNUAL MEAN					5261	1993
LOWEST ANNUAL MEAN					167	1968
HIGHEST DAILY MEAN	8960	Jun 24	6280	Jun 11	28700	Jun 22 1996
LOWEST DAILY MEAN	190	Jan 13	311	Sep 29	17	Jan 18 1977b
ANNUAL SEVEN-DAY MINIMUM	219	Jan 12	325	Sep 24	17	Jan 27 1977
INSTANTANEOUS PEAK FLOW			6500	Apr 22	32000	Jun 22 1996
INSTANTANEOUS PEAK STAGE			14.90	Apr 22	27.44	Feb 19 1971c
INSTANTANEOUS LOW FLOW			295	Sep 29		
ANNUAL RUNOFF (AC-FT)	1091000		1298000		1136000	
ANNUAL RUNOFF (CFSM)	.43		.51		.44	
ANNUAL RUNOFF (INCHES)	5.81		6.90		6.04	
10 PERCENT EXCEEDS	3180		4030		3740	
50 PERCENT EXCEEDS	1040		1240		808	
90 PERCENT EXCEEDS	416		474		150	

a Post closure of diversion to Monona-Harrison Ditch
b Also Jan 19, 20, Jan 28 to Feb 1, 1977
c Ice affected
e Estimated



06608500 SOLDIER RIVER AT PISGAH, IA

LOCATION.--Lat 41°49'50", long 95°55'52", in NW$^1/_4$ NE$^1/_4$ sec.14, T.81 N., R.44 W., Harrison County, Hydrologic Unit 10230001, on right bank at upstream side of bridge on county highway F20, at west edge of Pisgah, 0.4 mi downstream from Cobb Creek, 0.5 mi upstream from Mogger Ditch, and 13.1 mi upstream from mouth.

DRAINAGE AREA.--407 mi^2.

PERIOD OF RECORD.--March 1940 to current year.

REVISED RECORDS.--WSP 956: 1940 (M). WSP 1240: 1940, 1941 (M), 1947. WSP 1440: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,036.53 ft above sea level. Prior to Oct. 11, 1954, nonrecording gage at same site and datum with supplementary water-stage recorder operating above 8.2 ft gage height Mar. 2, 1946 to Sept. 24, 1953. Prior to Feb. 1954, on left bank at downstream side of bridge. Prior to June 21, 1989, at site 100 ft downstream at same datum.

REMARKS.--Records good except those for estimated daily discharges, which are poor. Periodic observations of water temperature and specific conductance are published in this report as miscellaneous water quality data. U.S. Army Corps of Engineers rain gage and satellite data collection platform at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	146	171	151	e90	e145	181	169	413	565	512	245	217
2	155	175	157	e85	e145	207	172	395	358	3530	241	200
3	191	175	158	e80	e300	186	207	388	286	1510	242	190
4	188	166	160	e75	374	180	206	386	817	796	235	230
5	248	153	165	e109	267	173	237	401	742	627	226	615
6	212	147	158	e120	287	165	388	482	353	528	258	258
7	178	150	151	e110	224	158	249	401	299	426	795	218
8	169	160	142	e105	222	157	262	362	282	397	365	202
9	170	166	137	e100	225	196	381	333	273	716	286	189
10	168	232	134	e110	206	195	287	323	2190	417	267	186
11	163	209	134	e126	223	174	273	317	648	375	260	185
12	158	178	140	e110	176	173	247	304	641	360	1160	183
13	153	177	138	e95	e150	174	266	291	426	344	381	176
14	151	175	134	e110	187	175	297	284	369	349	306	171
15	148	170	134	e130	191	185	501	297	459	311	284	165
16	151	171	133	e150	175	218	445	316	628	369	275	161
17	277	159	130	e140	153	242	391	1070	402	379	262	164
18	215	154	139	e130	167	213	363	413	359	367	334	164
19	174	153	135	e120	161	194	352	347	338	374	336	164
20	165	155	e70	e134	161	192	340	356	331	920	253	160
21	167	156	e110	e140	148	193	362	632	315	509	240	156
22	158	157	e98	e133	145	192	1890	355	306	443	228	157
23	155	154	e90	e140	153	189	808	520	304	353	230	154
24	157	151	e80	e145	185	185	656	336	283	366	218	152
25	159	154	e85	e120	166	175	577	310	271	314	213	149
26	160	150	e90	e132	174	173	548	292	261	308	209	148
27	226	148	e95	e134	169	169	676	296	1750	300	206	149
28	245	145	e110	e133	165	176	615	780	703	292	204	150
29	213	153	e100	e130	---	163	488	296	507	274	200	143
30	187	156	e95	e140	---	160	443	273	472	273	306	145
31	171	---	e80	e138	---	164	---	281	---	277	225	---
TOTAL	5578	4920	3833	3714	5444	5677	13096	12250	15938	17316	9490	5701
MEAN	180	164	124	120	194	183	437	395	531	559	306	190
MAX	277	232	165	150	374	242	1890	1070	2190	3530	1160	615
MIN	146	145	70	75	145	157	169	273	261	273	200	143
AC-FT	11060	9760	7600	7370	10800	11260	25980	24300	31610	34350	18820	11310
CFSM	.44	.40	.30	.29	.48	.45	1.07	.97	1.31	1.37	.75	.47
IN.	.51	.45	.35	.34	.50	.52	1.20	1.12	1.46	1.58	.87	.52

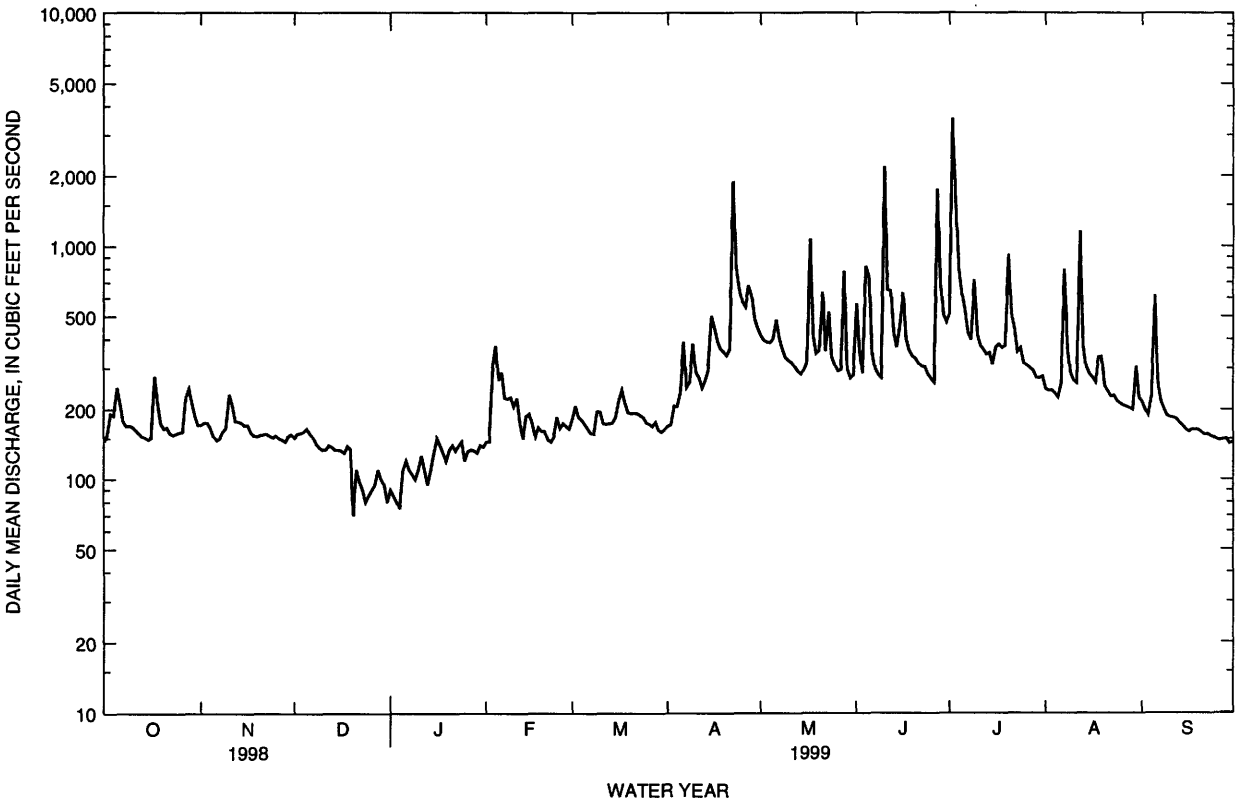
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1941 - 1999, BY WATER YEAR (WY)

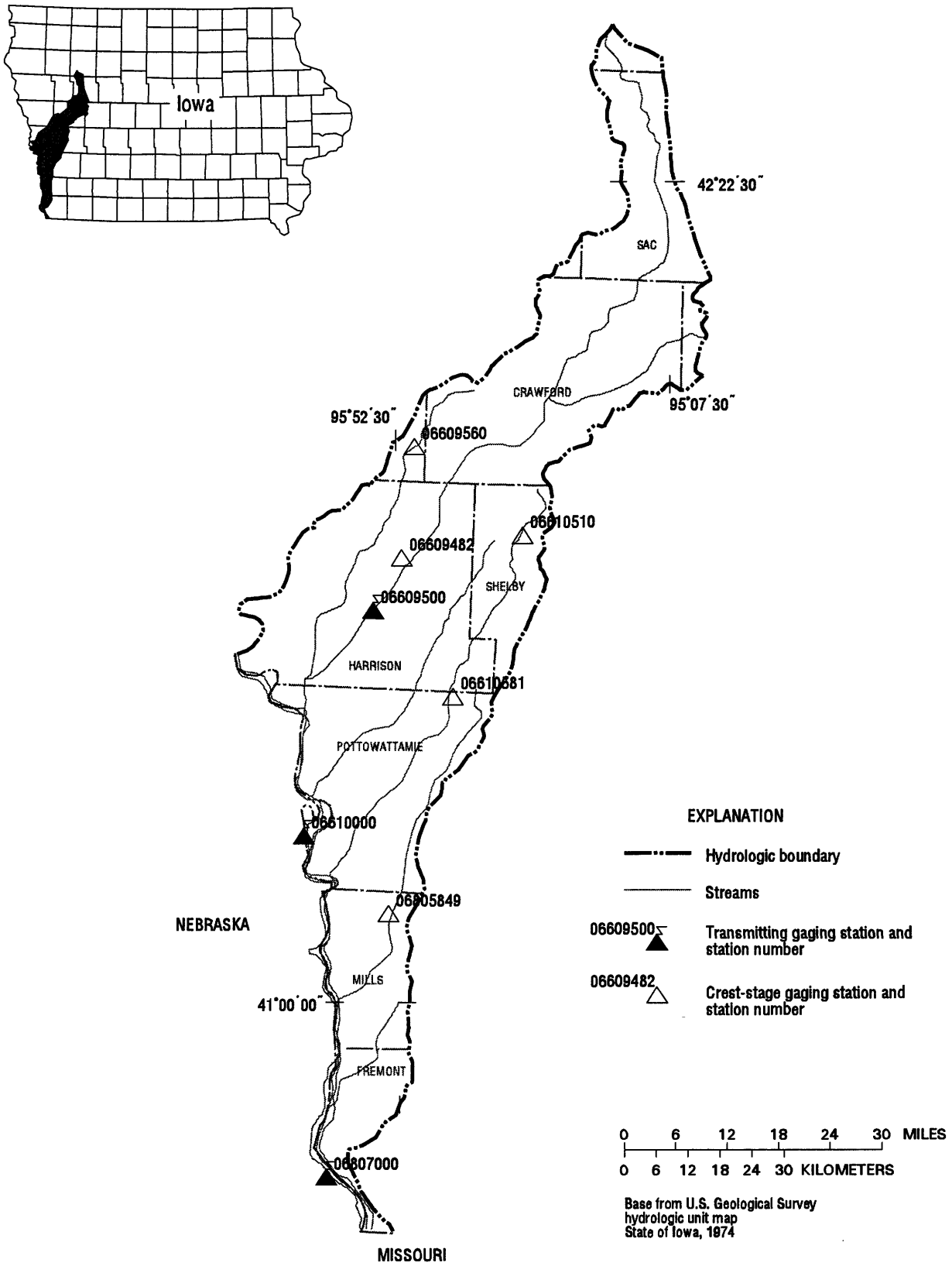
MEAN	81.2	75.1	67.0	66.3	157	268	169	199	314	204	146	113
MAX	330	274	281	431	653	897	623	555	1233	1607	632	482
(WY)	1994	1994	1985	1952	1971	1993	1983	1984	1991	1993	1993	1978
MIN	9.61	12.8	6.05	3.29	9.43	27.8	12.5	13.6	22.1	22.8	14.4	6.70
(WY)	1957	1959	1959	1959	1956	1957	1957	1957	1956	1970	1971	1956

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1941 - 1999	
ANNUAL TOTAL	88870		102957			
ANNUAL MEAN	243		282		155	
HIGHEST ANNUAL MEAN					487	1993
LOWEST ANNUAL MEAN					27.3	1956
HIGHEST DAILY MEAN	2690	Jul 6	3530	Jul 2	20700	Jul 17 1996
LOWEST DAILY MEAN	44	Mar 12	70	Dec 20	2.0	Jan 2 1945a
ANNUAL SEVEN-DAY MINIMUM	51	Mar 9	86	Dec 29	2.0	Jan 2 1945
INSTANTANEOUS PEAK FLOW			12200	Jul 2	34700	Jul 17 1996
INSTANTANEOUS PEAK STAGE			19.93	Jul 2	28.87	Jul 17 1996
ANNUAL RUNOFF (AC-FT)	176300		204200		112200	
ANNUAL RUNOFF (CFSM)	.60		.69		.38	
ANNUAL RUNOFF (INCHES)	8.12		9.41		5.17	
10 PERCENT EXCEEDS	451		476		289	
50 PERCENT EXCEEDS	170		194		72	
90 PERCENT EXCEEDS	78		134		16	

a Also Jan 3-10, 1945
e Estimated

06608500 SOLDIER RIVER AT PISGAH, IA--Continued




Iowa
42°22'30"
SAC
CRAWFORD
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95°07'30"
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06610510
06609482
SHELBY
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HARRISON
06610681
POTTOWATTAMIE
06610000
06605849
NEBRASKA
MILLS
41°00'00"
FREMONT
06607000
MISSOURI
EXPLANATION
Hydrologic boundary
Streams
06609500 Transmitting gaging station and station number
06609482 Crest-stage gaging station and station number
0 6 12 18 24 30 MILES
0 6 12 18 24 30 KILOMETERS
Base from U.S. Geological Survey hydrologic unit map State of Iowa, 1974

Gaging Stations

Crest Stage Gaging Stations

06609500 BOYER RIVER AT LOGAN, IA

LOCATION.--Lat 41°38'33", long 95°46'57", in $SE^1/_4$ $NW^1/_4$ sec.19, T.79 N., R.42 W., Harrison County, Hydrologic Unit 10230007, on left bank 9 ft downstream from Chicago Central and Pacific Railroad bridge at Logan, 0.4 mi downstream from Elk Grove Creek, 10.5 mi upstream from Willow Creek, and 15.8 mi upstream from mouth.

DRAINAGE AREA.--871 mi^2.

PERIOD OF RECORD.--May 1918 to November 1924, February 1925 to July 1925, November 1937 to current year. Monthly discharge only for some periods, published in WSP 1310.

REVISED RECORDS.--WSP 956: 1938-39. WSP 1240: 1918-19, 1920 (M), 1921, 1922 (M), 1924-25, 1938 (M), 1945. WSP 1440: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,009.38 ft above sea level (Chicago and Northwestern Railway Company bench mark). See WSP 1918 for history of changes prior to Oct. 18, 1960.

REMARKS.--Records good except those for estimated daily discharges, which are poor. Periodic observations of water temperature and specific conductance are published in this report as miscellaneous water quality data. U.S. Army Corps of Engineers rain gage and satellite data collection platform at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

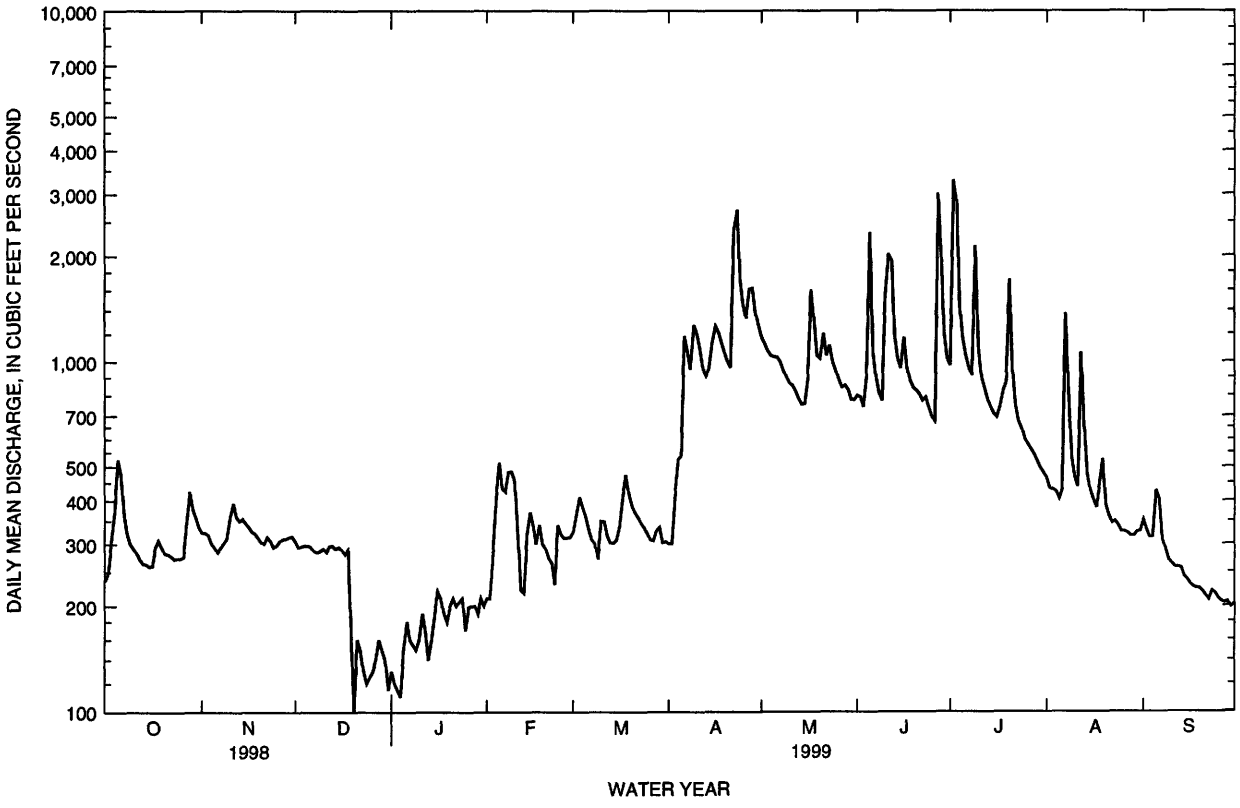
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	236	324	306	e130	e210	325	301	1170	799	972	464	351
2	249	324	294	e120	e210	365	301	1120	791	3280	434	330
3	306	319	295	e115	e290	409	419	1070	742	2830	430	314
4	371	302	297	e110	412	382	524	1040	920	1430	424	315
5	524	294	297	e150	513	360	539	1030	2330	1160	405	428
6	474	285	294	e180	433	331	1180	1030	1070	1040	431	402
7	364	293	287	e160	424	309	1070	998	900	957	1370	e310
8	322	302	284	e155	482	301	950	944	811	911	816	e290
9	301	311	287	e150	484	272	1270	902	772	2130	533	e270
10	292	359	291	e160	458	349	1200	868	1550	1100	467	264
11	283	393	285	e190	323	348	1090	855	2020	898	439	258
12	271	359	296	e170	222	317	961	823	1930	835	1060	258
13	264	350	297	e140	218	303	910	785	1180	777	662	256
14	263	354	291	e160	318	302	951	756	1020	741	480	242
15	259	344	294	e190	370	308	1130	759	956	710	426	237
16	260	337	289	e220	e340	337	1260	896	1170	693	402	230
17	293	326	281	e210	e300	410	1210	e1600	961	741	382	226
18	307	322	289	e190	e340	473	1130	1310	881	826	445	224
19	294	313	e170	e180	e301	415	1060	1040	840	876	525	224
20	282	304	e100	e200	291	385	1000	1020	826	1710	388	219
21	281	301	e160	e210	273	369	961	1200	806	941	362	213
22	277	314	e150	e200	e265	358	2370	1040	774	748	345	208
23	272	307	e130	e205	e230	345	2700	1110	790	675	349	220
24	273	294	e120	e210	e340	335	1710	1000	741	645	339	217
25	273	297	e125	e170	e320	322	1450	943	698	598	326	210
26	276	306	e130	e198	312	309	1330	886	677	579	326	206
27	347	310	e140	e200	313	307	1610	844	3000	560	323	204
28	425	311	e160	e200	314	328	1620	854	2020	541	317	205
29	378	314	e150	e190	---	335	1380	830	1200	518	317	198
30	357	316	e140	e210	---	303	1260	778	1020	495	325	202
31	336	---	e115	e200	---	305	---	777	---	480	327	---
TOTAL	9710	9585	7044	5473	9306	10617	34847	30278	34195	31397	14639	7731
MEAN	313	320	227	177	332	342	1162	977	1140	1013	472	258
MAX	524	393	306	220	513	473	2700	1600	3000	3280	1370	428
MIN	236	285	100	110	210	272	301	756	677	480	317	198
AC-FT	19260	19010	13970	10860	18460	21060	69120	60060	67830	62280	29040	15330
CFSM	.36	.37	.26	.20	.38	.39	1.33	1.12	1.31	1.16	.54	.30
IN.	.41	.41	.30	.23	.40	.45	1.49	1.29	1.46	1.34	.63	.33

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1919 - 1999, BY WATER YEAR (WY)

MEAN	187	170	139	129	320	601	454	510	770	473	312	260
MAX	796	558	565	692	1209	2619	1988	1698	2541	3022	1636	1288
(WY)	1974	1974	1973	1973	1971	1979	1983	1984	1990	1993	1951	1978
MIN	11.1	8.33	6.68	3.06	3.55	40.4	23.3	39.9	33.3	51.0	34.5	11.6
(WY)	1957	1940	1938	1940	1940	1981	1957	1968	1956	1977	1976	1939

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1919 - 1999	
ANNUAL TOTAL	237853		204822			
ANNUAL MEAN	652		561		364	
HIGHEST ANNUAL MEAN					1018	1993
LOWEST ANNUAL MEAN					58.7	1956
HIGHEST DAILY MEAN	7460	Jun 11	3280	Jul 2	24600	Jul 9 1993
LOWEST DAILY MEAN	80	Jan 13	100	Dec 20	1.5	Jul 16 1938
ANNUAL SEVEN-DAY MINIMUM	93	Jan 12	126	Dec 29	2.0	Jan 13 1940
INSTANTANEOUS PEAK FLOW			11800	Jul 2	30800	Jun 17 1990
INSTANTANEOUS PEAK STAGE			15.72	Jul 2	25.22	Mar 1 1965a
INSTANTANEOUS LOW FLOW			61	Feb 13		
ANNUAL RUNOFF (AC-FT)	471800		406300		263800	
ANNUAL RUNOFF (CFSM)	.75		.64		.42	
ANNUAL RUNOFF (INCHES)	10.16		8.75		5.68	
10 PERCENT EXCEEDS	1280		1120		763	
50 PERCENT EXCEEDS	364		340		167	
90 PERCENT EXCEEDS	146		200		32	

a Ice affected
e Estimated


DAILY MEAN DISCHARGE, IN CUBIC FEET PER SECOND
10,000
7,000
5,000
4,000
3,000
2,000
1,000
700
500
400
300
200
100
O
N
D
J
F
M
A
M
J
J
A
S
1998
1999
WATER YEAR

06610000 MISSOURI RIVER AT OMAHA, NE
(National stream-quality accounting network station)

LOCATION.--Lat 41°15'32", long 95°55'20", in $SE^1/_4$ $NW^1/_4$ sec.23, T.15 N., R.13 E., Douglas County, Hydrologic Unit 10230006, on right bank on left side of concrete floodwall, at foot of Douglas Street, 275 ft downstream from Interstate 480 Highway bridge in Omaha, and at mile 615.9.

DRAINAGE AREA.--322,800 mi^2, approximately. The 3,959 mi^2 in Great Divide basin are not included.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--September 1928 to current year. April 1872 to December 1899 (gage heights only) in reports of the Missouri River Commission and since January 1875, (gage heights only) in reports of the U.S. Weather Bureau.

REVISED RECORDS.--WSP 761: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 948.24 ft above sea level. See WSP 1730 for history of changes prior to Sept. 30, 1936. Oct. 1, 1936 to Sept. 30, 1982 at datum 10.00 ft higher.

REMARKS.--No estimated daily discharge, records good. Flow regulated by upstream main-stem reservoirs. Fort Randall Dam was completed in July 1952, with storage beginning in December 1952. Gavins Point Dam was completed in July 1955, with storage beginning in December 1955. Periodic observations of water temperature and specific conductance are published in this report as miscellaneous water quality data. U.S. Army Corps of Engineers rain gage and satellite data collection platform at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 396,000 ft^3/s Apr. 18, 1952, gage height, 40.20 ft, present datum; minimum, about 2,200 ft^3/s Jan. 6, 1937; minimum gage height, 6.85 ft, present datum, Feb. 5, 1989, result of freezeup.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

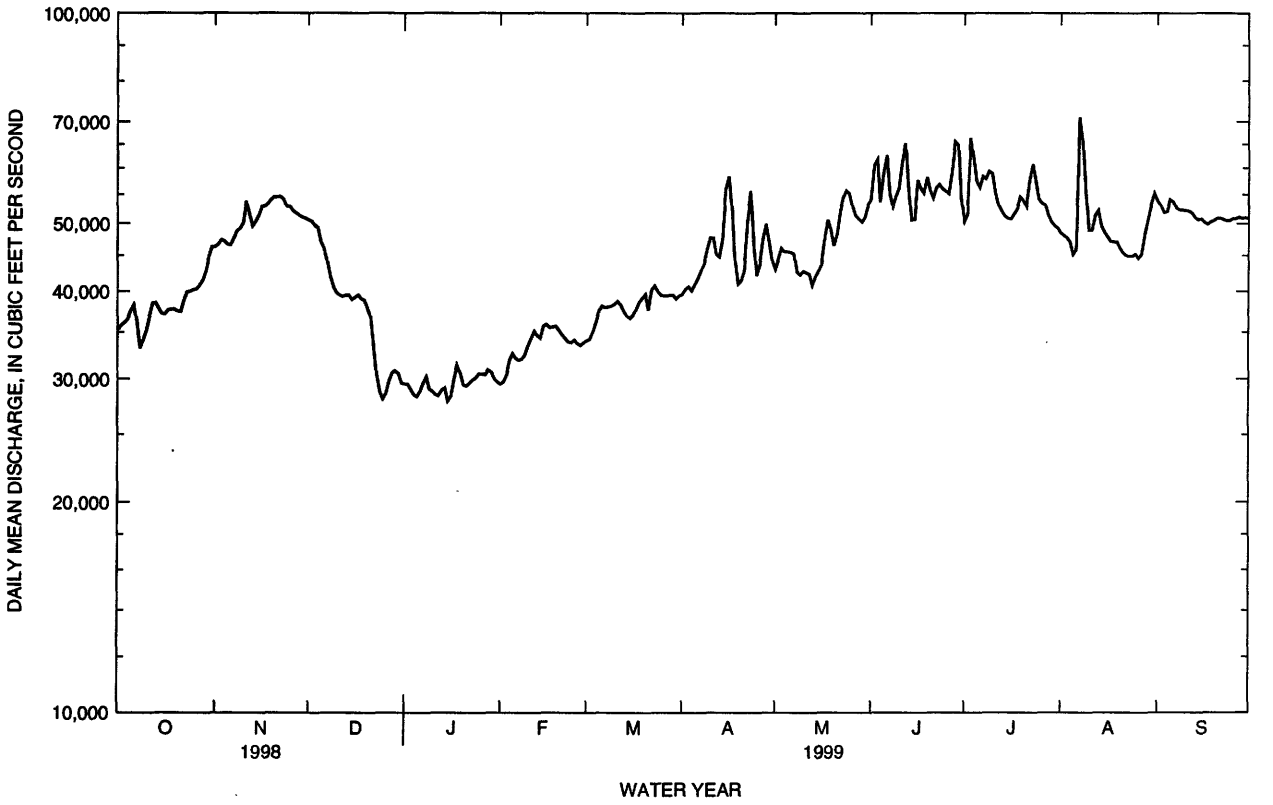
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	35300	46300	50600	29500	29500	34000	39600	43000	54000	50400	48500	53900
2	35800	46700	50400	29500	29700	34200	40300	44500	60700	51600	48100	53100
3	36100	47400	49700	29000	30400	35000	40600	46100	61800	66300	47700	51900
4	36500	47200	49300	28500	31900	36200	40100	45600	53700	61900	47100	52000
5	37500	46700	47100	28300	32600	37500	40900	45600	59200	57500	45200	54100
6	38200	46600	46100	28800	32100	38100	41700	45500	62600	56300	45900	53700
7	36100	47600	44200	29600	31900	37900	42800	45300	55300	58400	70900	52600
8	33200	48800	42000	30200	32000	38000	43700	42600	52900	58000	65500	52300
9	34100	49200	40600	29000	32400	38100	45900	42200	54700	59400	55700	52300
10	35200	50100	39800	28800	33400	38300	47700	42700	56200	59000	48900	52200
11	36800	53800	39500	28500	34300	38700	47700	42500	61400	55400	48900	52100
12	38400	51500	39300	28400	35100	38300	45200	42300	65200	53200	51400	51800
13	38500	49600	39500	28900	34600	37500	44800	40800	56300	52100	52200	51000
14	37800	50400	39500	29100	34300	36900	47500	42000	50600	51300	49700	50600
15	37200	51400	38900	27900	35700	36600	56100	42800	50700	50900	48600	50700
16	37100	52800	39200	28300	35900	37000	58400	43700	57700	50800	47900	50200
17	37600	53000	39500	30000	35500	37600	52400	47500	56200	51600	47200	49900
18	37700	53400	39000	31400	35600	38600	44200	50600	55300	52500	47100	50300
19	37700	54100	38800	30600	35700	39100	41000	49100	58200	54600	47100	50500
20	37500	54600	37900	29400	35200	39600	41400	46500	55800	54000	46200	50900
21	37400	54600	36800	29300	34700	37600	42800	48300	54400	52900	45500	50900
22	38800	54700	33600	29600	34300	40200	50100	52100	56300	57600	45000	50700
23	39900	54200	30400	29900	33900	40700	55700	54500	56900	60700	44900	50500
24	40000	52900	28800	30100	33800	40000	47200	55700	56100	57600	44900	50500
25	40200	52900	28100	30500	34100	39500	42100	55200	55700	54200	45200	50800
26	40300	52100	28600	30500	33700	39400	43600	52900	55200	53500	44600	50800
27	40800	51800	29800	30400	33500	39400	47400	51300	59400	53200	45200	51100
28	41500	51400	30600	30900	33800	39500	49900	50800	65600	51400	48300	50900
29	42700	51100	30800	30700	---	39500	47300	50300	64900	50300	50900	51000
30	44800	50900	30500	30000	---	39000	44300	51100	54300	49700	53400	50900
31	46300	---	29600	29700	---	39400	---	53200	---	49300	55200	---
TOTAL	1187000	1527800	1188500	915300	939600	1181400	1372400	1466300	1717300	1695600	1532900	1544200
MEAN	38290	50930	38340	29530	33560	38110	45750	47300	57240	54700	49450	51470
MAX	46300	54700	50600	31400	35900	40700	58400	55700	65600	66300	70900	54100
MIN	33200	46300	28100	27900	29500	34000	39600	40800	50600	49300	44600	49900
AC-FT	2354000	3030000	2357000	1815000	1864000	2343000	2722000	2908000	3406000	3363000	3041000	3063000
CFSM	.12	.16	.12	.09	.10	.12	.14	.15	.18	.17	.15	.16
IN.	.14	.18	.14	.11	.11	.14	.16	.17	.20	.20	.18	.18

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1953 - 1999, BY WATER YEAR (WY)

MEAN	38490	33970	20970	17590	19950	28280	38970	38680	42220	40900	39430	39370
MAX	74070	75040	44260	33250	40410	54660	93840	87620	76120	78560	68890	69770
(WY)	1998	1998	1998	1987	1997	1997	1997	1997	1997	1993	1997	1997
MIN	16920	8324	8296	8425	8162	10170	16480	26450	26890	27150	27280	28290
(WY)	1962	1962	1962	1964	1963	1957	1957	1961	1961	1958	1958	1958

06610000 MISSOURI RIVER AT OMAHA, NE--Continued
(National stream-quality accounting network station)

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1953 - 1999	
ANNUAL TOTAL	13999500		16268300			
ANNUAL MEAN	38350		44570		33280	
HIGHEST ANNUAL MEAN					62150	1997
LOWEST ANNUAL MEAN					20490	1957
HIGHEST DAILY MEAN	59700	Jun 25	70900	Aug 7	116000	Apr 4 1960
LOWEST DAILY MEAN	24900	Jan 12	27900	Jan 15	2440	Dec 14 1961
ANNUAL SEVEN-DAY MINIMUM	25600	Jan 11	28600	Jan 10	4300	Nov 28 1955
INSTANTANEOUS PEAK FLOW			77200	Aug 7	120000	Apr 1 1960
INSTANTANEOUS PEAK STAGE			24.22	Jun 29	30.26	Jul 10 1993
INSTANTANEOUS LOW FLOW			27700	Jan 15		
ANNUAL RUNOFF (AC-FT)	27770000		32270000		24110000	
ANNUAL RUNOFF (CFSM)	.12		.14		.10	
ANNUAL RUNOFF (INCHES)	1.61		1.87		1.40	
10 PERCENT EXCEEDS	49200		55700		53100	
50 PERCENT EXCEEDS	37700		45500		32600	
90 PERCENT EXCEEDS	30400		30500		13500	



06610000 MISSOURI RIVER AT OMAHA, NE--Continued
(National stream-quality accounting network station)

WATER-QUALITY RECORDS

LOCATION.--Water quality samples were collected from Interstate 80 highway bridge 2.0 mi downstream from gaging station.

PERIOD OF RECORD.--July 1969 to 1976, 1978 to current year. Daily sediment loads for April 1939 to September 1971 are in reports of U.S. Army Corps of Engineers.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1972 to September 1976, January 1978 to September 1981, October 1991 to current year.
WATER TEMPERATURES: October 1971 to September 1976, January 1978 to September 1981, October 1991 to current year.
SUSPENDED-SEDIMENT DISCHARGE: October 1971 to September 1976, October 1991 to current year.

REMARKS.--Records of specific conductance are obtained from suspended-sediment samples at time of analysis.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 950 microsiemens Dec. 4, 5, 1980; minimum daily, 335 microsiemens Mar. 22, 1978.
WATER TEMPERATURES: Maximum daily, 32.0°C July 24, 1972; minimum daily, 0.0°C on many days during winter period.
SEDIMENT CONCENTRATIONS: Maximum daily mean, 8,180 mg/L May 19, 1974; minimum daily mean, 71 mg/L Jan. 3, 1993.
SEDIMENT LOADS: Maximum daily, 1,470,000 tons Aug. 6, 1996; minimum daily, 2,560 tons Jan. 3, 1993.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum daily, 949 microsiemens July 15; minimum daily, 746 microsiemens Aug. 7.
WATER TEMPERATURES: Maximum daily, 29.0°C July 26, 29; minimum daily, 0.0°C Dec. 28.
SEDIMENT CONCENTRATIONS: Maximum daily mean, 1,640 mg/L Aug. 7; minimum daily mean, 198 mg/L Aug. 3.
SEDIMENT LOADS: Maximum daily, 316,000 tons Aug. 7; minimum daily, 20,300 tons Jan. 5.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	TEMPER-ATURE AIR (DEG C) (00020)	TUR-BID-ITY (NTU) (00076)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)
OCT												
20...	1100	37400	772	8.4	14.5	15.0	23	9.0	90	746	250	60
DEC												
11...	1330	38200	844	8.4	5.0	13.5	16	12.0	97	744	290	69
FEB												
08...	1030	32000	798	8.2	2.5	6.5	20	12.7	98	728	260	66
MAR												
01...	1100	34100	791	8.3	3.5	11.5	20	12.5	99	729	270	67
15...	1130	36600	789	8.3	3.5	5.5	20	12.7	99	735	270	65
29...	1100	39700	801	8.3	8.0	10.5	22	11.1	97	741	280	68
APR												
20...	1000	41300	957	8.2	10.0	13.0	75	10.1	93	732	400	95
MAY												
11...	1030	42600	903	8.3	15.0	13.5	75	8.8	91	734	350	83
17...	1100	46900	900	8.3	17.5	16.5	40	8.3	91	733	350	84
JUN												
02...	1030	60400	894	8.3	20.0	26.0	38	7.6	87	737	310	74
15...	1000	49500	900	8.2	22.5	15.0	120	6.8	81	741	320	79
JUL												
08...	1000	58300	912	8.2	25.0	24.5	110	7.1	90	733	330	82
AUG												
07...	1030	77000	737	8.2	24.0	30.5	200	5.9	73	730	220	56
23...	1000	45000	883	8.4	25.0	21.0	21	7.3	92	733	280	68
SEP												
07...	1100	45400	832	8.4	23.5	22.5	17	7.8	96	730	260	65

06610000 MISSOURI RIVER AT OMAHA, NE--Continued
(National stream-quality accounting network station)

WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	SODIUM PERCENT (00932)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)	CAR-BONATE WATER DIS IT FIELD MG/L AS CO3 (00452)	BICAR-BONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)
OCT												
20...	24	64	36	2	6.1	156	0	191	200	12	.46	9.9
DEC												
11...	28	65	33	2	5.6	179	0	217	230	15	.44	11
FEB												
08...	24	59	32	2	5.0	177	0	216	200	13	.41	11
MAR												
01...	26	57	31	2	5.2	177	0	216	200	15	.44	11
15...	26	60	32	2	5.2	172	0	210	200	14	.44	11
29...	28	61	31	2	5.4	174	0	212	210	15	.41	10
APR												
20...	40	44	19	1	6.6	201	0	245	270	16	.40	13
MAY												
11...	35	54	25	1	6.0	192	0	235	240	16	.42	10
17...	35	53	24	1	6.6	186	0	227	250	15	.42	11
JUN												
02...	30	66	31	2	6.9	168	0	205	250	17	.44	9.7
15...	31	57	27	1	6.7	194	0	237	240	17	.43	11
JUL												
08...	30	63	29	2	6.8	173	0	211	270	14	.42	11
AUG												
07...	20	54	34	2	5.9	138	0	168	200	13	.39	8.3
23...	26	77	37	2	6.5	166	0	202	260	14	.44	9.3
SEP												
07...	24	71	37	2	5.6	164	0	200	240	13	.41	8.8

DATE	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, DIS-SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)
OCT												
20...	499	475	.68	50400	.50	.527	<.010	.036	.53	.024	<.050	.118
DEC												
11...	572	536	.78	59000	.48	1.09	<.010	.065	.54	.042	E.034	.083
FEB												
08...	522	494	.71	45100	.45	1.24	.013	.106	.55	.036	.040	.221
MAR												
01...	527	494	.72	48500	.40	1.39	.023	.042	.44	.030	.032	.202
15...	523	489	.71	51700	.42	1.12	<.010	.026	.45	.024	.028	.132
29...	536	509	.73	57500	.55	1.19	<.010	.027	.58	.032	.036	.255
APR												
20...	669	619	.91	74600	1.4	3.58	.019	.051	1.5	.069	.078	.503
MAY												
11...	615	574	.84	70700	.97	2.48	.010	.084	1.1	.048	.052	.316
17...	623	580	.85	78900	--	2.32	.010	<.020	.99	.044	.048	.269
JUN												
02...	628	561	.85	102000	.76	1.60	.014	.054	.81	.039	.044	.265
15...	618	577	.84	82600	4.8	3.35	.021	.024	4.8	.069	.075	.467
JUL												
08...	624	588	.85	98200	--	2.09	.016	<.020	--	.056	.069	.202
AUG												
07...	475	444	.65	98800	2.9	.834	.015	.111	3.1	.072	.087	1.64
23...	585	560	.80	71100	--	.494	<.010	<.020	.71	.016	.030	.188
SEP												
07...	537	525	.73	65800	--	.285	<.010	<.020	.51	.021	.041	.267

06610000 MISSOURI RIVER AT OMAHA, NE--Continued
(National stream-quality accounting network station)

WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	BARIUM, DISSOLVED (UG/L AS BA) (01005)	BERYLLIUM, DISSOLVED (UG/L AS BE) (01010)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	COBALT, DISSOLVED (UG/L AS CO) (01035)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, DISSOLVED (UG/L AS FE) (01046)
OCT												
20...	386	39000	38	2	--	--	--	--	--	--	--	<10
DEC												
11...	320	33000	22	1	1.1	57	<1.0	<1.0	2.0	<1.0	1.9	<10
FEB												
08...	298	25700	32	2	--	--	--	--	--	--	--	<10
MAR												
01...	319	29400	23	2	--	--	--	--	--	--	--	<10
15...	299	29500	19	2	<1.0	56	<1.0	<1.0	7.7	<1.0	2.0	<10
29...	364	39000	26	2	--	--	--	--	--	--	--	<10
APR												
20...	573	63900	67	3	--	--	--	--	--	--	--	<10
MAY												
11...	342	39300	55	2	1.5	81	<1.0	<1.0	<1.0	<1.0	2.3	<10
17...	288	36500	54	3	--	--	--	--	--	--	--	<10
JUN												
02...	306	49900	49	2	--	--	--	--	--	--	--	<10
15...	484	64700	66	2	--	--	--	--	--	--	--	<10
JUL												
08...	427	67200	54	4	--	--	--	--	--	--	--	<10
AUG												
07...	1790	372000	92	4	2.7	99	<1.0	<1.0	<1.0	<1.0	1.9	<10
23...	310	37700	37	2	--	--	--	--	--	--	--	E5.8
SEP												
07...	309	37900	32	4	--	--	--	--	--	--	--	<10

DATE	LEAD, DISSOLVED (UG/L AS PB) (01049)	LITHIUM DISSOLVED (UG/L AS LI) (01130)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MOLYBDENUM, DISSOLVED (UG/L AS MO) (01060)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	SELENIUM, DISSOLVED (UG/L AS SE) (01145)	SILVER, DISSOLVED (UG/L AS AG) (01075)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	VANADIUM, DISSOLVED (UG/L AS V) (01085)	ZINC, DISSOLVED (UG/L AS ZN) (01090)	URANIUM NATURAL DISSOLVED (UG/L AS U) (22703)	DEETHYL ATRAZINE, WATER, DISS, REC (UG/L) (04040)
OCT												
20...	--	50	--	--	--	1	--	532	<10	--	--	E.009
DEC												
11...	<1.0	47	2.3	2.8	2.2	2	<1.0	512	<10	<1.0	5.1	E.010
FEB												
08...	--	47	--	--	--	2	--	527	<10	--	--	E.005
MAR												
01...	--	43	--	--	--	3	--	525	<10	--	--	E.004
15...	<1.0	46	3.8	2.8	4.3	1	<1.0	528	<10	1.3	4.9	E.005
29...	--	44	--	--	--	2	--	543	<10	--	--	E.006
APR												
20...	--	43	--	--	--	4	--	565	<10	--	--	E.022
MAY												
11...	<1.0	48	<1.0	3.4	3.3	2	<1.0	568	<10	1.2	5.6	E.018
17...	--	49	--	--	--	3	--	567	<10	--	--	E.029
JUN												
02...	--	54	--	--	--	2	--	566	<10	--	--	E.020
15...	--	49	--	--	--	4	--	538	<10	--	--	E.040
JUL												
08...	--	54	--	--	--	4	--	587	E7	--	--	--
AUG												
07...	<1.0	44	19	3.5	2.7	4	<1.0	400	<10	1.4	4.3	E.038
23...	--	54	--	--	--	2	--	580	E8	--	--	E.085
SEP												
07...	--	52	--	--	--	3	--	546	<10	--	--	E.020

06610000 MISSOURI RIVER AT OMAHA, NE--Continued
(National stream-quality accounting network station)

WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	PH WATER WHOLE LAB (STAND-ARD UNITS) (00403)	NITRO-GEN, TOTAL (MG/L AS N) (00600)	NITRO-GEN DIS-SOLVED (MG/L AS N) (00602)	NITRO-GEN, ORGANIC DIS-SOLVED (MG/L AS N) (00607)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N) (00618)	NITRO-GEN,AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOS-PHATE, ORTHO, DIS-SOLVED (MG/L AS PO4) (00660)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (00689)	HARD-NESS NONCARB DISSOLV FLD. AS CACO3 (MG/L) (00904)	HARD-NESS NONCARB DISSOLV LAB AS CACO3 (MG/L) (00905)	ANTI-MONY, DIS-SOLVED (UG/L AS SB) (01095)
OCT												
20...	8.3	1.1	.75	.19	--	.23	.07	3.4	1.8	90	76	--
DEC												
11...	8.2	1.6	1.4	.23	--	.30	.13	3.6	1.3	110	100	<1.0
FEB												
08...	8.1	1.8	1.6	.21	1.23	.31	.11	3.5	.20	88	81	--
MAR												
01...	8.1	1.8	1.7	.24	1.37	.28	.09	3.3	.70	96	84	--
15...	8.2	1.6	1.4	.21	--	.23	.07	3.5	.90	96	84	<1.0
29...	8.2	1.8	1.5	.30	--	.33	.10	3.6	.60	110	100	--
APR												
20...	8.1	5.0	4.1	.50	3.57	.55	.21	5.2	4.1	200	190	--
MAY												
11...	8.2	3.5	2.8	.21	2.47	.29	.15	4.3	3.1	160	150	<1.0
17...	8.3	3.3	2.5	--	2.31	.19	.13	4.8	2.2	170	150	--
JUN												
02...	8.3	2.4	2.0	.34	1.59	.39	.12	4.3	--	140	120	--
15...	8.2	8.2	3.8	.37	3.33	.40	.21	5.3	4.0	130	130	--
JUL												
08...	8.3	--	2.5	--	2.07	.38	.17	5.0	2.3	160	150	--
AUG												
07...	8.1	3.9	1.0	.10	.819	.21	.22	3.9	--	86	79	<1.0
23...	8.4	1.2	.77	--	--	.28	.05	3.8	--	110	100	--
SEP												
07...	8.4	.80	.46	--	--	.18	.06	3.6	1.5	98	87	--

DATE	PROP-CHLOR, WATER, DISS, REC (UG/L) (04024)	BUTYL-ATE, WATER, DISS, REC (UG/L) (04028)	SI-MAZINE, WATER, DISS, REC (UG/L) (04035)	PRO-METON, WATER, DISS, REC (UG/L) (04037)	CYANA-ZINE, WATER, DISS, REC (UG/L) (04041)	FONOFOS WATER DISS REC (UG/L) (04095)	ALKA-LINITY WAT.DIS FET LAB CACO3 (MG/L) (29801)	ALPHA BHC DIS-SOLVED (UG/L) (34253)	P,P' DDE DISSOLV (UG/L) (34653)	CHLOR-PYRIFOS DIS-SOLVED (UG/L) (38933)	LINDANE DIS-SOLVED (UG/L) (39341)
OCT											
20...	<.007	<.002	<.005	<.018	.008	<.003	170	<.002	<.006	<.004	<.004
DEC											
11...	<.007	<.002	<.005	E.002	.007	<.003	190	<.002	<.006	<.004	<.004
FEB											
08...	<.007	<.002	<.005	E.002	.005	<.003	180	<.002	<.006	<.004	<.004
MAR											
01...	<.007	<.002	<.005	E.002	E.003	<.003	190	<.002	<.006	<.004	<.004
15...	<.007	<.002	<.005	E.002	E.004	<.003	180	<.002	<.006	<.004	<.004
29...	<.007	<.002	<.005	<.018	<.004	<.003	180	<.002	<.006	<.004	<.004
APR											
20...	<.007	<.002	E.004	E.003	.013	<.003	210	<.002	<.006	<.004	<.004
MAY											
11...	<.007	<.002	E.004	E.005	.011	<.003	200	<.002	<.006	<.004	<.004
17...	<.007	<.002	.006	E.005	.032	<.003	200	<.002	<.006	<.004	<.004
JUN											
02...	<.007	<.002	.011	E.004	.087	<.003	190	<.002	<.006	<.004	<.004
15...	<.007	<.002	.001	E.007	.148	<.003	200	<.002	<.006	<.004	<.004
JUL											
08...	--	--	--	--	--	--	180	--	--	--	--
AUG											
07...	<.007	<.002	<.005	E.012	.022	<.003	150	.045	<.006	<.004	.007
23...	.106	.105	.106	.099	.110	.101	170	.080	.064	.091	.102
SEP											
07...	<.007	<.002	<.005	E.008	.016	<.003	170	<.002	<.006	<.004	<.004

06610000 MISSOURI RIVER AT OMAHA, NE--Continued
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WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	DI-ELDRIN DIS-SOLVED (UG/L) (39381)	METO-LACHLOR WATER DISSOLV (UG/L) (39415)	MALA-THION, DIS-SOLVED (UG/L) (39532)	PARA-THION, DIS-SOLVED (UG/L) (39542)	DI-AZINON, DIS-SOLVED (UG/L) (39572)	ATRA-ZINE, WATER, DISS, REC (UG/L) (39632)	ALA-CHLOR, WATER, DISS, REC, (UG/L) (46342)	ACETO-CHLOR, WATER FLTRD REC (UG/L) (49260)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS NH4) (71846)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS NO3) (71851)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS NO2) (71856)
OCT											
20...	<.001	.013	<.005	<.004	<.002	.032	<.002	<.0020	.05	--	--
DEC											
11...	<.001	.010	<.005	<.004	<.002	.041	<.002	.0172	.08	--	--
FEB											
08...	<.001	.022	<.005	<.004	<.002	.020	<.002	<.0020	.14	5.4	.04
MAR											
01...	<.001	.014	<.005	<.004	<.002	.018	<.002	.0042	.05	6.0	.08
15...	<.001	.011	<.005	<.004	<.002	.020	<.002	<.0020	.03	--	--
29...	<.001	.017	<.005	<.004	<.002	.072	<.002	.0065	.03	--	--
APR											
20...	<.001	.158	<.005	<.004	<.002	.126	<.002	.0742	.07	16	.06
MAY											
11...	<.001	.083	<.005	<.004	<.002	.080	.014	.183	.11	11	.03
17...	<.001	.114	<.005	<.004	<.002	.211	.006	.150	--	10	.03
JUN											
02...	<.001	.153	<.005	<.004	<.002	.367	.008	.182	.07	7.0	.05
15...	<.001	.249	<.005	<.004	<.002	1.08	.011	.107	.03	15	.07
JUL											
08...	--	--	--	--	--	--	--	--	--	9.2	.05
AUG											
07...	.007	.055	<.005	<.004	.015	.173	.021	.0277	.14	3.6	.05
23...	.101	.134	.080	.068	.102	.233	.110	.110	--	--	--
SEP											
07...	<.001	.028	<.005	<.004	<.002	.086	<.002	.0076	--	--	--

DATE	METRI-BUZIN SENCOR WATER DISSOLV (UG/L) (82630)	2,6-DI-ETHYL ANILINE WAT FLT 0.7 U GF, REC (UG/L) (82660)	TRI-FLUR-ALIN WAT FLT 0.7 U GF, REC (UG/L) (82661)	ETHAL-FLUR-ALIN WAT FLT 0.7 U GF, REC (UG/L) (82663)	PHORATE WATER FLTRD 0.7 U GF, REC (UG/L) (82664)	TER-BACIL WATER FLTRD 0.7 U GF, REC (UG/L) (82665)	LIN-URON WATER FLTRD 0.7 U GF, REC (UG/L) (82666)	METHYL PARA-THION WAT FLT 0.7 U GF, REC (UG/L) (82667)	EPTC WATER FLTRD 0.7 U GF, REC (UG/L) (82668)	PEB-ULATE WATER FILTRD 0.7 U GF, REC (UG/L) (82669)	TEBU-THIURON WATER FLTRD 0.7 U GF, REC (UG/L) (82670)
OCT											
20...	<.004	<.003	<.002	<.004	<.002	<.007	<.002	<.006	<.002	<.004	<.010
DEC											
11...	<.004	<.003	<.002	<.004	<.002	<.007	<.002	<.006	<.002	<.004	<.010
FEB											
08...	<.004	<.003	<.002	<.004	<.002	<.007	<.002	<.006	<.002	<.004	<.010
MAR											
01...	<.004	<.003	<.002	<.004	<.002	<.007	<.002	<.006	<.002	<.004	<.010
15...	<.004	<.003	<.002	<.004	<.002	<.007	<.002	<.006	<.002	<.004	<.010
29...	<.004	<.003	<.002	<.004	<.002	<.007	<.002	<.006	<.002	<.004	<.010
APR											
20...	<.004	<.003	E.002	<.004	<.002	<.007	<.002	<.006	.041	<.004	<.010
MAY											
11...	<.004	<.003	<.002	<.004	<.002	<.007	<.002	<.006	.065	<.004	<.010
17...	<.004	<.003	.005	<.004	<.002	<.007	<.002	<.006	.006	<.004	<.010
JUN											
02...	<.004	<.003	E.003	<.004	<.002	<.007	<.002	<.006	.011	<.004	<.010
15...	<.010	<.003	<.002	<.004	<.002	<.007	<.002	<.006	<.002	<.004	<.010
JUL											
08...	--	--	--	--	--	--	--	--	--	--	--
AUG											
07...	<.004	<.003	E.001	<.004	<.002	<.007	<.002	<.006	.023	<.004	<.010
23...	.096	.102	.066	.079	.090	E.102	.117	.082	.101	.095	.121
SEP											
07...	<.004	<.003	<.002	<.004	<.002	<.007	<.002	<.006	<.002	<.004	<.010

06610000 MISSOURI RIVER AT OMAHA, NE--Continued
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WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	MOLINATE WATER FLTRD 0.7 U GF, REC (UG/L) (82671)	ETHOPROP WATER FLTRD 0.7 U GF, REC (UG/L) (82672)	BENFLURALIN WAT FLD 0.7 U GF, REC (UG/L) (82673)	CARBOFURAN WATER FLTRD 0.7 U GF, REC (UG/L) (82674)	TERBUFOS WATER FLTRD 0.7 U GF, REC (UG/L) (82675)	PRONAMIDE WATER FLTRD 0.7 U GF, REC (UG/L) (82676)	DISULFOTON WATER FLTRD 0.7 U GF, REC (UG/L) (82677)	TRIALLATE WATER FLTRD 0.7 U GF, REC (UG/L) (82678)	PROPANIL WATER FLTRD 0.7 U GF, REC (UG/L) (82679)	CARBARYL WATER FLTRD 0.7 U GF, REC (UG/L) (82680)	THIOBENCARB WATER FLTRD 0.7 U GF, REC (UG/L) (82681)
OCT											
20...	<.004	<.003	<.002	<.003	<.013	<.003	<.017	<.001	<.004	<.003	<.002
DEC											
11...	<.004	<.003	<.002	<.003	<.013	<.003	<.017	<.001	<.004	<.003	<.002
FEB											
08...	<.004	<.003	<.002	<.003	<.013	<.003	<.017	<.001	<.004	<.003	<.002
MAR											
01...	<.004	<.003	<.002	<.003	<.013	<.003	<.017	<.001	<.004	<.003	<.002
15...	<.004	<.003	<.002	<.003	<.013	<.003	<.017	<.001	<.004	<.003	<.002
29...	<.004	<.003	<.002	<.003	<.013	<.003	<.017	<.001	<.004	<.003	<.002
APR											
20...	<.004	<.003	<.002	<.003	<.013	<.003	<.017	<.001	<.004	<.003	<.002
MAY											
11...	<.004	<.003	<.002	<.003	<.013	<.003	<.017	<.001	<.004	<.003	<.002
17...	<.004	<.003	<.002	<.003	<.013	<.003	<.017	<.001	<.004	<.003	<.002
JUN											
02...	<.004	<.003	<.002	<.003	<.013	<.003	<.017	<.001	<.004	<.003	<.002
15...	<.004	<.003	<.002	<.003	<.013	<.003	<.017	<.001	<.004	<.003	<.002
JUL											
08...	--	--	--	--	--	--	--	--	--	--	--
AUG											
07...	<.004	<.003	<.002	<.003	<.013	<.003	<.017	<.001	<.004	E.011	<.002
23...	.093	.090	.065	E.141	.079	.101	.090	.093	.102	E.099	.096
SEP											
07...	<.004	<.003	<.002	<.003	<.013	<.003	<.017	<.001	<.004	<.003	<.002

DATE	DCPA WATER FLTRD 0.7 U GF, REC (UG/L) (82682)	PENDIMETHALIN WAT FLT 0.7 U GF, REC (UG/L) (82683)	NAPROPAMIDE WATER FLTRD 0.7 U GF, REC (UG/L) (82684)	PROPARGITE WATER FLTRD 0.7 U GF, REC (UG/L) (82685)	METHYL AZINPHOS WAT FLT 0.7 U GF, REC (UG/L) (82686)	PERMETHRIN CIS WAT FLT 0.7 U GF, REC (UG/L) (82687)	SPECIFIC CONDUCTANCE LAB (US/CM) (90095)	DIAZINON D10 SRG WAT FLT 0.7 U GF, REC PERCENT (91063)	TERBUTHYLAZINE SURROGT WAT FLT 0.7 U GF, REC PERCENT (91064)	HCH ALPHA D6 SRG WAT FLT 0.7 U GF, REC PERCENT (91065)	BORON, DISSOLVED (UG/L AS B) (01020)
OCT											
20...	<.002	<.004	<.003	<.013	<.001	<.005	765	98.7	101	90.9	119
DEC											
11...	<.002	<.004	<.003	<.013	<.001	<.005	807	125	110	102	109
FEB											
08...	<.002	<.004	<.003	<.013	<.001	<.005	767	87.4	92.8	82.0	102
MAR											
01...	<.002	<.004	<.003	<.013	<.001	<.005	803	86.8	95.6	80.6	104
15...	<.002	<.004	<.003	<.013	<.001	<.005	791	120	123	106	97
29...	<.002	<.004	<.003	<.013	<.001	<.005	809	99.6	105	97.2	104
APR											
20...	<.002	<.004	<.003	<.013	<.001	<.005	951	96.8	102	88.5	92
MAY											
11...	<.002	<.004	<.003	<.013	<.001	<.005	896	104	114	91.7	97
17...	<.002	<.004	<.003	<.013	<.001	<.005	894	92.8	109	96.5	102
JUN											
02...	<.002	<.004	<.003	<.013	<.001	<.005	888	111	--	109	113
15...	<.002	<.004	<.003	<.013	<.001	<.005	895	82.5	--	82.9	103
JUL											
08...	--	--	--	--	--	--	890	--	--	--	108
AUG											
07...	<.002	<.004	<.003	<.013	<.001	<.005	737	99.7	--	99.2	98
23...	.102	.059	.103	--	E.072	.053	862	102	--	96.9	124
SEP											
07...	<.002	<.004	<.003	<.013	<.001	<.005	804	105	--	101	120

06610000 MISSOURI RIVER AT OMAHA, NE--Continued
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WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	TIME	NUMBER OF SAMPLING POINTS (COUNT) (00063)	BED MAT. SIEVE DIAM. % FINER THAN .062 MM (80164)	BED MAT. SIEVE DIAM. % FINER THAN .125 MM (80165)	BED MAT. SIEVE DIAM. % FINER THAN .250 MM (80166)	BED MAT. SIEVE DIAM. % FINER THAN .500 MM (80167)	BED MAT. SIEVE DIAM. % FINER THAN 1.00 MM (80168)	BED MAT. SIEVE DIAM. % FINER THAN 2.00 MM (80169)	BED MAT. SIEVE DIAM. % FINER THAN 4.00 MM (80170)	BED MAT. SIEVE DIAM. % FINER THAN 8.00 MM (80171)	BED MAT. SIEVE DIAM. % FINER THAN 16.0 MM (80172)
OCT											
20...	1050	3	--	0	20	95	100	--	--	--	--
NOV											
09...	1210	3	--	0	16	44	75	94	98	100	--
DEC											
11...	1330	3	--	0	22	87	97	98	99	99	100
FEB											
08...	1030	3	0	1	40	97	99	99	99	100	--
MAR											
01...	1100	3	--	0	25	91	98	99	99	100	--
29...	1100	3	--	0	30	91	99	100	--	--	--
MAY											
11...	0930	3	--	0	25	97	99	100	--	--	--
JUN											
01...	1200	3	--	0	23	90	98	99	100	--	--
JUL											
08...	1200	3	0	1	26	87	98	100	--	--	--
AUG											
07...	1030	8	--	0	25	88	98	100	--	--	--
SEP											
07...	1100	3	--	0	30	89	98	100	--	--	--

SPECIFIC CONDUCTANCE MICROSIEMENS/CM AT 25 DEG C, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY INSTANTANEOUS VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	796	794	806	---	897	867	---	---
2	---	783	---	---	---	---	---	---	898	---	---	---
3	---	---	---	---	---	---	---	864	875	---	917	856
4	---	---	829	---	---	---	---	---	---	---	---	---
5	---	---	---	---	---	---	772	---	---	---	919	---
6	752	790	---	---	---	---	---	856	---	884	---	---
7	---	---	846	---	---	---	---	---	889	---	746	838
8	758	---	---	---	784	---	767	---	---	915	---	---
9	---	774	---	---	---	794	---	---	---	---	---	---
10	---	---	---	---	---	---	---	---	909	---	846	824
11	---	---	---	---	---	---	---	872	---	---	---	---
12	---	---	832	---	---	---	---	---	---	932	876	---
13	747	---	---	---	---	---	---	888	---	---	---	814
14	---	---	---	---	---	---	---	---	---	---	---	---
15	767	---	---	---	---	790	---	---	903	949	---	---
16	---	771	830	---	---	---	---	---	---	---	888	---
17	---	---	---	---	750	---	851	893	852	---	---	822
18	---	---	---	---	---	---	---	---	---	---	---	---
19	---	---	---	855	---	---	---	---	---	934	891	---
20	773	808	---	---	---	---	942	883	---	---	---	823
21	---	---	---	---	---	---	---	---	890	---	---	---
22	784	---	---	---	---	815	936	---	---	---	---	---
23	---	821	---	---	---	---	---	---	---	796	890	818
24	---	---	---	---	---	797	---	---	---	---	---	---
25	---	---	---	---	787	---	---	887	900	---	---	---
26	778	---	---	---	---	---	928	---	---	896	---	---
27	---	820	---	---	---	---	---	876	---	---	881	---
28	---	---	834	---	---	---	---	---	814	---	---	808
29	771	---	---	---	---	807	---	---	---	836	---	---
30	---	820	---	---	---	---	890	---	---	---	879	---
31	---	---	---	---	---	---	---	---	---	---	---	---

06610000 MISSOURI RIVER AT OMAHA, NE--Continued
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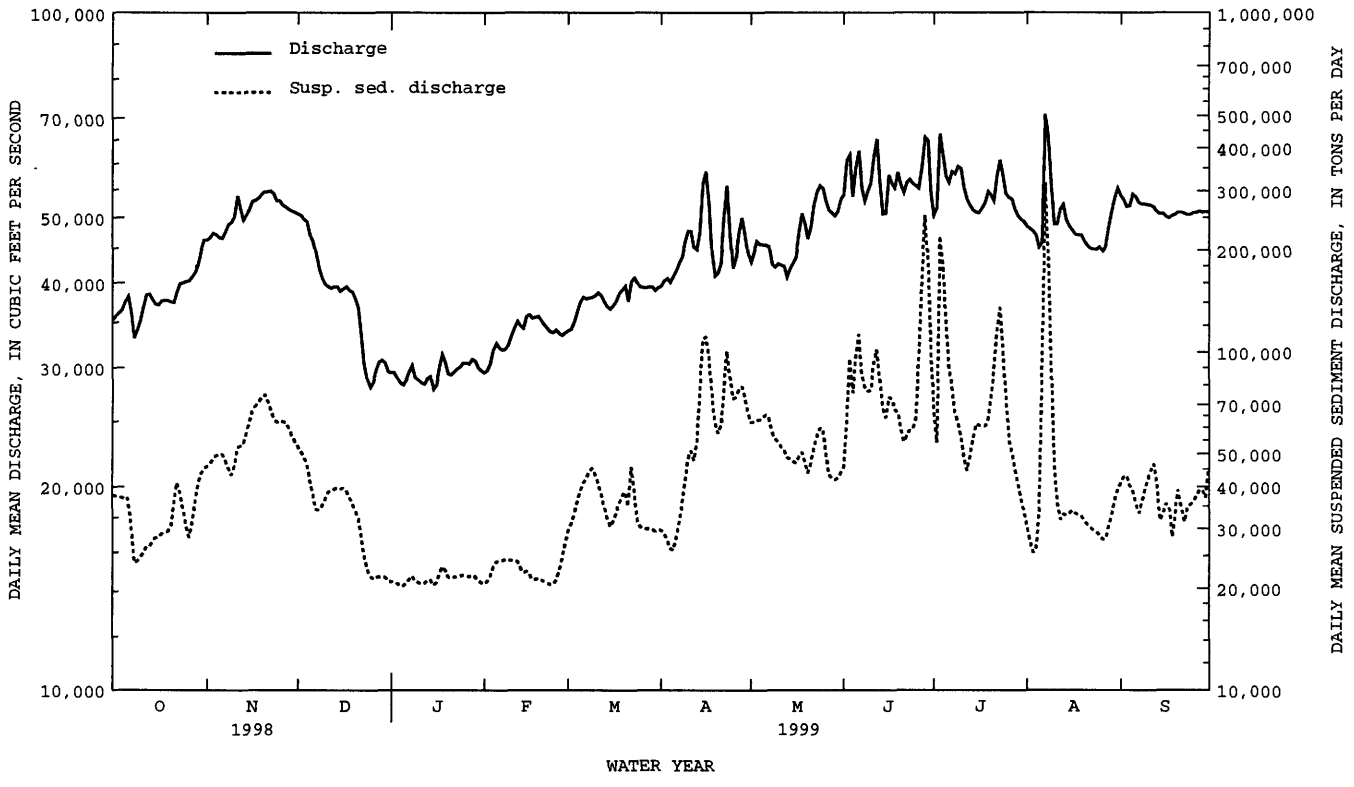
TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY INSTANTANEOUS VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	2.0	3.5	11.0	---	20.5	21.0	---	---
2	---	12.5	---	---	---	---	---	---	20.0	---	---	---
3	---	---	---	---	---	---	---	14.5	19.0	---	26.5	27.0
4	---	---	9.5	---	---	---	---	---	---	---	---	---
5	---	---	---	---	---	---	9.5	---	---	---	26.0	---
6	15.0	9.5	---	---	---	---	---	14.5	---	26.0	---	---
7	---	---	7.5	---	---	---	---	---	23.0	---	24.0	23.5
8	---	---	---	---	2.5	---	11.0	---	---	25.0	---	---
9	---	8.5	---	---	---	4.5	---	---	---	---	---	---
10	---	---	---	---	---	---	---	---	24.0	---	30.0	23.0
11	---	---	5.0	---	---	---	---	15.0	---	---	---	---
12	---	---	---	---	---	---	---	---	---	26.0	26.0	---
13	15.5	---	---	---	---	---	---	16.0	---	---	---	21.0
14	---	---	---	---	---	---	---	---	---	---	---	---
15	15.5	---	---	---	---	3.5	---	---	22.5	26.0	---	---
16	---	6.5	5.0	---	---	---	---	---	---	---	28.0	---
17	---	---	---	---	3.0	---	10.0	17.0	20.0	---	---	19.0
18	---	---	---	---	---	---	---	---	---	---	---	---
19	---	---	---	1.5	---	---	---	---	---	26.5	25.0	---
20	14.5	4.0	---	---	---	---	10.0	17.0	---	---	---	18.5
21	---	---	---	---	---	---	---	---	19.5	---	---	---
22	14.0	---	---	---	---	7.0	12.5	---	---	---	---	---
23	---	7.0	---	---	---	---	---	---	---	28.0	24.5	18.5
24	---	---	---	---	---	7.0	---	---	---	---	---	---
25	---	---	---	---	2.0	---	---	17.0	23.0	---	---	---
26	16.0	---	---	---	---	---	12.0	---	---	29.0	---	---
27	---	7.0	---	---	---	---	---	17.0	---	---	27.0	---
28	---	---	.0	---	---	---	---	---	24.0	---	---	18.0
29	14.0	---	---	---	---	8.0	---	---	---	29.0	---	---
30	---	---	---	---	---	---	13.0	---	---	---	26.0	---
31	---	---	---	---	---	---	---	---	---	---	---	---
MAX	---	---	---	---	---	---	---	---	---	---	---	---
MIN	---	---	---	---	---	---	---	---	---	---	---	---



06807000 MISSOURI RIVER AT NEBRASKA CITY, NE

LOCATION.--Lat 40°40'55", long 95°50'48", in NW$^1/_4$ NE$^1/_4$ sec.9, T.8 N., R.14 E., Otoe County, Hydrologic Unit 10240001, on right bank 1.0 mi upstream from Highway 2 Bridge at Nebraska City, and at mile 562.6.

DRAINAGE AREA.--410,000 mi^2, approximately. The 3,959 mi^2 in Great Divide basin are not included.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--August 1929 to current year. Gage-height records collected in this vicinity from August 1878 to December 1899 are contained in reports of Missouri River Commission.

REVISED RECORDS.--WSP 761: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 905.36 ft above sea level, supplementary adjustment of 1954. See WSP 1918 or 1919 for history of changes prior to Apr. 1, 1963.

REMARKS.--Records good. Flow regulated by upstream main-stem reservoirs. Fort Randall Dam was completed in July 1952, with storage beginning in December 1952. Gavins Point Dam was completed in July 1955, with storage beginning in December 1955. Periodic observations of water temperature and specific conductance are published in this report as miscellaneous water quality data. U.S. Army Corps of Engineers rain gage and satellite data collection platform at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 414,000 ft^3/s Apr. 19, 1952; maximum gage height, 27.66 ft Apr. 18, 1952; minimum discharge, 1,600 ft^3/s Dec. 31, 1946 (discharge measurement); minimum gage height observed, -0.28 ft Dec. 24, 1960, result of freezeup.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	40000	52200	58500	34600	37000	43400	46400	52400	64600	92200	52900	56000
2	40600	53600	58100	34800	37300	43700	47000	51900	75100	79900	51500	55100
3	41900	55300	57400	34400	38200	45200	48400	52900	85700	79200	50900	54600
4	41800	54900	56900	33600	40300	45300	47500	53500	74700	78800	50800	54400
5	44800	54400	55400	31900	42200	45900	49200	55000	76000	75600	49700	56900
6	44700	53600	53400	32600	44300	46500	52300	55600	84400	74200	49300	57200
7	44000	53500	52200	33100	46200	45900	52700	58600	77700	71400	69800	55500
8	41300	54400	50600	34400	46600	45200	54000	58700	71200	68900	85700	55300
9	39800	54600	49300	33600	46800	45400	58600	58100	67500	68600	71700	55200
10	39700	56000	48700	33100	45600	44700	59700	58600	66700	70500	60200	55400
11	39800	61700	48000	33000	45100	44600	61400	58900	68300	65900	57000	55500
12	40800	61400	47800	33300	44700	44400	59700	59100	76100	62000	58800	54900
13	40900	58500	47500	33800	44200	43800	58800	58100	73600	59100	59100	54400
14	41000	58000	47400	34400	42900	43300	60700	57600	67700	56800	58200	54100
15	40800	58600	47000	34200	42900	42600	77900	59500	64000	55800	56500	54000
16	41200	59800	46800	33900	43600	43300	88100	65400	66400	54600	56100	53800
17	42100	61000	46900	35400	43100	44000	79700	67900	67700	54500	56400	53000
18	42600	61000	46600	37400	43000	44100	67300	67900	67500	54800	56800	53200
19	42700	61300	46400	38300	43100	45000	60200	66600	68000	55800	56800	53400
20	43100	61400	45800	37400	42800	45800	57300	62900	66000	57300	55200	53700
21	42800	61300	43600	36800	42300	44900	56600	64800	63500	58800	55000	53200
22	43100	61100	39200	36700	41900	44500	63000	65700	63200	60600	55000	53600
23	43900	61400	34900	36800	41800	46600	67100	68600	65300	62700	54800	53600
24	44500	60500	31700	37000	40400	46900	61200	67800	64900	62400	54200	53600
25	44700	60000	30500	37200	40800	46200	54500	66400	64300	60000	54100	53600
26	44900	59500	30600	38100	41700	45400	52700	65900	63000	59000	53100	53900
27	45800	59500	31500	38000	42500	45500	56300	63100	70800	58400	52100	54000
28	46500	58900	33000	37900	42900	45700	58600	61400	95500	57700	52900	53700
29	48100	59000	33900	37600	---	45300	57700	60300	102000	56000	53600	53600
30	49900	59100	34100	37200	---	46100	55000	60500	88200	54700	54500	52700
31	51800	---	33700	37000	---	45500	---	63600	---	53900	55800	---
TOTAL	1339600	1745500	1387400	1097500	1194200	1394700	1769600	1887300	2169600	1980100	1758500	1631100
MEAN	43210	58180	44750	35400	42650	44990	58990	60880	72320	63870	56730	54370
MAX	51800	61700	58500	38300	46800	46900	88100	68600	102000	92200	85700	57200
MIN	39700	52200	30500	31900	37000	42600	46400	51900	63000	53900	49300	52700
AC-FT	2657000	3462000	2752000	2177000	2369000	2766000	3510000	3743000	4303000	3928000	3488000	3235000
CFSM	.11	.14	.11	.09	.10	.11	.14	.15	.18	.16	.14	.13
IN.	.12	.16	.13	.10	.11	.13	.16	.17	.20	.18	.16	.15

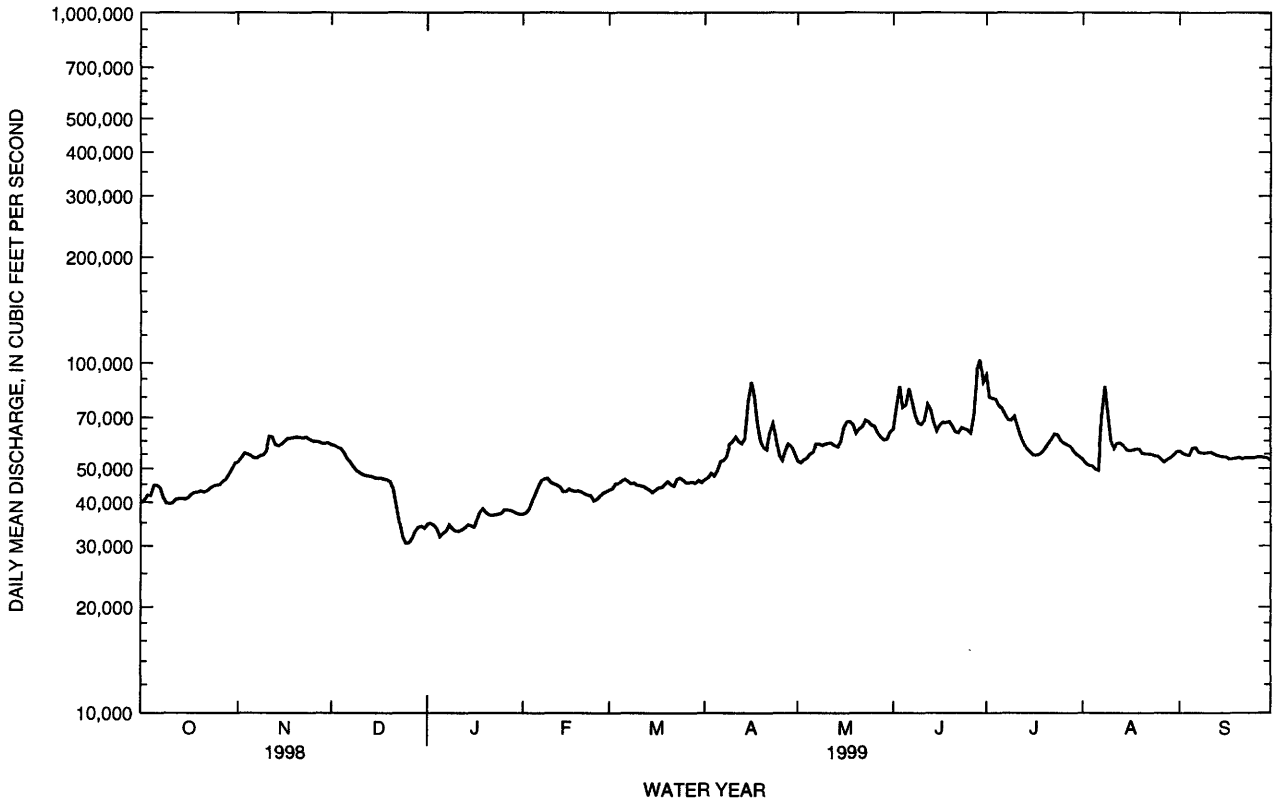
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1953 - 1999, BY WATER YEAR (WY)

MEAN	42850	38790	25490	21310	26700	38250	48050	47790	52850	46900	43160	43010
MAX	76760	79410	52410	39970	48630	66730	98960	90280	117500	116700	71540	73410
(WY)	1998	1998	1987	1987	1983	1983	1997	1997	1984	1993	1996	1997
MIN	22420	14380	10510	10160	12780	15310	21850	32470	33530	32760	29870	32560
(WY)	1962	1962	1956	1957	1957	1957	1957	1955	1958	1961	1955	1958

06807000 MISSOURI RIVER AT NEBRASKA CITY, NE--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1953 - 1999a	
ANNUAL TOTAL	17163900		19355100			
ANNUAL MEAN	47020		53030		39630	
HIGHEST ANNUAL MEAN					66450	1997
LOWEST ANNUAL MEAN					25370	1957
HIGHEST DAILY MEAN	93900	Jun 15	102000	Jun 29	188000	Jul 25 1993
LOWEST DAILY MEAN	25900	Jan 16	30500	Dec 25	4320	Jan 11 1957
ANNUAL SEVEN-DAY MINIMUM	27100	Jan 14	32200	Dec 24	5590	Nov 29 1955
INSTANTANEOUS PEAK FLOW			104000	Jun 29	196000	Jul 23 1993
INSTANTANEOUS PEAK STAGE			20.73	Jun 29	27.19	Jul 23 1993
INSTANTANEOUS LOW FLOW			30200	Dec 25		
ANNUAL RUNOFF (AC-FT)	34040000		38390000		28710000	
ANNUAL RUNOFF (CFSM)	.11		.13		.097	
ANNUAL RUNOFF (INCHES)	1.56		1.76		1.31	
10 PERCENT EXCEEDS	60300		67700		62300	
50 PERCENT EXCEEDS	44700		53600		37300	
90 PERCENT EXCEEDS	37000		37400		17500	

a Post regulation revised



06807000 MISSOURI RIVER AT NEBRASKA CITY, NE.--Continued

WATER-QUALITY RECORDS

LOCATION.--Water quality samples were collected from Highway 2 bridge, 2.0 miles downstream of gage.

PERIOD OF RECORD.--May 1951 to current year. Daily sediment loads August 1957 to September 1971 in reports of U.S. Army Corps of Engineers.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: May 1951 to December 1977, October 1991 to current year.
WATER TEMPERATURES: May 1951 to December 1977, October 1991 to current year.
SUSPENDED SEDIMENT DISCHARGE: October 1971 to September 1976, October 1991 to current year.

REMARKS.--Records of specific conductance are obtained from suspended-sediment samples at time of analysis.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 994 microsiemens Dec. 17, 1962; minimum daily, 273 microsiemens June 17, 1964.
WATER TEMPERATURES: Maximum daily, 31°C July 26, 1977, and July 25, 1997; minimum daily, 0.0°C on many days during winter periods.
SEDIMENT CONCENTRATIONS: Maximum daily mean, 8,420 mg/L Aug. 7, 1996; minimum daily mean, 115 mg/L Jan. 3, 1993.
SEDIMENT LOADS: Maximum daily, 3,120,000 tons June 24, 1996; minimum daily, 4,050 tons Jan. 17, 1972.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum daily, 922 microsiemens July 19; minimum daily, 618 microsiemens July 1.
WATER TEMPERATURES: Maximum daily, 30.0°C July 29; minimum daily, 1.0°C Jan. 21.
SEDIMENT CONCENTRATIONS: Maximum daily mean, 2,750 mg/L Apr. 16; minimum daily, 220 mg/L Mar. 1.
SEDIMENT LOADS: Maximum daily, 729,000 tons June 29; minimum daily, 20,400 tons Dec. 25.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	TIME	TEMPERATURE WATER (DEG C) (00010)	TEMPERATURE AIR (DEG C) (00020)	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	NUMBER OF SAMPLING POINTS (COUNT) (00063)	SPECIFIC CONDUCTANCE (US/CM) (00095)
OCT						
05...	1215	17.0	16.0	45300	3	--
13...	1245	17.0	27.0	40900	--	627
20...	1320	15.4	15.0	43000	--	639
26...	1215	14.5	18.0	44800	--	740
NOV						
03...	1240	11.0	4.0	55700	--	756
09...	1230	9.2	7.5	54500	3	762
16...	1135	7.0	8.0	59700	--	760
24...	1300	6.5	15.5	60400	--	778
30...	1120	9.0	9.0	59100	--	820
DEC						
07...	1230	9.3	5.0	52200	3	819
15...	1145	4.7	5.8	47100	--	828
29...	1400	.0	-7.0	34000	--	788
JAN						
21...	1235	1.0	3.0	37000	--	813
FEB						
04...	1250	2.1	12.0	40300	--	759
09...	1330	3.5	17.0	46900	3	720
17...	1305	3.3	3.0	43000	--	752
MAR						
01...	1120	4.0	9.0	43400	--	790
11...	1135	3.0	2.0	44800	3	786
18...	1110	6.0	7.0	44000	--	801
26...	1115	8.0	8.0	45300	--	797
30...	1230	10.5	22.0	46400	--	809
APR						
06...	1220	10.5	12.0	52500	3	743
16...	1115	9.0	4.0	89000	--	690
19...	1330	11.0	21.5	59700	--	792
26...	1250	12.0	15.0	52300	--	847
MAY						
04...	1015	14.5	17.5	53000	3	846
11...	1045	16.0	15.0	58900	--	774
18...	1215	18.0	20.0	68400	--	831
25...	1205	19.0	20.0	66300	--	795
JUN						
01...	1350	15.0	18.0	64200	3	834
08...	0830	--	--	72000	--	--
14...	1315	21.5	19.0	67800	--	773
22...	1210	21.0	21.0	62700	--	847
29...	1220	23.0	22.0	104000	--	580
JUL						
06...	1140	21.5	27.0	75100	3	760
13...	1320	25.0	25.0	58800	--	866
19...	1250	27.0	26.0	56000	--	886
27...	1210	29.5	28.0	58500	--	831
AUG						
02...	1220	27.0	24.5	51500	3	872
10...	1030	25.5	24.5	60400	--	725
17...	1115	24.0	28.0	56200	--	844
26...	0950	25.5	26.0	52900	--	850
30...	1040	25.0	25.0	54500	--	846
SEP						
08...	1110	24.0	21.0	55500	3	812
13...	1200	21.0	19.5	54500	--	780
20...	1405	18.5	16.5	53500	--	810
28...	1220	19.0	15.5	55700	--	764

06807000 MISSOURI RIVER AT NEBRASKA CITY, NE.--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	TIME	NUMBER OF SAMPLING POINTS (COUNT) (00063)	BED MAT. SIEVE DIAM. % FINER THAN .062 MM (80164)	BED MAT. SIEVE DIAM. % FINER THAN .125 MM (80165)	BED MAT. SIEVE DIAM. % FINER THAN .250 MM (80166)	BED MAT. SIEVE DIAM. % FINER THAN .500 MM (80167)	BED MAT. SIEVE DIAM. % FINER THAN 1.00 MM (80168)	BED MAT. SIEVE DIAM. % FINER THAN 2.00 MM (80169)	BED MAT. SIEVE DIAM. % FINER THAN 4.00 MM (80170)	BED MAT. SIEVE DIAM. % FINER THAN 8.00 MM (80171)	BED MAT. SIEVE DIAM. % FINER THAN 16.0 MM (80172)
OCT											
05...	1215	3	0	1	20	68	90	97	99	100	--
NOV											
09...	1230	3	0	1	28	52	78	92	98	100	--
DEC											
07...	1230	3	0	1	31	99	100	--	--	--	--
FEB											
09...	1330	3	--	0	13	61	85	94	98	100	--
MAR											
11...	1135	3	--	0	20	65	90	98	99	100	--
APR											
06...	1220	3	0	1	30	63	76	89	96	100	--
MAY											
04...	1015	3	--	0	14	54	85	98	100	--	--
JUN											
01...	1350	3	--	0	9	44	74	90	97	100	--
JUL											
06...	1140	3	0	1	17	50	76	93	99	100	--
AUG											
02...	1220	3	--	0	11	50	82	94	96	96	100
SEP											
08...	1110	3	--	0	9	52	81	93	99	100	--

SPECIFIC CONDUCTANCE MICROSIEMENS/CM AT 25 DEG C, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY INSTANTANEOUS VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	778	790	---	831	618	---	---
2	766	---	---	---	---	---	---	---	---	---	888	---
3	---	785	---	---	---	---	---	---	703	---	---	847
4	---	---	812	---	---	---	---	851	---	---	---	---
5	713	---	---	---	---	---	---	---	---	---	904	---
6	---	769	---	---	---	---	747	826	---	773	---	---
7	---	---	825	---	---	---	---	---	---	---	---	---
8	---	---	---	---	---	---	740	---	---	---	---	822
9	739	---	---	---	735	---	---	---	---	879	---	---
10	---	---	---	---	---	---	---	---	854	---	758	811
11	---	---	---	---	---	785	---	794	---	---	---	---
12	---	---	---	---	---	---	---	---	---	---	807	---
13	766	724	---	---	---	---	813	816	---	897	---	793
14	---	---	---	---	---	---	---	---	784	---	---	---
15	---	---	839	---	---	---	---	---	---	916	---	---
16	778	758	---	---	---	---	675	---	---	---	---	---
17	---	---	---	---	750	---	---	---	847	---	855	810
18	---	---	---	---	---	781	---	834	---	---	---	---
19	---	779	---	---	---	---	790	---	---	922	862	---
20	764	---	---	---	---	---	---	826	---	---	---	820
21	---	---	---	823	---	---	---	---	---	---	---	---
22	---	---	---	---	---	---	781	---	865	---	---	---
23	787	---	---	---	---	---	---	---	---	866	---	817
24	---	799	---	---	---	788	---	---	---	---	---	---
25	---	---	---	---	---	---	---	831	848	---	865	---
26	767	---	---	---	---	786	851	---	---	---	870	---
27	---	813	---	---	---	---	---	834	---	855	---	---
28	---	---	---	---	---	---	---	---	---	---	---	804
29	757	---	---	---	---	---	---	---	652	821	---	---
30	---	810	---	---	---	801	850	---	---	---	---	806
31	---	---	---	---	---	---	---	---	---	---	---	---

06807000 MISSOURI RIVER AT NEBRASKA CITY, NE.--Continued

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY INSTANTANEOUS VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	4.0	10.5	---	15.0	21.5	---	---
2	19.0	---	---	---	---	---	---	---	---	---	28.0	---
3	---	12.0	---	---	---	---	---	---	19.5	---	---	27.0
4	---	---	9.5	---	---	---	---	16.0	---	---	---	---
5	17.0	---	---	---	---	---	---	---	---	---	27.0	---
6	---	9.0	---	---	---	---	9.0	14.5	---	26.0	---	---
7	---	---	7.0	---	---	---	---	---	---	---	---	---
8	---	---	---	---	---	---	12.5	---	---	---	---	24.0
9	17.0	---	---	---	3.5	---	---	---	---	26.0	---	---
10	---	---	---	---	---	---	---	---	24.5	---	25.5	23.0
11	---	---	---	---	---	3.0	---	16.0	---	---	---	---
12	---	---	---	---	---	---	---	---	---	---	26.0	---
13	17.0	---	---	---	---	---	8.5	17.0	---	25.0	---	23.0
14	---	---	---	---	---	---	---	---	21.5	---	---	---
15	---	---	4.5	---	---	---	---	---	---	26.0	---	---
16	16.5	7.0	---	---	---	---	9.0	---	---	---	---	---
17	---	---	---	---	3.5	---	---	---	11.5	---	25.0	19.0
18	---	---	---	---	---	6.0	---	---	---	---	---	---
19	---	7.0	---	---	---	---	11.0	---	---	27.0	25.0	---
20	15.5	---	---	---	---	---	---	17.0	---	---	---	18.5
21	---	---	---	1.0	---	---	---	---	---	---	---	---
22	---	---	---	---	---	---	13.5	---	21.0	---	---	---
23	14.0	---	---	---	---	---	---	---	---	28.0	---	18.5
24	---	6.5	---	---	---	7.0	---	---	---	---	---	---
25	---	---	---	---	---	---	---	19.0	24.0	---	25.5	---
26	14.5	---	---	---	---	8.0	12.0	---	---	---	25.5	---
27	---	7.0	---	---	---	---	---	17.0	---	29.5	---	---
28	---	---	---	---	---	---	---	---	---	---	---	19.0
29	16.5	---	---	---	---	---	---	---	23.0	30.0	---	---
30	---	9.0	---	---	---	10.5	12.0	---	---	---	---	18.0
31	---	---	---	---	---	---	---	---	---	---	---	---

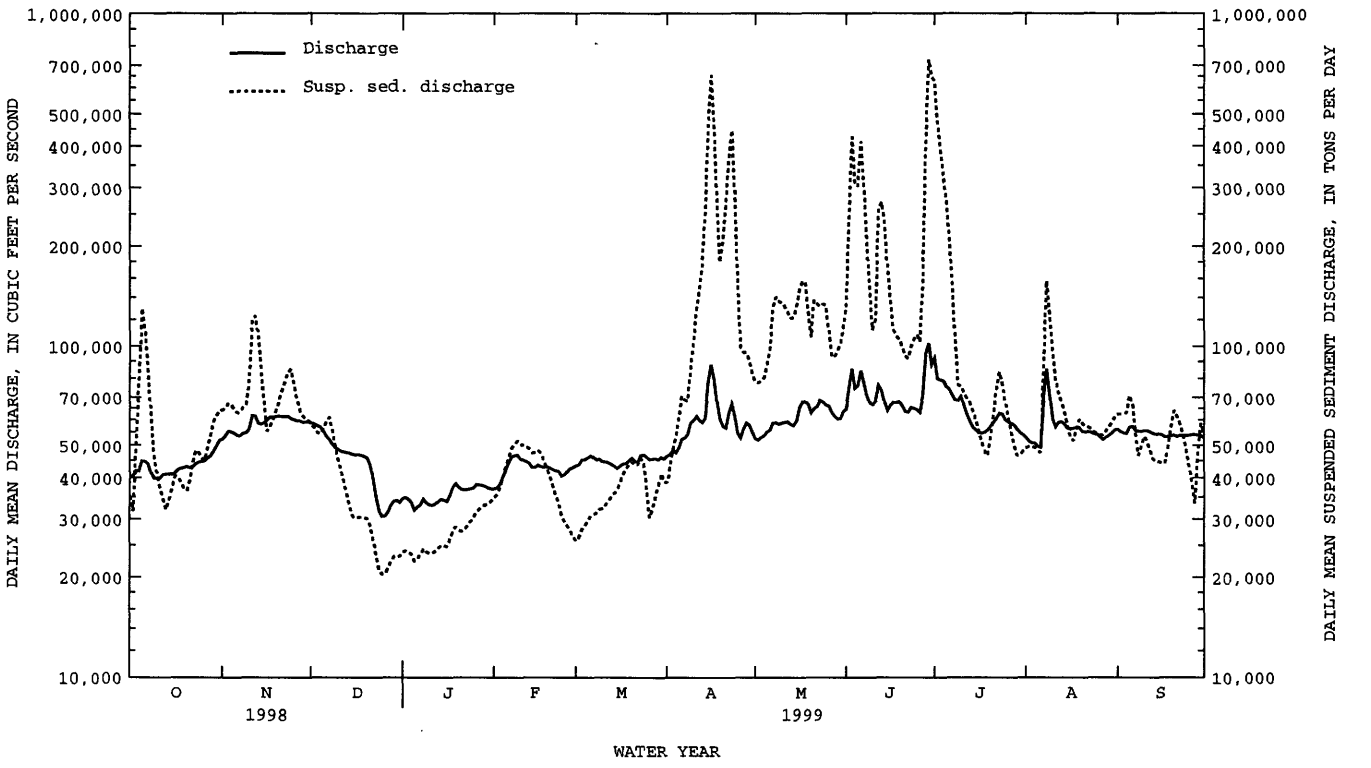
SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

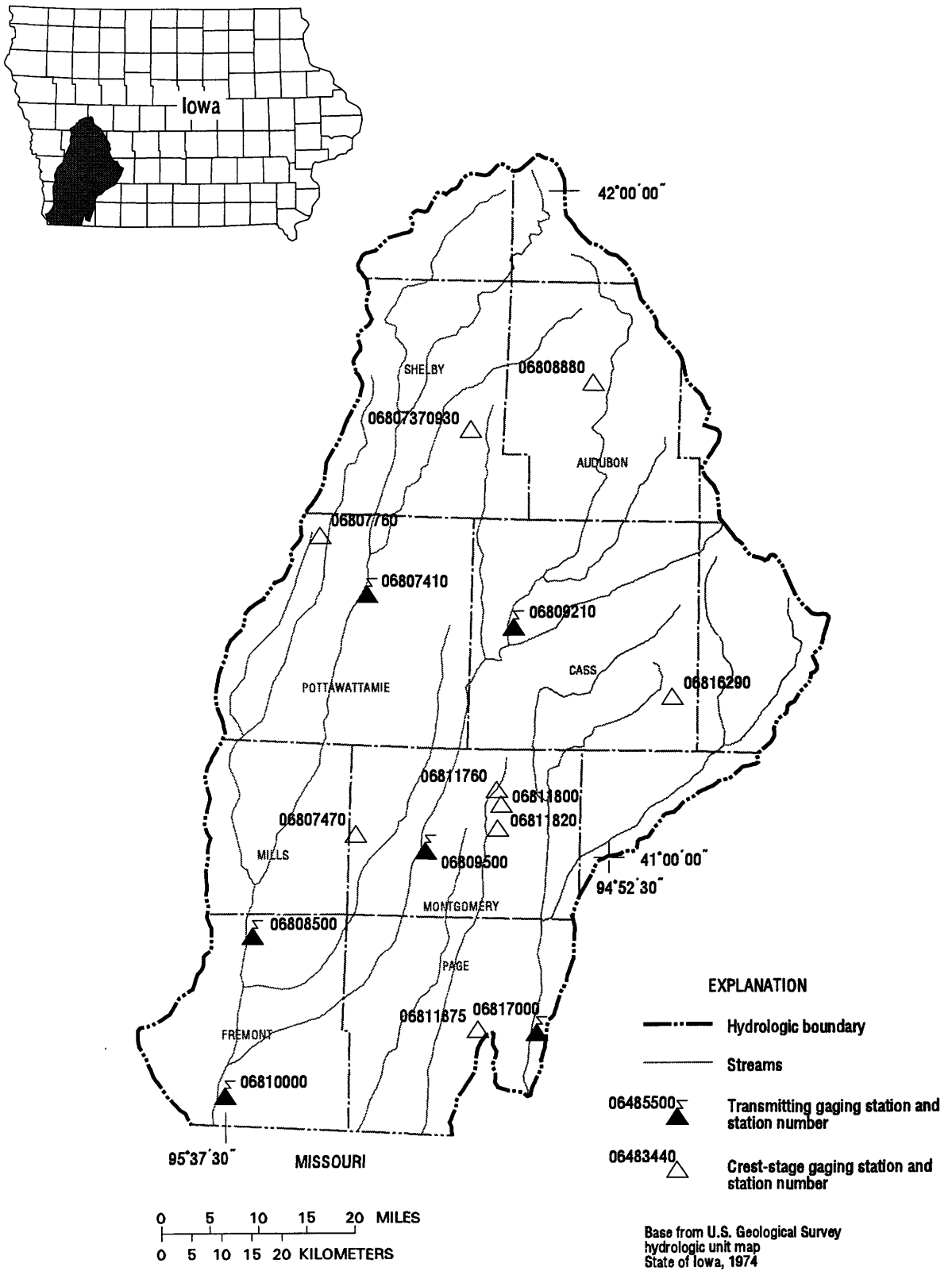
DAY	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS/ DAY)	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS/ DAY)	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS/ DAY)	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS/ DAY)	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS/ DAY)	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS/ DAY)
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	325	35100	455	64200	366	57900	255	23800	347	34600	220	25800
2	289	31700	453	65600	360	56500	256	24000	354	35700	223	26400
3	448	50700	450	67300	354	54900	257	23800	362	37300	228	27900
4	728	82200	444	65900	352	54200	258	23400	369	40200	234	28600
5	1070	130000	438	64300	378	56400	259	22300	377	43000	239	29600
6	911	110000	434	62800	409	59000	260	22900	385	46000	244	30600
7	704	83700	439	63500	433	61000	261	23400	393	49000	250	31000
8	544	60800	447	65600	408	55800	262	24400	401	50500	256	31200
9	431	46300	454	67000	378	50300	263	23800	409	51600	261	32000
10	384	41200	510	77200	350	46000	264	23600	410	50500	267	32200
11	347	37200	705	118000	324	42000	265	23600	410	49900	274	33000
12	313	34500	743	123000	300	38700	266	23900	410	49500	284	34100
13	290	32000	690	109000	277	35500	267	24400	410	48900	296	34900
14	310	34300	551	86200	256	32800	268	25000	410	47500	307	36000
15	339	37300	426	67300	240	30500	270	24900	410	47500	320	36800
16	363	40400	342	55200	239	30200	271	24800	410	48300	332	38800
17	352	40100	347	57100	240	30400	272	25900	407	47400	345	41000
18	337	38700	366	60200	241	30300	273	27500	389	45200	357	42500
19	322	37200	386	63900	242	30300	274	28300	369	42900	359	43700
20	314	36500	412	68200	243	30000	275	27700	350	40400	361	44600
21	341	39500	440	72800	244	28700	277	27500	332	37900	362	43900
22	378	44000	470	77500	245	25900	282	27900	315	35600	363	43600
23	408	48300	502	83200	246	23200	288	28600	298	33700	365	45900
24	396	47600	524	85400	247	21100	294	29400	283	30900	352	44600
25	380	45800	482	78000	248	20400	300	30200	268	29600	291	36400
26	371	45000	435	69900	249	20500	306	31500	255	28700	247	30300
27	397	49100	398	64000	250	21300	313	32000	242	27700	262	32100
28	430	54100	387	61600	251	22300	319	32700	229	26500	285	35200
29	459	59600	380	60500	252	23000	326	33100	---	---	310	37900
30	460	61900	373	59500	253	23300	333	33400	---	---	331	41200
31	457	64000	---	---	254	23100	340	34000	---	---	316	38800
TOTAL	---	1598800	---	2183900	---	1135500	---	831700	---	1156500	---	1110600

06807000 MISSOURI RIVER AT NEBRASKA CITY, NE.--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DAY	MEAN CONC TRAT (MG/	LOAD (TONS/ DAY)	MEAN CONCE TRATI (MG/L	LOAD (TONS/ DAY)	MEAN CONCEN TRATIO (MG/L)	LOAD (TONS/ DAY)	MEAN CONCEN TRATIO (MG/L)	LOAD (TONS/ DAY)	MEAN CONCE TRATI (MG/L	LOAD (TONS/ DAY)	MEAN CONCE TRATI (MG/L	LOAD (TONS/ DAY)
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	308	38600	556	78600	738	129000	2520	627000	344	49100	413	62400
2	338	42900	554	77600	1200	249000	2160	466000	357	49600	420	62400
3	375	49000	552	78800	1840	426000	1820	390000	359	49400	426	62800
4	416	53500	557	80500	1540	312000	1540	328000	361	49400	429	63000
5	462	61400	591	87800	1460	302000	1300	266000	360	48400	462	71100
6	502	70800	654	98100	1810	413000	1080	216000	358	47600	434	67000
7	484	68900	818	130000	1460	306000	784	151000	460	88800	361	54100
8	469	68500	889	141000	1080	209000	559	104000	681	157000	313	46600
9	540	85500	871	137000	807	147000	412	76400	659	128000	332	49500
10	645	104000	853	135000	623	112000	399	75800	592	96200	356	53300
11	770	128000	832	132000	648	120000	407	72400	518	79800	344	51500
12	920	148000	800	128000	1250	259000	415	69500	458	72800	325	48200
13	1120	178000	773	121000	1370	271000	421	67200	428	68300	310	45500
14	1550	255000	787	122000	1300	237000	412	63200	401	63000	307	44800
15	2180	464000	809	130000	1020	176000	397	59800	376	57400	306	44600
16	2750	655000	831	147000	776	139000	372	54900	353	53400	304	44200
17	2080	449000	854	156000	615	112000	347	51100	339	51600	308	44100
18	1460	266000	850	156000	587	107000	324	47900	365	56000	346	49600
19	1100	179000	709	128000	573	105000	310	46700	392	60100	395	56900
20	1340	207000	628	107000	559	99600	345	53500	392	58400	441	63900
21	1780	271000	786	137000	546	93600	394	62600	388	57500	426	61200
22	2140	364000	760	135000	539	92000	450	73500	384	57000	402	58100
23	2460	447000	711	132000	566	99800	495	83800	380	56200	376	54300
24	1740	288000	732	134000	600	105000	461	77600	376	55000	339	49100
25	1070	158000	740	133000	624	108000	419	67900	372	54400	303	43900
26	696	99000	632	112000	607	103000	381	60800	376	53800	264	38400
27	632	96000	546	93000	785	154000	348	54900	382	53700	230	33500
28	605	95800	563	93400	1530	397000	324	50500	388	55300	325	47100
29	579	90200	594	96700	2660	729000	308	46600	394	57000	404	58500
30	559	83000	626	102000	2710	645000	318	46900	400	58900	383	54500
31	---	---	661	114000	---	---	331	48100	406	61300	---	---
TOTAL	---	5564100	---	3653500	---	6757000	---	3959600	---	2004400	---	1584100
YEAR		31539700										




Iowa
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MONTGOMERY
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MISSOURI
0 5 10 15 20 MILES
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EXPLANATION
Hydrologic boundary
Streams
06485500 Transmitting gaging station and station number
06483440 Crest-stage gaging station and station number
Base from U.S. Geological Survey hydrologic unit map State of Iowa, 1974

Gaging Stations

Crest Stage Gaging Stations

06807410 WEST NISHNABOTNA RIVER AT HANCOCK, IA

LOCATION.--Lat 41°23'24", long 95°22'17", in NW$^1/_4$ NE$^1/_4$ sec.18, T.76 N., R.39 W., Pottawattamie County, Hydrologic Unit 10240002, on right bank at upstream side of bridge on county highway G30, 0.6 mi west of Hancock school, 3.0 mi downstream from Jim Creek, 59.6 mi upstream from confluence with East Nishnabotna River, and at mile 75.1 mi upstream from mouth of Nishnabotna River.

DRAINAGE AREA.--609 mi^2.

PERIOD OF RECORD.--October 1959 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,085.83 ft above sea level. Prior to Sept. 15, 1980, on downstream end of right pier at same datum.

REMARKS.--Records good except those for estimated daily discharges, which are poor. Periodic observations of water temperature and specific conductance are published in this report as miscellaneous water quality data. U.S. Army Corps of Engineers rain gage and satellite data collection platform at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	210	232	212	e125	e202	208	261	1100	709	948	459	287
2	230	244	215	e118	e240	241	255	1030	688	1180	442	288
3	281	246	216	e112	e290	269	295	980	650	3880	440	275
4	284	231	214	e105	398	253	409	949	690	1310	438	288
5	318	226	215	e140	405	241	468	935	1540	1070	423	334
6	327	221	208	e170	326	226	1700	896	856	1030	426	288
7	256	224	205	e160	310	215	1080	853	792	874	896	272
8	234	232	206	e150	270	211	942	789	708	824	612	284
9	226	231	208	e142	263	198	1780	743	778	3150	483	261
10	224	255	207	e155	245	270	1110	715	1100	1390	455	246
11	222	282	205	e180	244	246	959	701	1250	1040	449	244
12	216	259	211	e160	214	242	829	707	863	938	1550	243
13	214	253	209	e129	196	242	780	671	810	868	917	238
14	214	251	206	e152	214	241	847	637	749	812	569	232
15	213	244	205	e175	213	248	1400	642	729	764	511	229
16	223	241	202	e210	196	290	1610	1390	819	725	491	226
17	257	237	199	e200	178	380	1330	1510	791	716	453	223
18	241	237	204	e185	186	405	1190	1050	740	726	453	221
19	219	241	196	e170	180	346	1100	920	711	883	471	220
20	211	238	178	e185	e178	328	1010	888	690	849	422	217
21	211	232	e140	e200	e173	316	975	1180	669	855	400	211
22	209	233	e110	e190	e162	304	2830	992	664	677	385	210
23	207	228	e140	e200	e157	293	1840	1010	960	628	373	209
24	208	222	e112	e210	e184	285	1410	908	746	601	358	206
25	208	225	e118	e180	196	274	1250	845	665	572	346	200
26	210	221	e122	e190	192	269	1150	799	632	568	338	197
27	217	220	e130	e195	198	273	1770	765	1830	553	330	199
28	268	221	e150	e192	202	282	1690	737	2070	530	320	197
29	278	225	e145	e190	---	273	1340	715	1100	509	311	192
30	284	222	e132	e195	---	264	1190	708	983	490	302	192
31	240	---	e120	e198	---	258	---	724	---	483	292	---
TOTAL	7360	7074	5540	5263	6412	8391	34800	27489	26982	30443	15115	7129
MEAN	237	236	179	170	229	271	1160	887	899	982	488	238
MAX	327	282	216	210	405	405	2830	1510	2070	3880	1550	334
MIN	207	220	110	105	157	198	255	637	632	483	292	192
AC-FT	14600	14030	10990	10440	12720	16640	69030	54520	53520	60380	29980	14140
CFSM	.39	.39	.29	.28	.38	.44	1.90	1.46	1.48	1.61	.80	.39
IN.	.45	.43	.34	.32	.39	.51	2.13	1.68	1.65	1.86	.92	.44

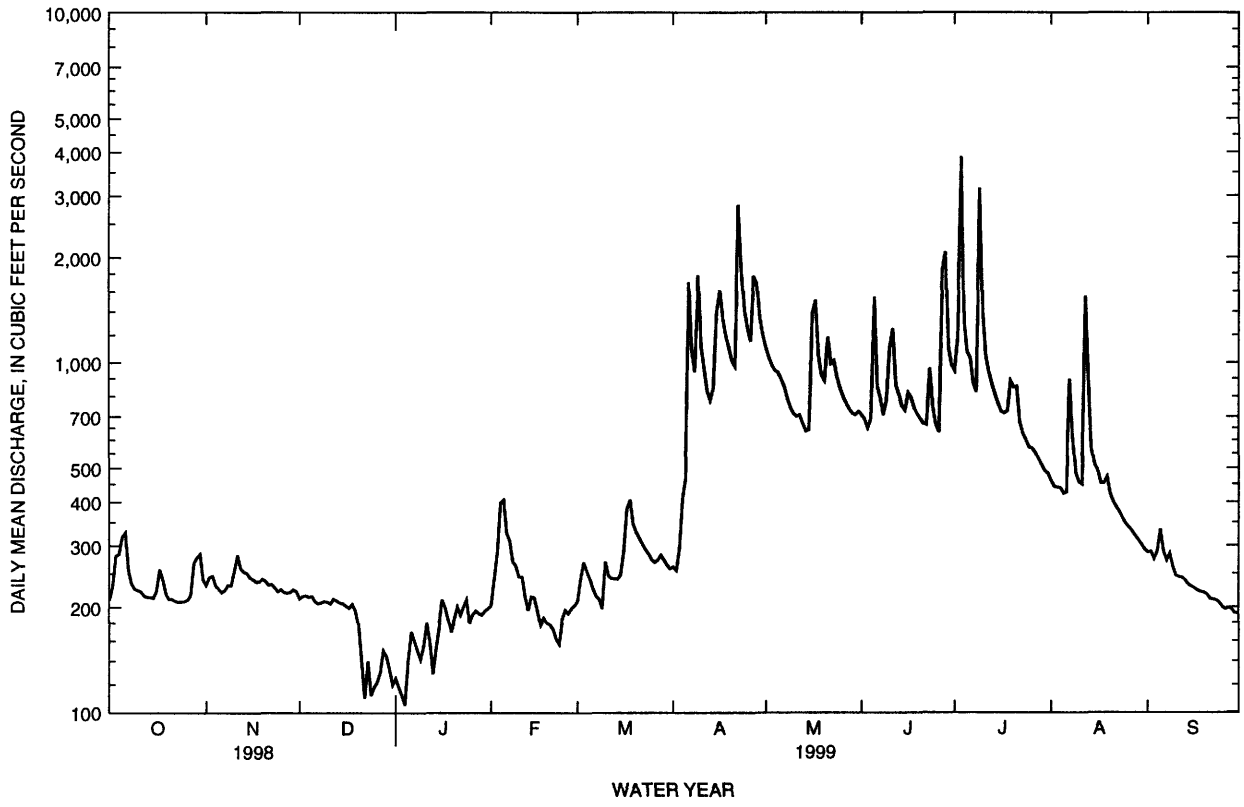
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1960 - 1999, BY WATER YEAR (WY)

MEAN	197	186	161	126	285	533	444	516	617	437	253	304
MAX	998	910	628	625	993	1946	1295	1586	2228	2925	1073	2412
(WY)	1987	1973	1973	1973	1983	1979	1983	1973	1998	1993	1996	1972
MIN	35.3	32.1	17.9	4.58	27.2	40.3	45.6	30.1	26.7	38.4	26.4	14.7
(WY)	1972	1971	1971	1971	1967	1968	1968	1967	1977	1970	1968	1971

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1960 - 1999	
ANNUAL TOTAL	231704		181998			
ANNUAL MEAN	635		499		338	
HIGHEST ANNUAL MEAN					966	1993
LOWEST ANNUAL MEAN					42.4	1968
HIGHEST DAILY MEAN	8210	Jun 11	3880	Jul 3	23300	Sep 12 1972
LOWEST DAILY MEAN	75	Jan 13	105	Jan 4	2.2	Feb 8 1971a
ANNUAL SEVEN-DAY MINIMUM	86	Jan 12	122	Dec 30	2.5	Feb 4 1971
INSTANTANEOUS PEAK FLOW			7260	Jul 3	30100	Jul 10 1993
INSTANTANEOUS PEAK STAGE			12.18	Jul 3	23.52	Jul 10 1993
ANNUAL RUNOFF (AC-FT)	459600		361000		244900	
ANNUAL RUNOFF (CFSM)	1.04		.82		.56	
ANNUAL RUNOFF (INCHES)	14.15		11.12		7.54	
10 PERCENT EXCEEDS	1090		1040		750	
50 PERCENT EXCEEDS	379		273		167	
90 PERCENT EXCEEDS	137		185		36	

a Also Feb 9, 1971
e Estimated

06807410 WEST NISHNABOTNA RIVER AT HANCOCK, IA--Continued



06808500 WEST NISHNABOTNA RIVER AT RANDOLPH, IA

LOCATION.--Lat 40°52'23", long 95°34'48", in NE$^1/_4$ NE$^1/_4$ sec.17, T.70 N., R.41 W., Fremont County, Hydrologic Unit 10240002, on right bank at upstream side of bridge on State Highway 184, 0.3 mi downstream from Deer Creek, 0.5 mi west of Randolph, and 16.0 mi upstream from confluence with East Nishnabotna River, and at mile 31.5 upstream from mouth of Nishnabotna River.

DRAINAGE AREA.--1,326 mi^2.

PERIOD OF RECORD.--June 1948 to current year.

REVISED RECORDS.--WSP 1440: Drainage area. WDR IA-74-1: 1973 (M). WDR IA-76-1: 1975 (P).

GAGE.--Water-stage recorder. Datum of gage is 932.99 ft above sea level, unadjusted. Prior to Aug. 26, 1955, nonrecording gage with supplementary water-stage recorder operating above 8.4 ft. June 30, 1949 to Aug. 25, 1955 at same site and datum.

REMARKS.--Records good except those for estimated daily discharges, which are poor. Periodic observations of water temperature and specific conductance are published in this report as miscellaneous water quality data. U.S. Geological Survey satellite data collection platform and rain gage at station.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in June 1947 reached a stage of about 24 ft, discharge not determined, from information by local residents.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	450	628	639	e290	528	565	574	2570	2030	4190	975	889
2	488	708	631	e270	545	582	559	2430	1930	2420	944	866
3	566	783	636	e260	562	610	573	2330	1820	3980	936	848
4	596	741	636	e250	589	630	601	2250	1750	3190	920	852
5	695	679	634	e320	628	610	985	2250	1860	2290	890	979
6	656	647	628	e380	735	591	2120	2150	2340	3480	856	931
7	631	653	610	e360	663	566	2570	2090	1890	2230	15000	836
8	559	707	599	e340	635	577	1790	1990	1720	1980	21800	1480
9	534	697	596	e320	588	570	2080	1890	1610	2470	4040	958
10	523	752	594	e360	569	552	2380	1840	1740	3910	2400	821
11	509	760	592	e400	561	595	1710	1790	2490	2230	1980	773
12	506	762	592	e360	537	582	1520	1780	2110	1990	2130	752
13	502	764	598	e320	494	561	1400	1740	2690	1870	2870	726
14	499	760	598	e340	484	557	1560	1670	2020	1740	1980	703
15	508	707	589	e380	498	564	4540	1700	1770	1670	1660	684
16	515	700	582	e480	492	591	3970	2050	1780	1610	1540	667
17	614	677	578	e460	466	645	3360	10600	1770	1610	1460	655
18	607	e665	573	e420	450	692	2890	3760	1690	1570	1610	640
19	567	663	568	e400	446	727	2570	2780	1630	1560	1470	631
20	549	657	530	e500	451	680	2360	2790	1590	2360	1350	651
21	550	658	e410	e600	446	653	2200	5100	1550	1680	1270	622
22	553	661	e310	e525	441	648	4430	3110	1550	1500	1210	600
23	557	657	e410	e550	415	642	4320	3250	3220	1330	1160	589
24	563	651	e340	e600	421	625	3010	2690	2170	1270	1120	580
25	571	646	e300	e500	445	608	2700	2430	1770	1200	1080	565
26	576	644	e320	e600	485	596	2520	2260	1640	1170	1050	548
27	586	641	e340	e650	523	594	3760	2130	2990	1170	1020	566
28	606	646	e370	e575	561	608	3980	2020	4700	1150	994	558
29	643	657	e340	530	---	603	3160	1940	2700	1080	971	530
30	656	657	e300	524	---	593	2780	1890	2420	1040	951	521
31	662	---	e260	519	---	584	---	2500	---	1010	924	---
TOTAL	17597	20628	15703	13383	14658	18801	72972	81770	62940	61950	78561	22021
MEAN	568	688	507	432	524	606	2432	2638	2098	1998	2534	734
MAX	695	783	639	650	735	727	4540	10600	4700	4190	21800	1480
MIN	450	628	260	250	415	552	559	1670	1550	1010	856	521
AC-FT	34900	40920	31150	26550	29070	37290	144700	162200	124800	122900	155800	43680
CFSM	.43	.52	.38	.33	.39	.46	1.83	1.99	1.58	1.51	1.91	.55
IN.	.49	.58	.44	.38	.41	.53	2.05	2.29	1.77	1.74	2.20	.62

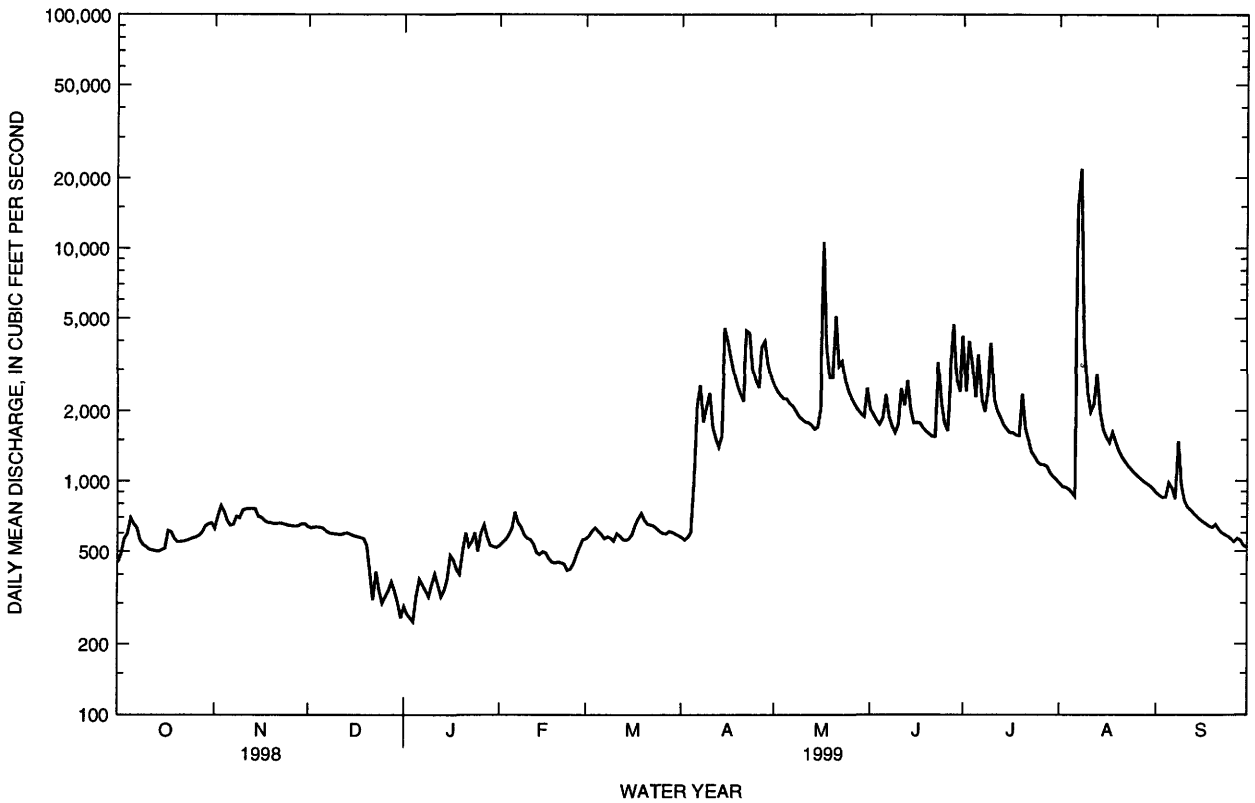
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1949 - 1999, BY WATER YEAR (WY)

MEAN	387	356	307	272	554	966	826	1068	1278	905	609	544
MAX	2002	1277	1140	1201	1777	3877	2867	3227	5031	6357	2610	2531
(WY)	1987	1973	1973	1973	1973	1979	1973	1973	1998	1993	1993	1972
MIN	27.1	33.6	20.6	17.4	19.4	67.8	42.7	97.3	65.6	71.2	30.1	41.0
(WY)	1956	1956	1956	1956	1956	1956	1956	1967	1956	1954	1955	1955

06808500 WEST NISHNABOTNA RIVER AT RANDOLPH, IA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1949 - 1999	
ANNUAL TOTAL	564985		480984			
ANNUAL MEAN	1548		1318		673	
HIGHEST ANNUAL MEAN					1985	1993
LOWEST ANNUAL MEAN					111	1968
HIGHEST DAILY MEAN	25800	Jun 15	21800	Aug 8	25800	Jun 15 1998
LOWEST DAILY MEAN	206	Jan 4	250	Jan 4	10	Dec 17 1955a
ANNUAL SEVEN-DAY MINIMUM	233	Jan 10	279	Dec 30	11	Dec 16 1955
INSTANTANEOUS PEAK FLOW			29300	Aug 8	40800	May 26 1987
INSTANTANEOUS PEAK STAGE			23.36	Aug 8	24.80	Mar 5 1949b
ANNUAL RUNOFF (AC-FT)	1121000		954000		487300	
ANNUAL RUNOFF (CFSM)	1.17		.99		.51	
ANNUAL RUNOFF (INCHES)	15.85		13.49		6.89	
10 PERCENT EXCEEDS	3170		2570		1460	
50 PERCENT EXCEEDS	888		677		350	
90 PERCENT EXCEEDS	416		451		90	

a Also Dec 18-21, 1955
b From graph based on gage readings, backwater from ice
e Estimated



06809210 EAST NISHNABOTNA RIVER NEAR ATLANTIC, IA

LOCATION.--Lat 41°20'46", long 95°04'36", in NW¼ NW¼ sec.35, T.76 N., R.37 W., Cass County, Hydrologic Unit 10240003, on left bank at downstream side of bridge on county highway, 1.6 mi upstream from Turkey Creek, 5.2 mi southwest of junction of U.S. Highway 6 and State Highway 83 in Atlantic, 69.1 mi upstream from confluence with West Nishnabotna River, and at mile 84.6 upstream from mouth of Nishnabotna River.

DRAINAGE AREA.--436 mi^2.

PERIOD OF RECORD.--October 1960 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,105.83 ft above sea level. Prior to Oct. 1, 1970, at site 2.2 mi upstream at datum 5.00 ft higher.

REMARKS.--Records good except those for estimated daily discharges, which are poor. Periodic observations of water temperature and specific conductance are published in this report as miscellaneous water quality data. U.S. Army Corps of Engineers rain gage and satellite data collection platform at station.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of July 2, 1958 reached a stage of 22.49 ft, from floodmark, discharge, 34,200 ft^3/s.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	121	169	162	e92	e150	269	214	827	652	919	372	160
2	144	191	164	e90	e200	357	206	780	616	990	336	159
3	185	204	162	e85	e300	405	240	735	582	2660	327	155
4	190	185	159	e80	283	348	249	716	782	980	314	163
5	226	172	157	e85	283	314	841	705	1570	899	296	179
6	220	170	153	e95	287	284	2250	665	785	4310	298	173
7	169	177	147	e120	248	260	1080	643	1420	1170	481	168
8	152	193	147	e115	239	252	1070	610	725	888	376	200
9	146	197	148	e105	242	235	2080	575	938	5600	300	167
10	141	265	e145	e100	223	329	1100	560	3200	1790	270	147
11	136	351	e145	e115	237	251	926	551	1880	1120	268	146
12	128	287	e150	e130	194	240	772	616	1050	950	646	141
13	125	267	e145	e100	186	237	721	583	901	844	523	135
14	125	257	e140	e105	202	238	769	542	805	767	320	129
15	124	231	e140	e115	205	252	2050	540	737	708	284	126
16	138	221	e140	e130	179	346	2080	1430	781	667	272	124
17	173	214	e138	e150	161	502	1450	4470	698	654	265	124
18	156	210	139	e140	175	428	1170	1960	646	622	276	123
19	137	196	126	e135	168	345	1030	1240	612	624	320	119
20	131	190	109	e120	186	318	916	1080	588	647	251	119
21	130	192	e95	e130	164	291	846	4170	563	575	232	114
22	125	193	e80	e150	162	267	1730	1720	580	542	218	113
23	121	188	e100	e140	149	255	1270	1500	3830	517	209	112
24	120	185	e80	e150	194	245	1010	1150	1360	508	203	109
25	120	184	e85	e140	186	235	908	1010	944	484	195	107
26	120	178	e90	e130	197	232	846	890	806	478	195	103
27	120	174	e100	e140	208	235	1440	829	2080	464	189	110
28	145	173	e110	e150	241	235	1330	769	2060	443	180	108
29	411	175	e105	e140	---	220	1030	713	1070	422	176	99
30	260	169	e95	e140	---	212	900	684	941	394	173	97
31	182	---	e85	e145	---	211	---	688	---	380	164	---
TOTAL	4921	6158	3941	3762	5849	8848	32524	33951	34202	33016	8929	4029
MEAN	159	205	127	121	209	285	1084	1095	1140	1065	288	134
MAX	411	351	164	150	300	502	2250	4470	3830	5600	646	200
MIN	120	169	80	80	149	211	206	540	563	380	164	97
AC-FT	9760	12210	7820	7460	11600	17550	64510	67340	67840	65490	17710	7990
CFSM	.36	.47	.29	.28	.48	.65	2.49	2.51	2.61	2.44	.66	.31
IN.	.42	.53	.34	.32	.50	.75	2.77	2.90	2.92	2.82	.76	.34

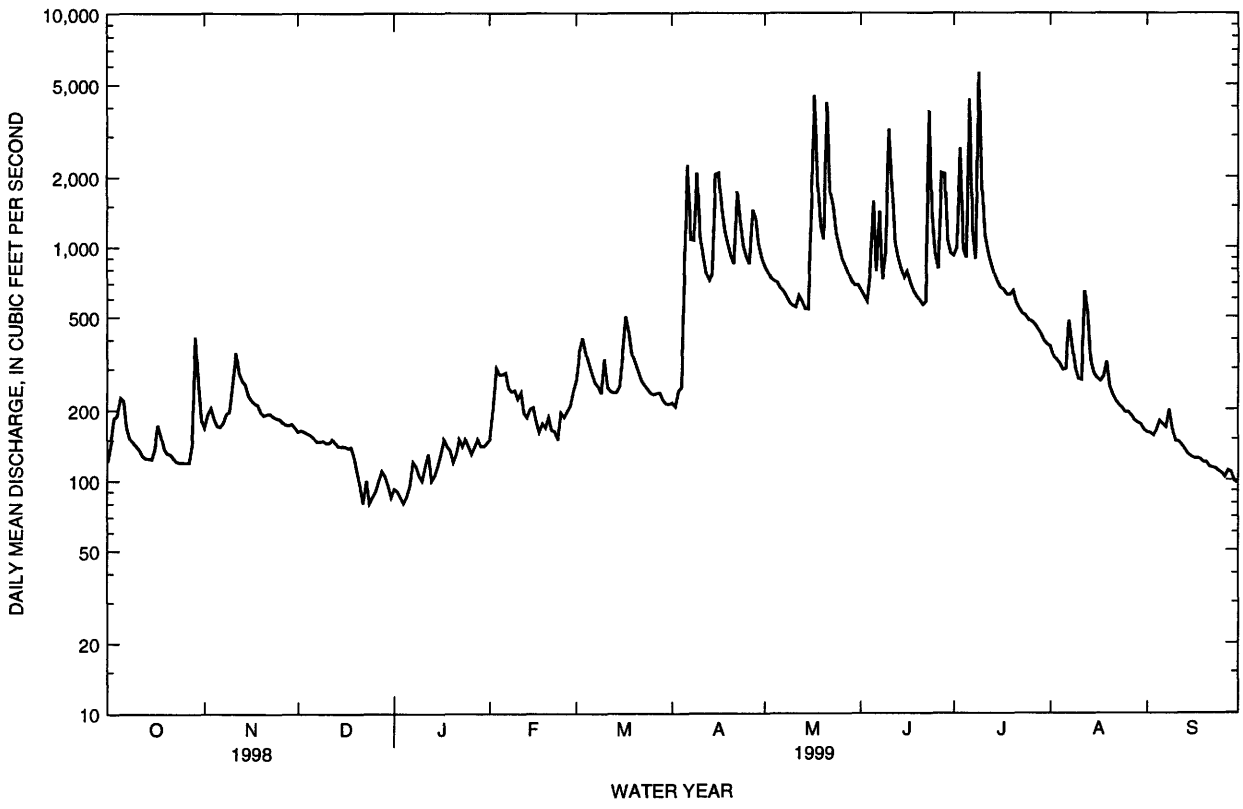
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1961 - 1999, BY WATER YEAR (WY)

MEAN	146	139	114	93.3	210	414	385	431	530	364	184	219
MAX	1069	757	529	529	812	1378	1138	1208	3125	2747	1394	1855
(WY)	1987	1973	1993	1973	1971	1965	1973	1986	1998	1993	1993	1972
MIN	21.0	20.3	10.6	7.68	18.7	28.4	27.9	15.0	23.5	15.6	13.4	14.8
(WY)	1967	1969	1964	1971	1968	1968	1981	1967	1977	1968	1968	1971

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1961 - 1999	
ANNUAL TOTAL	236970		180130			
ANNUAL MEAN	649		494		269	
HIGHEST ANNUAL MEAN					842	1993
LOWEST ANNUAL MEAN					23.7	1968
HIGHEST DAILY MEAN	32300	Jun 15	5600	Jul 9	32300	Jun 15 1998
LOWEST DAILY MEAN	70	Jan 13	80	Dec 22a	2.5	Jul 10 1977
ANNUAL SEVEN-DAY MINIMUM	80	Jan 9	87	Dec 30	7.0	Dec 17 1963
INSTANTANEOUS PEAK FLOW			11300	Jul 9	41400	Jun 15 1998
INSTANTANEOUS PEAK STAGE			14.18	Jul 9	22.81	Sep 12 1972
ANNUAL RUNOFF (AC-FT)	470000		357300		194800	
ANNUAL RUNOFF (CFSM)	1.49		1.13		.62	
ANNUAL RUNOFF (INCHES)	20.22		15.37		8.38	
10 PERCENT EXCEEDS	1060		1070		591	
50 PERCENT EXCEEDS	300		235		113	
90 PERCENT EXCEEDS	116		119		24	

a Also Dec 24 and Jan 4
e Estimated

06809210 EAST NISHNABOTNA RIVER NEAR ATLANTIC, IA--Continued



06809500 EAST NISHNABOTNA RIVER AT RED OAK, IA

LOCATION.--Lat 41°00'31", long 95°14'29", in $NW^1/_4$ $SE^1/_4$ sec.29, T.72 N., R.38 W., Montgomery County, Hydrologic Unit 10240003, on upstream side of Coolbaugh Street and 200 ft left of left end of Coolbaugh Street bridge in Red Oak, 0.2 mi upstream from Red Oak Creek, 38.0 mi upstream from confluence with West Nishnabotna River, and at mile 53.6 upstream from mouth of Nishnabotna River.

DRAINAGE AREA.--894 mi^2.

PERIOD OF RECORD.--May 1918 to November 1924, February 1925 to July 1925, May 1936 to current year. Monthly discharge only for some periods, published in WSP 1310.

REVISED RECORDS.--WSP 1240: 1921, 1922-23 (M), 1924, 1942 (M), 1944 (M), 1946. WSP 1440: Drainage area. WSP 1710: 1957.

GAGE.--Water-stage recorder. Datum of gage is 1,005.45 ft above sea level. Prior to July 5, 1925, nonrecording gage at present site at datum 4.60 ft higher. May 29, 1936 to Nov. 13, 1952, nonrecording gage with supplementary water-stage recorder in operation above 3.2 ft gage height. July 30, 1939 to Nov. 13, 1952, and Nov. 14, 1952 to June 13, 1966, water-stage recorder, all at site 0.5 mi upstream at datum 5.00 ft higher. June 14, 1966 to Sept. 30, 1969, at present site at datum 5.00 ft higher.

REMARKS.--Records good except those for estimated daily discharges, which are poor. Periodic observations of water temperature and specific conductance are published in this report as miscellaneous water quality data. U.S. Army Corps of Engineers rain gage and satellite data collection platform at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	215	309	306	e130	e270	394	397	e1660	1540	2620	660	325
2	232	328	301	e160	e290	428	398	e1540	e1400	1810	630	317
3	275	368	305	e150	e320	529	404	e1450	e1350	3790	614	312
4	335	356	304	e142	e360	515	438	e1380	1390	2080	607	328
5	362	323	302	e170	e420	480	655	e1370	2140	1650	585	351
6	419	306	299	e190	447	453	3550	e1310	1590	6110	562	337
7	371	310	291	e175	384	420	2060	e1240	2400	2930	7000	324
8	330	326	284	e168	326	420	1640	e1180	e1650	1930	1770	582
9	312	338	283	e160	320	386	3700	e1150	e1300	7280	959	378
10	305	372	281	e178	309	433	2190	e1120	4080	4640	762	319
11	299	459	277	e200	305	453	1740	e1110	3590	2480	705	298
12	293	467	277	e170	303	408	1450	e1090	e2200	2000	789	289
13	285	421	279	e152	e250	398	1260	e1080	e1800	1750	1280	278
14	284	406	277	e178	264	391	1370	1050	e1700	1580	733	269
15	284	396	274	e210	280	396	3820	1050	e1500	1450	633	265
16	287	376	273	e240	277	432	4600	2140	1420	1340	593	261
17	335	364	269	e220	252	565	3100	12300	1350	1280	572	257
18	351	e356	269	e215	242	683	2370	5600	1220	1220	589	255
19	323	350	269	e200	262	568	2030	3170	1150	1150	583	255
20	300	338	e130	e220	250	519	1820	2670	1100	1320	556	259
21	290	331	e170	e230	259	499	1630	9880	1050	1120	504	251
22	287	335	e160	e222	261	484	2750	e5500	1050	1020	475	245
23	285	333	e140	e230	e230	468	3080	e3400	4580	957	454	244
24	283	323	e130	e240	263	457	2060	e2800	3490	916	436	241
25	284	320	e140	e190	308	442	1810	2220	1920	875	419	236
26	282	318	e150	e215	307	428	1700	1960	1590	833	405	235
27	283	311	e160	e216	339	423	2240	1770	3120	829	396	246
28	289	310	e170	e216	364	426	3100	1630	5330	796	378	243
29	349	313	e160	e210	---	422	e2140	1520	2360	749	362	234
30	529	315	e150	e230	---	406	e1840	1610	1980	709	350	228
31	372	---	e140	e250	---	400	---	1730	---	674	339	---
TOTAL	9730	10478	7220	6077	8462	14126	61342	78680	62340	59888	25700	8662
MEAN	314	349	233	196	302	456	2045	2538	2078	1932	829	289
MAX	529	467	306	250	447	683	4600	12300	5330	7280	7000	582
MIN	215	306	130	130	230	386	397	1050	1050	674	339	228
AC-FT	19300	20780	14320	12050	16780	28020	121700	156100	123700	118800	50980	17180
CFSM	.35	.39	.26	.22	.34	.51	2.29	2.84	2.32	2.16	.93	.32
IN.	.40	.44	.30	.25	.35	.59	2.55	3.27	2.59	2.49	1.07	.36

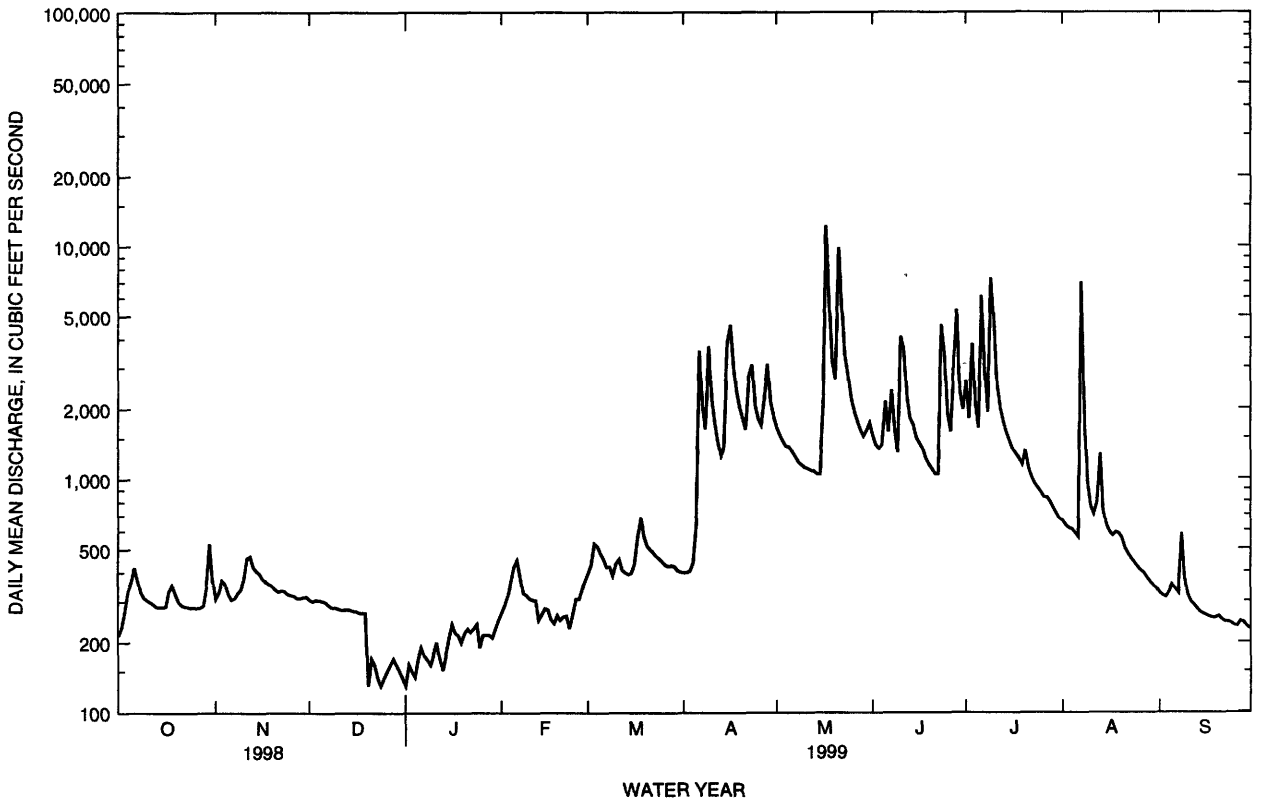
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1919 - 1999, BY WATER YEAR (WY)

MEAN	229	218	172	160	372	683	590	729	925	582	366	366
MAX	1816	1335	1038	1078	1438	2596	2194	2538	5330	6971	2821	3074
(WY)	1987	1973	1993	1973	1973	1965	1973	1999	1998	1993	1993	1972
MIN	16.5	19.9	14.6	12.3	17.2	32.3	30.4	35.2	40.5	24.5	17.0	14.9
(WY)	1938	1940	1938	1940	1940	1938	1956	1939	1968	1936	1936	1937

06809500 EAST NISHNABOTNA RIVER AT RED OAK, IA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1919 - 1999	
ANNUAL TOTAL	431850		352705			
ANNUAL MEAN	1183		966		453	
HIGHEST ANNUAL MEAN					1842	1993
LOWEST ANNUAL MEAN					54.9	1968
HIGHEST DAILY MEAN	45100	Jun 15	12300	May 17	45100	Jun 15 1998
LOWEST DAILY MEAN	130	Dec 20	130	Dec 20	6.0	Aug 18 1936
ANNUAL SEVEN-DAY MINIMUM	146	Dec 20	146	Dec 20	8.1	Dec 15 1937
INSTANTANEOUS PEAK FLOW			15100	May 17	60500	Jun 15 1998
INSTANTANEOUS PEAK STAGE			19.06	May 17	29.39	Jun 15 1998
ANNUAL RUNOFF (AC-FT)	856600		699600		328500	
ANNUAL RUNOFF (CFSM)	1.32		1.08		.51	
ANNUAL RUNOFF (INCHES)	17.97		14.68		6.89	
10 PERCENT EXCEEDS	2340		2190		984	
50 PERCENT EXCEEDS	544		398		186	
90 PERCENT EXCEEDS	220		220		42	

e Estimated



06810000 NISHNABOTNA RIVER ABOVE HAMBURG, IA

LOCATION.--Lat 40°37'57", long 95°37'32", in $SW^1/_4$ $SE^1/_4$ sec.11, T.67 N., R.42 W., Fremont County, Hydrologic Unit 10240004, on left bank 1.7 mi downstream from confluence of East Nishnabotna and West Nishnabotna Rivers, 2 mi northeast of Hamburg, and at mile 13.8.

DRAINAGE AREA.--2,806 mi^2.

PERIOD OF RECORD.--March 1922 to September 1923, October 1928 to current year. Monthly discharge only for some periods published in WSP 1310.

REVISED RECORDS.--WSP 1240: 1923, 1929-37, 1938-40 (M), 1943 (M). WSP 1440: Drainage area. WDR IA-74-1: 1973.

GAGE.--Water-stage recorder. Datum of gage is 894.17 ft above sea level. See WSP 1730 for history of changes prior to Nov. 16, 1950.

REMARKS.--Records good except those for estimated daily discharges, which are poor. U.S. Army Corps of Engineers rain gage and satellite data collection platform at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	846	1080	987	e480	e850	1060	1050	5300	4880	8400	2200	1880
2	887	1220	954	e480	911	1100	1020	4910	4410	5940	2050	1830
3	1020	1380	946	e460	962	1160	1040	4690	4080	5880	1990	1790
4	1090	1350	959	e440	1000	1290	1060	4490	3900	8010	1960	1810
5	1290	1190	964	e550	1070	1260	1600	4450	3790	5010	1900	2050
6	1230	1090	962	e650	1190	1180	4540	4320	5020	6730	1820	2040
7	1220	1100	941	e600	1190	1110	6290	4160	4200	8680	11100	1900
8	1120	1260	920	e570	1100	1110	4650	3970	4650	5120	22500	2170
9	1020	1230	908	e530	1000	1130	4950	3780	3720	5060	12200	1900
10	967	1340	913	e580	969	1040	6330	3640	3830	11500	5920	1340
11	941	1360	940	e700	971	1100	4450	3550	6800	6270	4680	1210
12	923	1400	933	e650	945	1150	3860	3610	5800	4960	4490	1160
13	900	1380	921	e600	881	1060	3460	3530	7640	4440	4930	1150
14	877	1280	918	e700	817	1040	3350	3430	5370	4070	4640	1130
15	841	1230	933	e800	836	1040	7940	3370	4430	3770	3600	1110
16	909	1200	933	e900	871	1070	10700	3560	4070	3550	3250	1080
17	1030	1150	941	e880	842	1160	8390	14800	3970	3410	3060	1050
18	1130	1130	955	e750	803	1340	6670	14100	3770	3320	3090	1030
19	1060	1110	926	e700	802	1530	5860	8350	3510	3170	3210	1010
20	973	1080	856	e800	821	1370	5270	6810	3360	3640	2870	1020
21	922	1070	e650	e950	796	1280	4830	14700	3230	3770	2730	1020
22	892	1060	e500	e900	789	1260	6900	13200	3210	3240	2580	970
23	887	1050	e600	e850	696	1260	8760	10000	4900	2860	2500	946
24	875	1040	e550	e900	693	1200	6470	7960	7790	2750	2390	926
25	871	1010	e550	e850	702	1160	5480	6600	4910	2610	2300	907
26	878	1000	e550	e900	853	1140	5070	5880	4050	2500	2240	879
27	876	991	e600	e950	959	1120	6810	5330	5760	2460	2200	939
28	894	982	e650	e900	1050	1130	8120	4900	12100	2450	2140	948
29	941	998	e600	e830	---	1130	7060	4550	7940	2330	2090	953
30	1000	1010	e550	e800	---	1120	5850	4340	5590	2220	2010	887
31	1230	---	e480	e820	---	1090	---	6170	---	2560	1930	---
TOTAL	30540	34771	24990	22470	25369	36190	157830	192450	150680	140680	126570	39035
MEAN	985	1159	806	725	906	1167	5261	6208	5023	4538	4083	1301
MAX	1290	1400	987	950	1190	1530	10700	14800	12100	11500	22500	2170
MIN	841	982	480	440	693	1040	1020	3370	3210	2220	1820	879
MED	941	1120	920	750	876	1130	5380	4690	4420	3770	2580	1100
AC-FT	60580	68970	49570	44570	50320	71780	313100	381700	298900	279000	251100	77430
CFSM	.35	.41	.29	.26	.32	.42	1.87	2.21	1.79	1.62	1.46	.46
IN.	.40	.46	.33	.30	.34	.48	2.09	2.55	2.00	1.87	1.68	.52

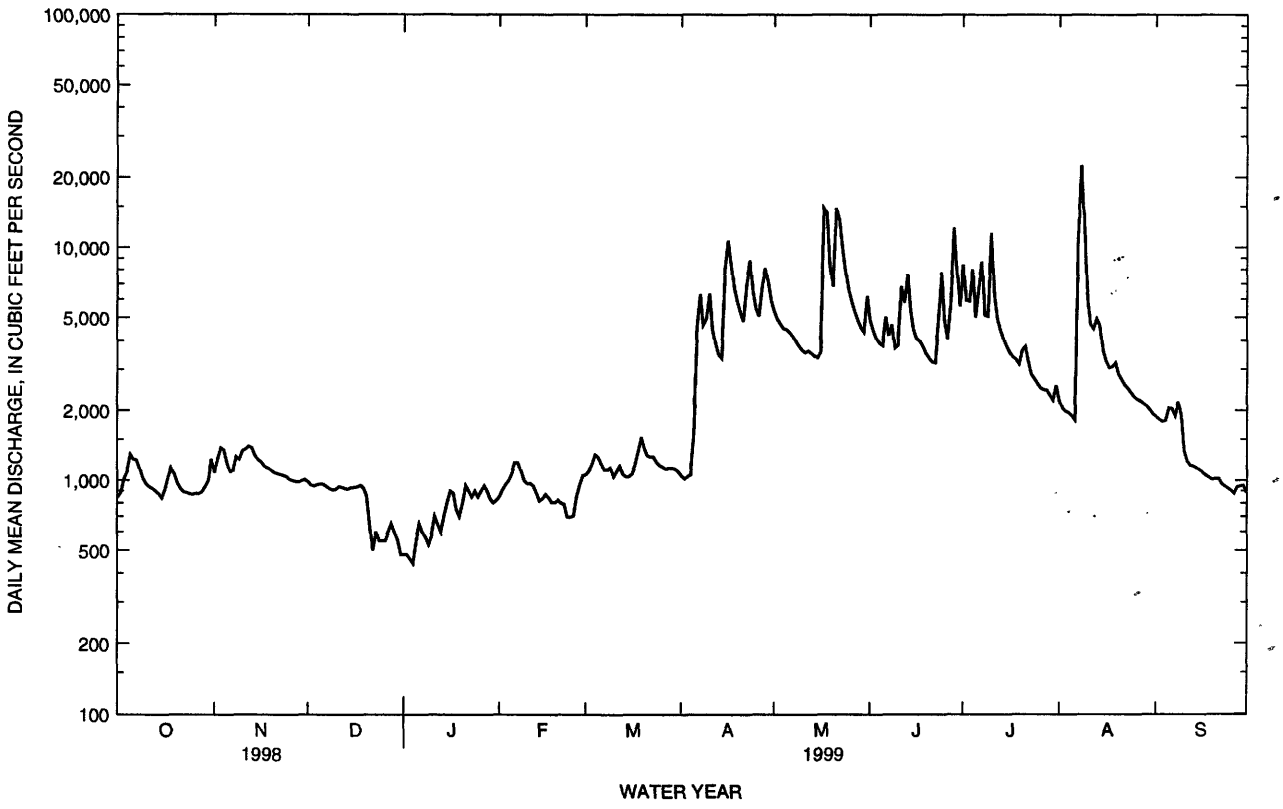
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1922 - 1999, BY WATER YEAR (WY)

MEAN	679	678	564	565	1055	1839	1534	1925	2612	1715	1122	1020
MAX	5004	3083	2557	3585	4720	7229	5866	6621	16430	17780	6266	7385
(WY)	1987	1973	1973	1973	1973	1979	1973	1995	1947	1993	1993	1993
MIN	39.5	42.9	27.1	21.3	30.3	115	89.7	68.2	151	52.8	16.8	44.1
(WY)	1938	1938	1938	1940	1940	1931	1956	1934	1956	1936	1934	1937

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1922 - 1999	
ANNUAL TOTAL	1201288		981575			
ANNUAL MEAN	3291		2689		1279	
HIGHEST ANNUAL MEAN					5062	1993
LOWEST ANNUAL MEAN					170	1934
HIGHEST DAILY MEAN	53700	Jun 17	22500	Aug 8	53700	Jun 17 1998
LOWEST DAILY MEAN	480	Dec 31	440	Jan 4	4.5	Aug 30 1934
ANNUAL SEVEN-DAY MINIMUM	569	Dec 25	491	Dec 30	9.9	Aug 24 1934
INSTANTANEOUS PEAK FLOW			25800	Aug 8	65100	Jun 17 1998
INSTANTANEOUS PEAK STAGE			28.83	Aug 8	33.18	Jun 17 1998
ANNUAL RUNOFF (AC-FT)	2383000		1947000		926500	
ANNUAL RUNOFF (CFSM)	1.17		.96		.46	
ANNUAL RUNOFF (INCHES)	15.93		13.01		6.19	
10 PERCENT EXCEEDS	6580		6030		2940	
50 PERCENT EXCEEDS	1900		1210		600	
90 PERCENT EXCEEDS	860		803		120	

e Estimated

06810000 NISHNABOTNA RIVER ABOVE HAMBURG, IA--Continued



06813500 MISSOURI RIVER AT RULO, NE

LOCATION.--Lat 40°03'13", long 95°25'19", in NW$^1/_4$ NW$^1/_4$ sec.17, T.1 N., R.18 E., Richardson County, Hydrologic Unit 10240005, on right bank at downstream side of bridge on U.S. Highway 159 at Rulo, 3.2 mi upstream from Big Nemaha River, and at mile 498.0.

DRAINAGE AREA.--414,900 mi^2, approximately. The 3,959 mi^2 in Great Divide basin are not included.

PERIOD OF RECORD.--October 1949 to current year in reports of U.S. Geological Survey. Gage- height record collected at site 80 ft upstream January 1886 to December 1899 published in reports of Missouri River Commission; September 1929 to September 1950 in files of Kansas City office of U.S. Army Corps of Engineers.

GAGE.--Water-stage recorder. Datum of gage is 837.23 ft above sea level. Oct. 1949 to Sept. 12, 1950, nonrecording gage at site 80 ft upstream and Sept. 13, 1950 to Apr. 19, 1983, recording gage on downstream end of middle pier, all at same datum.

REMARKS.--Records good, except those for estimated daily discharges, which are poor. Flow regulated by upstream main-stem reservoirs. Fort Randall Dam was completed in July 1952, with storage beginning in December 1952. Gavins Point Dam was completed in July 1955, with storage beginning in December 1955. Periodic observations of water temperature and specific conductance are published in this report as miscellaneous water quality data. U.S. Army Corps of Engineers satellite data collection platform at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 358,000 ft^3/s Apr. 22, 1952, gage height, 25.60 ft; minimum daily discharge, 4,420 ft^3/s Jan. 13, 1957; minimum gage height, -0.19 ft Dec. 25, 1990, result of freezeup.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in 1881 reached a stage of 22.9 ft, from floodmark, discharge not determined.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	43200	51200	60200	38000	38700	44900	47600	61800	82000	114000	60200	58100
2	43900	63600	60200	38500	38300	45300	48000	59200	79500	111000	58500	57900
3	45500	63200	61000	37700	38700	46500	49200	59500	96500	99500	58400	57000
4	47200	59000	60500	37500	40900	48400	49300	60600	94500	99300	58400	56800
5	50800	e57000	60000	35900	42900	48400	52800	63800	84500	95100	57300	58000
6	52700	e56000	58300	35300	45000	49600	68600	65400	91900	89900	54300	62300
7	50100	e55000	57300	36200	47700	49400	62600	65900	93600	91100	63300	60500
8	47600	57800	55500	36700	47300	48900	60000	69200	83800	86000	104000	59100
9	44500	57100	53600	36900	47400	49600	63300	67800	77200	82800	102000	60100
10	43900	60300	51900	35700	47100	49500	66400	67400	76800	89400	79400	60200
11	43600	65100	51200	35500	46500	49300	67300	68300	80800	86600	66300	60400
12	43600	67000	50200	35300	46500	49400	65300	69700	85800	76800	64900	60900
13	44000	61900	50000	35700	46300	48800	62500	68600	95900	71500	65200	60200
14	43600	60000	49300	36100	45300	48500	60800	65500	91500	67000	65000	60100
15	43500	61200	49300	36200	44700	47800	100000	67700	79200	64300	61900	59500
16	43000	62800	48900	35500	45300	48200	111000	74800	76200	62700	59400	59000
17	45200	65600	48800	36200	45000	49500	99800	94800	79000	63200	59100	57800
18	46400	66200	48900	37900	45200	49500	84800	101000	78400	63400	58900	57000
19	45100	66100	48300	39300	45100	50400	74300	86900	78200	64500	60100	57300
20	44900	66200	47800	38600	45000	51500	68200	77800	76700	65800	58700	57400
21	44600	65600	46700	37600	44200	51900	65400	110000	73500	67900	57500	57300
22	44700	64900	43600	38000	43700	49600	70400	102000	72700	69400	57200	56600
23	44600	64500	39700	38800	43400	52200	81100	90600	78000	69400	56200	56200
24	45600	63900	36800	38800	43100	52400	76900	86400	81400	70500	55700	56100
25	45500	62600	34900	38700	42000	51300	65600	81000	78000	67000	55400	55600
26	46000	62500	34400	39200	43100	50800	58800	78100	74800	64700	55200	55700
27	45900	61600	35000	39300	44100	49800	88600	74700	81100	63200	54100	56600
28	46400	61300	36300	39300	44600	49700	88600	71200	113000	62000	53500	56400
29	46800	60600	37500	39000	---	49000	74200	69100	122000	60400	54500	55800
30	48100	60400	38200	38700	---	48300	66800	68000	119000	59200	55300	55300
31	49800	---	37700	38600	---	47600	---	79900	---	59700	56600	---
TOTAL	1420300	1850200	1492000	1160700	1237100	1526000	2098200	2326700	2575500	2357300	1926500	1741200
MEAN	45820	61670	48130	37440	44180	49230	69940	75050	85850	76040	62150	58040
MAX	52700	67000	61000	39300	47700	52400	111000	110000	122000	114000	104000	62300
MIN	43000	51200	34400	35300	38300	44900	47600	59200	72700	59200	53500	55300
AC-FT	2817000	3670000	2959000	2302000	2454000	3027000	4162000	4615000	5109000	4676000	3821000	3454000
CFSM	.11	.15	.12	.09	.11	.12	.17	.18	.21	.18	.15	.14
IN.	.13	.17	.13	.10	.11	.14	.19	.21	.23	.21	.17	.16

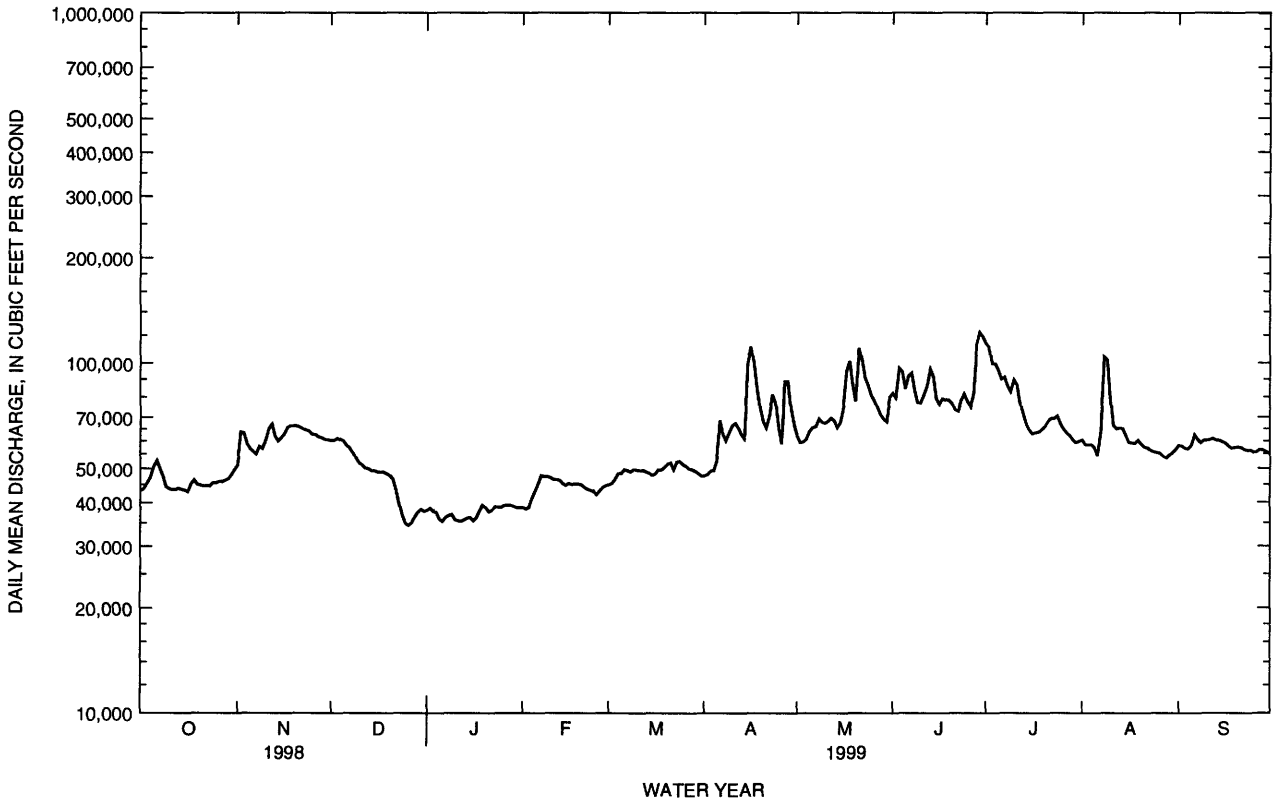
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1953 - 1999, BY WATER YEAR (WY)

MEAN	44820	40860	27190	22620	28720	41550	51740	52090	57390	51520	45490	45640
MAX	80050	83880	57380	42280	53140	79590	106100	97280	130600	164800	78730	76410
(WY)	1998	1998	1998	1973	1997	1979	1997	1997	1984	1993	1996	1997
MIN	25580	17000	9953	10800	13220	15380	21820	33790	33710	33860	29820	34140
(WY)	1962	1962	1956	1957	1957	1957	1957	1956	1956	1963	1955	1991

06813500 MISSOURI RIVER AT RULO, NE--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1953 - 1999a	
ANNUAL TOTAL	19695500		21711700			
ANNUAL MEAN	53960		59480		42500	
HIGHEST ANNUAL MEAN					71880	1997
LOWEST ANNUAL MEAN					26340	1957
HIGHEST DAILY MEAN	129000	Jun 15	122000	Jun 29	289000	Jul 24 1993
LOWEST DAILY MEAN	29800	Jan 16	34400	Dec 26	4420	Jan 13 1957
ANNUAL SEVEN-DAY MINIMUM	30800	Jan 14	35700	Jan 10	5560	Nov 30 1955
INSTANTANEOUS PEAK FLOW			125000	Jun 29	307000	Jul 24 1993
INSTANTANEOUS PEAK STAGE			21.63	Jun 29	25.37	Jul 24 1993
INSTANTANEOUS LOW FLOW			34200	Dec 26		
ANNUAL RUNOFF (AC-FT)	39070000		43070000		30790000	
ANNUAL RUNOFF (CFSM)	.13		.14		.10	
ANNUAL RUNOFF (INCHES)	1.77		1.95		1.39	
10 PERCENT EXCEEDS	69500		84100		67400	
50 PERCENT EXCEEDS	50200		57400		38900	
90 PERCENT EXCEEDS	40600		38800		18500	

a Post regulation, revised
e Estimated



06817000 NODAWAY RIVER AT CLARINDA, IA

LOCATION.--Lat 40°44'19", long 95°00'47", in $SW^1/_4$ $NE^1/_4$ sec.32, T.69 N., R.36 W., Page County, Hydrologic Unit 10240009, near left abutment on downstream side of bridge on State Highway 2 (city route), 0.5 mi downstream from North Branch, 1.2 mi east of city square of Clarinda, and 7.5 mi upstream from East Nodaway River.

DRAINAGE AREA.--762 mi^2.

PERIOD OF RECORD.--May 1918 to July 1925, May 1936 to current year. Monthly discharge only for some periods, published in WSP 1310. No winter records 1918-1925.

REVISED RECORDS.--WSP 1240: 1918-20 (M), 1921, 1922-25 (M), 1936-38, 1942, 1943-45 (M), 1948. WSP 1440: Drainage area. WSP 1710: 1958, 1959 (P).

GAGE.--Water-stage recorder. Datum of gage is 955.36 ft above sea level. Prior to July 5, 1925, and May 28, 1936 to Mar. 26, 1957, nonrecording gage at same site, and prior to Oct. 1, 1987, at datum 5.00 ft. higher.

REMARKS.--Records good except those for estimated daily discharges, which are poor. Clarinda municipal water supply is taken from Nodaway River, 500 ft upstream from station. Average daily pumpage was 1.14 ft^3/s. Periodic observations of water temperature and specific conductance are published in this report as miscellaneous water quality data. U.S. Geological Survey and satellite data collection platform at station.

COOPERATION.--Average pumpage provided by City of Clarinda water works.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in August 1903 reached a stage of 25.4 ft, from floodmarks, discharge not determined.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	88	110	126	e80	e130	296	190	1110	1230	1680	222	116
2	94	158	126	e77	e140	281	172	955	1060	946	172	119
3	108	198	121	e75	217	290	174	865	926	688	163	114
4	121	227	125	e70	273	257	176	844	866	580	171	121
5	130	164	120	e80	297	235	220	863	825	491	162	129
6	140	137	106	e105	256	212	618	803	765	468	149	129
7	135	135	106	e100	260	188	575	777	708	526	4100	122
8	108	162	96	e95	230	165	412	704	668	408	1740	389
9	101	175	95	e90	215	164	1260	637	602	1310	671	204
10	103	279	98	e110	211	194	953	600	783	1810	511	117
11	101	354	91	e140	175	228	631	560	1030	757	431	97
12	92	286	91	e120	162	186	490	716	1070	586	453	86
13	94	225	96	e90	149	178	435	896	2070	513	404	74
14	99	204	95	e105	138	180	460	627	877	469	366	69
15	103	180	95	e115	159	186	5700	657	651	431	334	72
16	103	166	94	e130	142	249	3950	822	598	398	318	72
17	121	159	86	e125	115	361	2750	9660	562	373	301	69
18	130	162	93	e120	116	448	2110	4700	509	366	303	71
19	303	136	81	e110	117	304	1680	2980	476	349	311	66
20	162	129	95	e120	125	273	1320	2130	459	330	283	65
21	131	127	65	e125	134	253	1130	17200	435	340	264	69
22	114	138	89	e120	98	235	2860	6920	435	304	247	70
23	109	131	e80	e125	76	236	2720	4990	1480	280	216	73
24	106	121	e70	e130	127	229	1520	3230	1920	273	179	71
25	113	128	e75	e110	139	211	1200	2430	835	259	179	69
26	108	125	e80	e115	172	193	1040	1960	640	235	175	62
27	113	124	e85	e120	229	199	2940	1660	942	232	176	86
28	124	126	e88	e115	257	208	3360	1450	2030	263	168	98
29	153	141	e85	e120	---	196	1830	1280	896	229	148	87
30	134	131	e80	e125	---	184	1350	1490	679	205	126	71
31	117	---	e75	e120	---	180	---	1780	---	600	118	---
TOTAL	3758	5038	2908	3382	4859	7199	44226	76296	27027	16699	13561	3057
MEAN	121	168	93.8	109	174	232	1474	2461	901	539	437	102
MAX	303	354	126	140	297	448	5700	17200	2070	1810	4100	389
MIN	88	110	65	70	76	164	172	560	435	205	118	62
AC-FT	7450	9990	5770	6710	9640	14280	87720	151300	53610	33120	26900	6060
CFSM	.16	.22	.12	.14	.23	.30	1.93	3.23	1.18	.71	.57	.13
IN.	.18	.25	.14	.17	.24	.35	2.16	3.72	1.32	.82	.66	.15

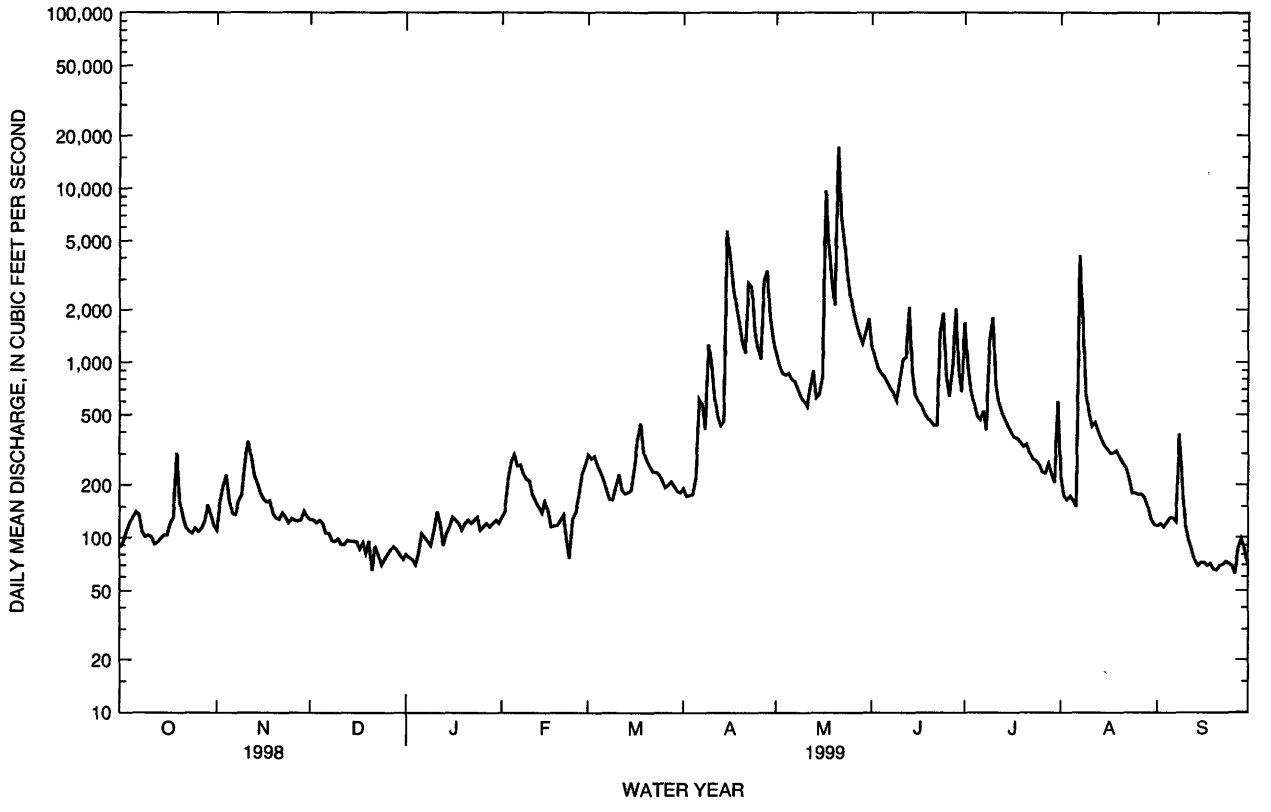
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1919 - 1999, BY WATER YEAR (WY)

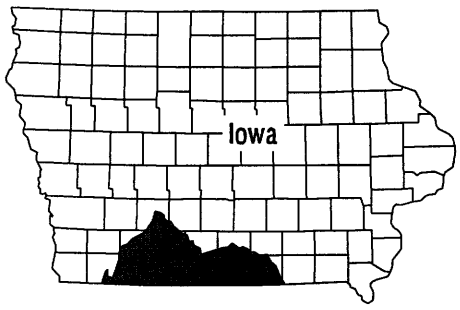
MEAN	177	177	140	136	320	569	574	706	775	444	238	322
MAX	1658	1602	1090	853	1857	2456	2450	2489	4779	6778	1953	3019
(WY)	1974	1973	1993	1974	1973	1979	1973	1996	1947	1993	1987	1972
MIN	7.52	8.27	2.10	6.52	11.3	14.0	14.4	10.3	20.0	17.3	9.81	6.83
(WY)	1938	1938	1924	1940	1940	1938	1956	1939	1968	1954	1936	1937

06817000 NODAWAY RIVER AT CLARINDA, IA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1919 - 1999	
ANNUAL TOTAL	236623		208010			
ANNUAL MEAN	648		570		392	
HIGHEST ANNUAL MEAN					1577	1993
LOWEST ANNUAL MEAN					36.8	1968
HIGHEST DAILY MEAN	20000	Jun 15	17200	May 21	25500	Sep 13 1972
LOWEST DAILY MEAN	46	Jan 13	62	Sep 26	1.0	Dec 9 1923a
ANNUAL SEVEN-DAY MINIMUM	69	Jan 10	68	Sep 20	1.3	Dec 25 1923
INSTANTANEOUS PEAK FLOW			23200	May 21	31100	Jun 13 1947b
INSTANTANEOUS PEAK STAGE			20.82	May 21	25.30	Jun 13 1947c
INSTANTANEOUS LOW FLOW			42	Dec 21		
ANNUAL RUNOFF (AC-FT)	469300		412600		283900	
ANNUAL RUNOFF (CFSM)	.85		.75		.51	
ANNUAL RUNOFF (INCHES)	11.55		10.15		6.99	
10 PERCENT EXCEEDS	1470		1290		850	
50 PERCENT EXCEEDS	237		184		106	
90 PERCENT EXCEEDS	94		88		20	

a Also Dec 27-31, 1923
b From rating curve extended above 15,000 ft^3/s on basis of an overflow profile and extended channel rating
c From floodmark
e Estimated





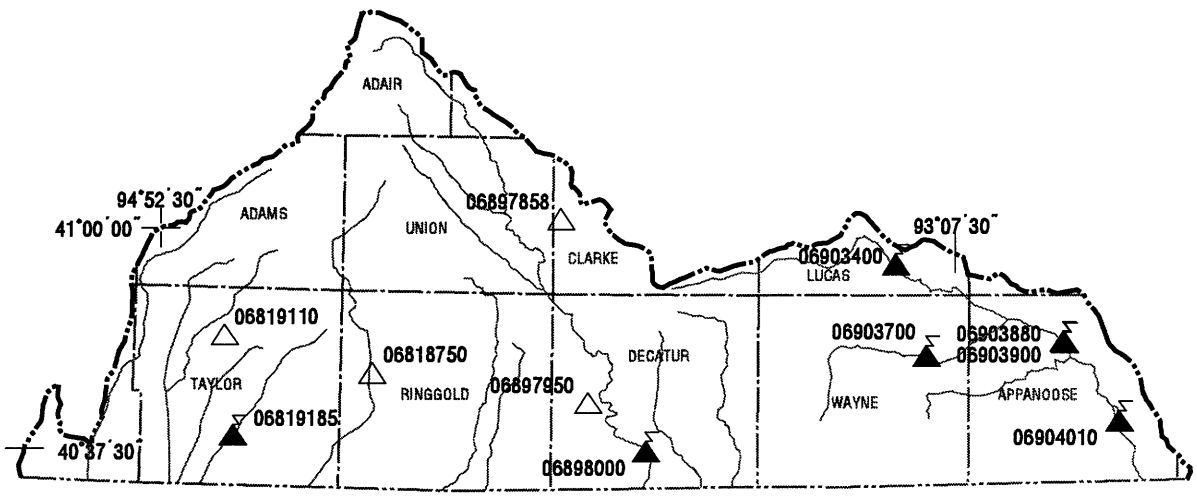
EXPLANATION

Hydrologic boundary

Streams

05449600 Transmitting gaging station and station number

05448600 Crest-stage gaging station and station number



Base from U.S. Geological Survey hydrologic unit map State of Iowa, 1974

0 8 16 24 32 MILES

0 8 16 24 32 KILOMETERS

Gaging Stations

Crest Stage Gaging Stations

06819185 EAST FORK ONE HUNDRED AND TWO RIVER AT BEDFORD, IA

LOCATION.--Lat 40°39'38", long 94°42'59", in NE$^1/_4$ sec.35, T.68 N., R.34 W., Taylor County, Hydrologic Unit 10240013, on left bank at downstream side of bridge of county highway N44, 0.1 mi south of Bedford, 0.4 mi upstream from concrete stablization dam, and 3.0 mi upstream from Daugherty creek.

DRAINAGE AREA.--85.4 mi^2.

PERIOD OF RECORD.--October 1983 to current year. September 1959 to September 1983, at site 2 mi downstream published as "near Bedford" (station 06819190) not equivalent because of difference in drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,069.16 ft above sea level.

REMARKS:--Records fair except those for estimated daily discharges, which are poor. Slight regulation at low flow by low dam used for water supply in Bedford. Periodic observations of water temperature and specific conductance are published in this report as miscellaneous water quality data. U.S. Geolocial Survey satellite data collection platform and a U.S. National Weather Service Limited Automatic Remote Collector (LARC) at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.9	6.7	7.9	e1.6	e2.8	52	18	57	112	162	187	e1.6
2	5.3	17	7.9	e1.9	e3.4	43	19	49	71	67	65	e1.5
3	4.4	39	8.4	e1.7	e5.0	32	25	46	55	54	41	e1.6
4	6.8	16	8.6	e1.4	e6.5	27	25	53	50	42	29	e2.0
5	4.8	7.0	8.9	e1.2	e8.0	25	138	66	46	35	17	e2.5
6	3.1	4.7	9.8	e1.1	e12	19	103	64	39	32	13	e2.1
7	2.7	6.8	10	e1.2	17	16	52	80	36	25	964	e1.7
8	3.5	13	9.7	e1.2	19	18	44	58	31	22	108	e1.4
9	3.0	27	9.3	e1.1	15	31	43	48	28	206	49	e1.2
10	2.6	245	9.9	e1.1	12	24	33	43	109	57	30	e1.0
11	1.9	36	9.3	e1.2	17	22	27	42	73	37	22	e.90
12	1.6	18	9.6	e1.1	14	31	20	99	164	29	42	e.80
13	1.5	13	11	e1.0	10	36	19	62	2290	22	22	e.70
14	2.0	11	11	e1.0	10	47	80	48	379	19	13	e.60
15	2.2	9.1	11	e1.1	11	59	1770	75	116	15	9.8	e.60
16	2.9	8.9	11	e1.2	10	87	462	69	86	14	7.8	e.60
17	13	7.7	11	e1.4	8.2	60	198	104	68	17	5.9	e.60
18	6.0	7.5	11	e1.3	9.0	36	107	75	57	14	7.4	e.60
19	3.9	6.4	11	e1.2	11	30	79	54	52	13	6.1	e.70
20	3.3	5.3	9.2	e1.3	11	29	63	48	49	11	4.7	e.70
21	2.7	5.1	8.3	e1.4	10	26	56	598	45	10	5.3	e.70
22	2.1	5.9	5.1	e1.4	9.1	25	151	164	48	9.3	4.8	e.70
23	2.2	6.3	3.4	e1.5	11	28	193	248	906	7.9	e4.0	e.70
24	2.3	5.3	2.6	e1.6	14	24	84	92	156	7.8	e4.2	e.80
25	2.8	6.2	2.4	e1.5	15	19	67	68	83	7.4	e3.8	e.90
26	2.6	6.1	2.6	e1.6	68	18	61	54	63	7.9	e3.2	e.80
27	2.2	6.9	2.7	e1.9	154	18	641	46	57	8.1	e2.6	e1.0
28	3.1	7.6	2.5	e1.8	95	22	184	40	184	47	e2.4	e1.6
29	3.0	8.8	2.7	e2.0	---	18	95	35	84	13	e2.2	e1.3
30	2.9	9.8	e2.1	e2.3	---	17	69	74	72	8.7	e2.0	e1.0
31	3.9	---	e1.8	e2.5	---	16	---	603	---	1680	e1.8	---
TOTAL	107.2	573.1	231.7	44.8	588.0	955	4926	3262	5609	2700.1	1680.0	32.90
MEAN	3.46	19.1	7.47	1.45	21.0	30.8	164	105	187	87.1	54.2	1.10
MAX	13	245	11	2.5	154	87	1770	603	2290	1680	964	2.5
MIN	1.5	4.7	1.8	1.0	2.8	16	18	35	28	7.4	1.8	.60
AC-FT	213	1140	460	89	1170	1890	9770	6470	11130	5360	3330	65
CFSM	.04	.22	.09	.02	.25	.36	1.92	1.23	2.19	1.02	.63	.01
IN.	.05	.25	.10	.02	.26	.42	2.15	1.42	2.44	1.18	.73	.01

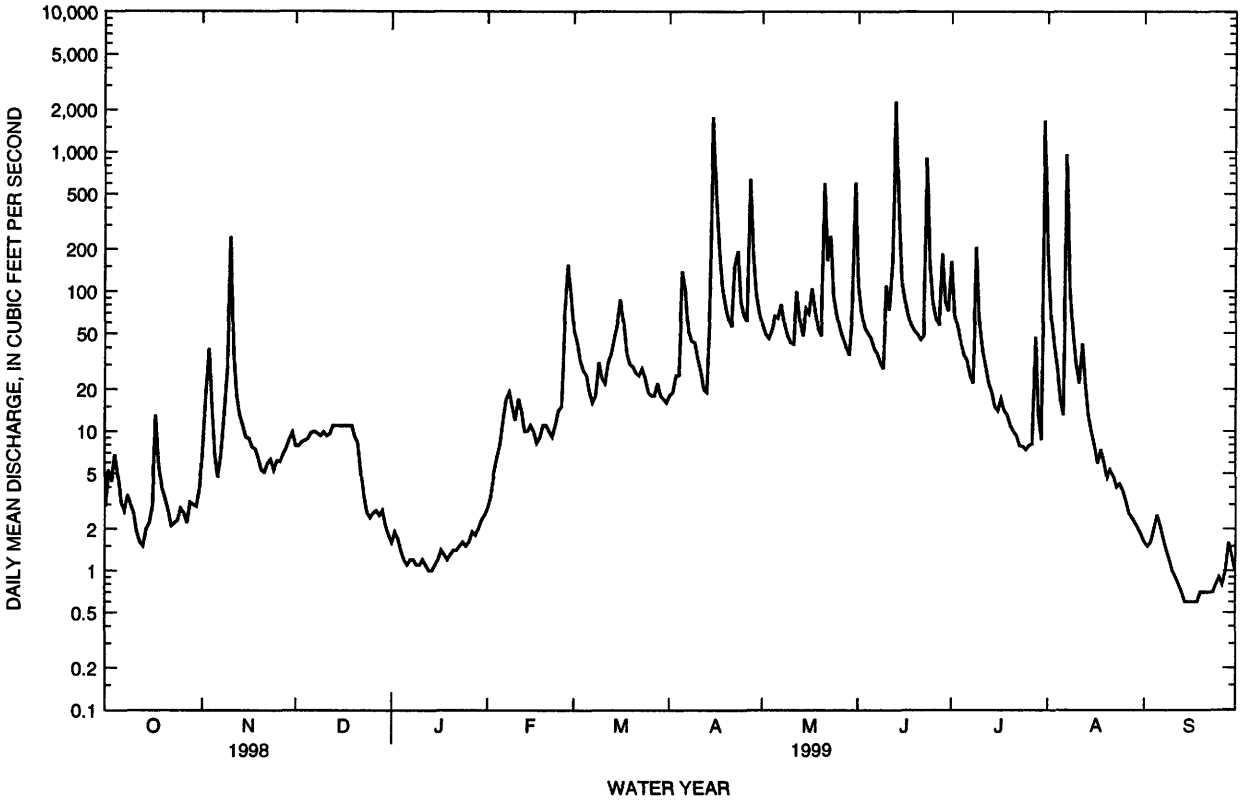
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1984 - 1999, BY WATER YEAR (WY)

MEAN	26.2	32.7	29.7	12.2	43.1	77.2	107	156	112	127	24.9	55.1
MAX	159	202	181	50.2	149	276	289	488	255	889	173	260
(WY)	1987	1993	1993	1998	1997	1998	1984	1995	1995	1993	1987	1993
MIN	.26	.78	.47	.50	.17	2.13	.82	.67	1.90	1.97	.63	.31
(WY)	1992	1991	1989	1991	1989	1989	1989	1989	1988	1988	1991	1991

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1984 - 1999	
ANNUAL TOTAL	28691.90		20709.80			
ANNUAL MEAN	78.6		56.7		67.1	
HIGHEST ANNUAL MEAN					200	1993
LOWEST ANNUAL MEAN					12.0	1985
HIGHEST DAILY MEAN	2420	Mar 30	2290	Jun 13	7600	Jul 5 1993
LOWEST DAILY MEAN	.77	Aug 26	.60	Sep 14a	.00	Jul 6 1989b
ANNUAL SEVEN-DAY MINIMUM	.82	Aug 21	.63	Sep 13	.00	Aug 3 1989
INSTANTANEOUS PEAK FLOW			6350	Jul 31	9570	Jul 14 1986
INSTANTANEOUS PEAK STAGE			22.60	Jul 31	23.85	Jul 5 1993
ANNUAL RUNOFF (AC-FT)	56910		41080		48590	
ANNUAL RUNOFF (CFSM)	.92		.66		.79	
ANNUAL RUNOFF (INCHES)	12.50		9.02		10.67	
10 PERCENT EXCEEDS	192		89		110	
50 PERCENT EXCEEDS	17		11		9.1	
90 PERCENT EXCEEDS	1.8		1.4		.72	

a Also Sep 15-18
b Many days between July 6 and Dec 24, 1989
e Estimated

06819185 EAST FORK ONE HUNDRED AND TWO RIVER AT BEDFORD, IA--Continued



06898000 THOMPSON RIVER AT DAVIS CITY, IA

LOCATION.--Lat 40°38'25", long 93°48'29", in $SE^1/_4$ $SE^1/_4$ sec.35, T.68 N., R.26 W., Decatur County, Hydrologic Unit 10280102, on right bank 15 ft downstream from bridge on U.S. Highway 69 at Davis City, 3.1 mi. upstream from Dickersons Branch, and 5.8 mi. upstream from Iowa-Missouri State line.

DRAINAGE AREA.--701 mi^2.

PERIOD OF RECORD.--May 1918 to July 1925, July 1941 to current year. Monthly discharge only for some periods, published in WSP 1310. No winter records 1921-25. Prior to October 1918, published as "Grand River".

REVISED RECORDS.--WSP 1240: 1918, 1920-21 (M), 1922-24, 1925 (M), 1946-47 (M). WSP 1440: Drainage area. WSP 1710: 1957.

GAGE.--Water-stage recorder. Datum of gage is 874.04 ft above sea level. May 14, 1918 to July 2, 1925, July 14, 1941 to Feb. 24, 1942, nonrecording gage, and Feb. 25, 1942 to Feb. 8, 1967, water-stage recorder at same site at datum 2.00 ft higher.

REMARKS.--Records good except those for estimated daily discharges, which are poor. Periodic observations of water temperature and specific conductance are published in this report as miscellaneous water quality data. U.S. Geological Survey satellite data collection platform and U.S. National Weather Service Limited Automatic Remote Collector (LARC) at station.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Aug. 8, 1885, reached a stage of 22.8 ft, datum in use prior to Feb. 9, 1967, from floodmark, discharge, 30,000 ft^3/s.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	48	68	97	e32	e50	681	157	733	959	315	142	27
2	62	328	95	e38	e60	500	151	605	823	275	67	26
3	66	429	95	e34	e75	402	167	526	492	248	53	27
4	88	297	96	e29	e110	356	171	488	381	218	46	27
5	320	194	94	e26	e140	337	584	541	340	190	43	30
6	132	159	98	e22	e190	322	2260	466	306	167	41	30
7	112	134	105	e23	e260	280	945	423	271	145	180	45
8	122	234	98	e22	e190	260	648	397	242	198	240	48
9	100	256	95	e20	e220	247	1000	376	220	348	213	275
10	81	1600	96	e21	254	296	842	349	322	305	153	164
11	70	1300	94	e22	515	347	613	336	1870	192	86	72
12	64	551	91	e21	387	365	432	2410	2040	143	89	51
13	59	342	90	e20	233	364	360	1790	1670	121	107	41
14	57	251	90	e21	222	445	343	896	626	110	88	34
15	56	208	90	e20	217	648	4060	705	442	101	65	30
16	55	184	89	e23	211	1190	5670	860	367	94	55	26
17	469	163	88	e27	186	1220	4280	1920	315	89	47	24
18	463	148	87	e25	170	798	2060	4060	280	88	44	23
19	182	135	84	e23	168	545	1240	1790	250	89	40	22
20	126	123	65	e25	172	416	912	1060	225	87	39	22
21	106	116	57	e27	169	360	740	801	208	82	64	21
22	91	113	66	e27	161	317	997	1900	195	76	50	20
23	77	109	e44	e29	146	286	3910	2590	1040	72	39	19
24	69	105	e40	e34	158	260	1930	1210	1760	68	34	20
25	65	104	e36	e32	193	234	1090	818	952	56	33	19
26	63	100	e40	e30	420	214	810	636	516	52	32	18
27	63	96	e42	e36	854	202	3590	525	388	50	32	29
28	64	94	e44	e32	907	197	3060	448	335	52	31	32
29	66	96	e42	e36	---	190	1640	394	312	49	29	37
30	62	100	e38	e42	---	176	981	354	325	49	29	39
31	59	---	e36	e45	---	160	---	1300	---	282	28	---
TOTAL	3517	8137	2322	864	7038	12615	45643	31707	18472	4411	2239	1298
MEAN	113	271	74.9	27.9	251	407	1521	1023	616	142	72.2	43.3
MAX	469	1600	105	45	907	1220	5670	4060	2040	348	240	275
MIN	48	68	36	20	50	160	151	336	195	49	28	18
AC-FT	6980	16140	4610	1710	13960	25020	90530	62890	36640	8750	4440	2570
CFSM	.16	.39	.11	.04	.36	.58	2.17	1.46	.88	.20	.10	.06
IN.	.19	.43	.12	.05	.37	.67	2.42	1.68	.98	.23	.12	.07

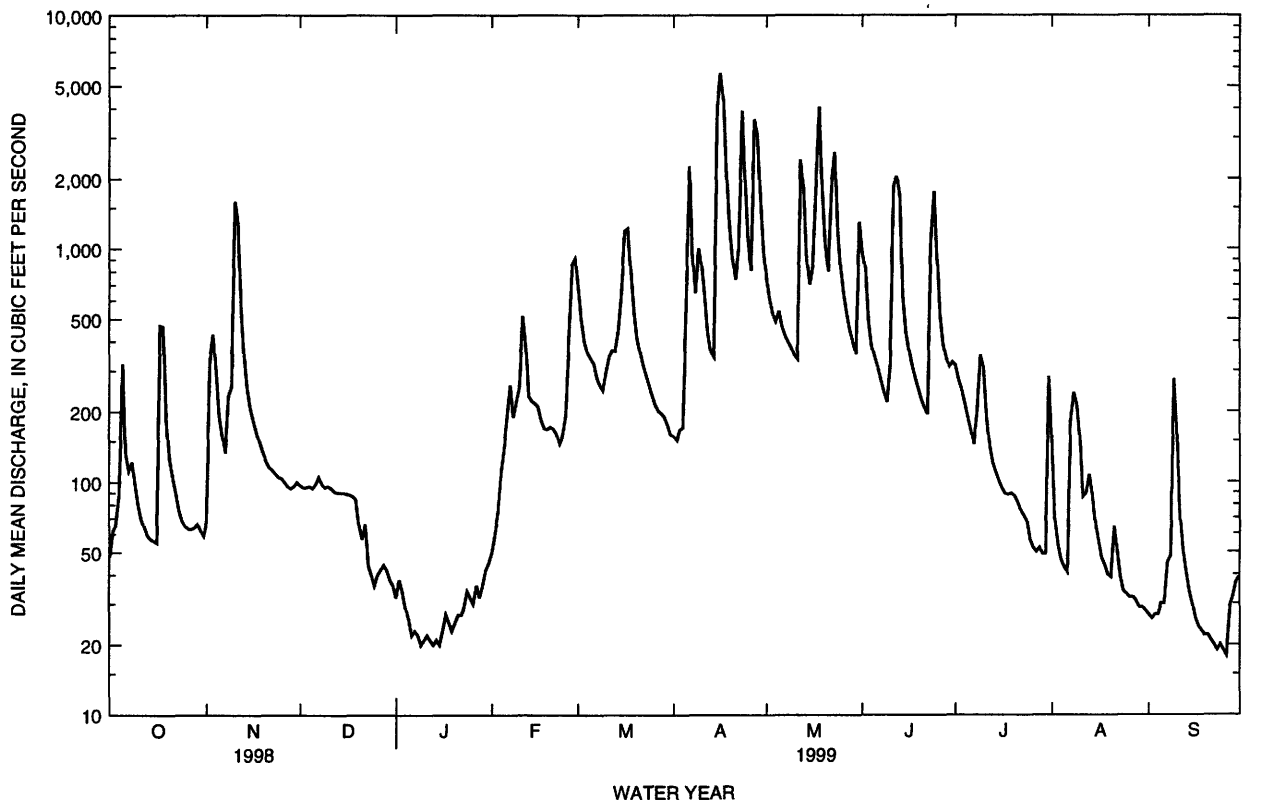
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1919 - 1999, BY WATER YEAR (WY)

MEAN	192	221	154	162	344	655	709	711	665	438	190	342
MAX	2138	1462	1299	1292	1849	2375	2586	3364	4750	7239	2255	5178
(WY)	1974	1962	1983	1960	1973	1979	1973	1996	1947	1993	1987	1992
MIN	1.41	2.07	.94	.62	1.14	10.7	2.55	1.19	3.08	1.98	9.35	4.13
(WY)	1957	1956	1956	1956	1956	1954	1956	1956	1956	1977	1955	1953

06898000 THOMPSON RIVER AT DAVIS CITY, IA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1919 - 1999	
ANNUAL TOTAL	182517		138263			
ANNUAL MEAN	500		379		402	
HIGHEST ANNUAL MEAN					1469	1993
LOWEST ANNUAL MEAN					52.3	1956
HIGHEST DAILY MEAN	11900	Mar 31	5670	Apr 16	52900	Sep 16 1992
LOWEST DAILY MEAN	36	Dec 25	18	Sep 26	.10	Jun 25 1956
ANNUAL SEVEN-DAY MINIMUM	40	Dec 25	20	Sep 20	.36	Jun 19 1956
INSTANTANEOUS PEAK FLOW			6080	Apr 16	57000	Sep 16 1992
INSTANTANEOUS PEAK STAGE			7.36	Apr 16	24.29	Sep 16 1992
INSTANTANEOUS LOW FLOW			17	Sep 26		
ANNUAL RUNOFF (AC-FT)	362000		274200		291000	
ANNUAL RUNOFF (CFSM)	.71		.54		.57	
ANNUAL RUNOFF (INCHES)	9.69		7.34		7.78	
10 PERCENT EXCEEDS	1380		948		865	
50 PERCENT EXCEEDS	209		145		85	
90 PERCENT EXCEEDS	58		29		9.8	

e Estimated



06903400 CHARITON RIVER NEAR CHARITON, IA

LOCATION.--Lat 40°57'12", long 93°15'37", in SW$^1/_4$ NE$^1/_4$ sec.15, T.71 N., R.21 W., Lucas County, Hydrologic Unit 10280201, on right bank 15 ft downstream from bridge on County Highway S43, 0.1 mi downstream from Wolf Creek, and 5.0 mi southeast of Chariton.

DRAINAGE AREA.--182 mi^2.

PERIOD OF RECORD.--October 1965 to current year. Occasional low-flow measurements, water years 1958-60, 1962, 1964.

GAGE.--Water stage recorder. Datum of gage is 917.90 ft above sea level (U.S. Army Corps of Engineers bench mark).

REMARKS.--Records fair except those for estimated daily discharges, which are poor. Periodic observations of water temperature and specific conductance are published in this report as miscellaneous water quality data. U.S. Army Corps of Engineers rain gage and satellite data collection platform at station.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in March 1960 reached a stage of about 23 ft, discharge, about 15,000 ft^3/s and flood of June 5, 1947 reached a stage of 21.65 ft, from floodmark, discharge, 11,000 ft^3/s. A discharge of 0.08 ft^3/s was measured on Oct. 30, 1963.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.8	29	26	e11	e60	158	26	139	416	22	144	2.7
2	3.2	534	24	e12	e67	85	e25	85	576	21	69	2.7
3	3.8	777	24	e13	e72	61	162	68	201	18	18	2.5
4	5.8	449	24	e12	e71	49	109	61	190	17	8.5	2.0
5	506	197	22	e11	e64	44	85	82	270	17	5.6	1.9
6	85	97	23	e20	e58	44	172	63	71	16	5.0	1.7
7	28	68	35	e18	e54	41	156	59	47	e11	62	1.7
8	16	121	37	e17	67	41	102	55	38	e8.0	458	1.7
9	9.0	348	37	e17	80	52	418	50	28	e12	262	1.4
10	6.6	1080	44	e19	59	52	250	46	141	e50	48	1.3
11	5.6	678	48	e19	80	53	121	58	1040	e44	30	1.1
12	6.2	377	42	e18	378	54	69	1730	441	e32	57	1.3
13	6.2	118	37	e17	331	58	52	1730	215	22	83	1.3
14	6.0	79	34	e17	85	67	46	956	292	13	56	1.2
15	5.9	63	32	e19	64	135	791	499	112	8.5	25	1.2
16	5.8	55	32	e21	56	781	2160	282	58	6.4	10	1.2
17	722	48	33	e22	47	1170	2030	1230	42	5.8	5.6	1.3
18	2140	44	31	e21	41	572	1670	1340	34	5.1	4.0	1.2
19	923	41	26	e22	42	164	676	839	28	4.5	3.0	1.2
20	226	37	20	e21	45	87	143	198	23	7.1	3.2	1.1
21	79	34	e16	e26	45	64	95	87	19	5.3	3.0	1.1
22	55	33	e14	e42	42	53	114	67	16	3.9	2.4	1.1
23	45	31	e12	e85	44	46	649	55	75	3.6	2.7	e1.2
24	39	30	e14	e70	42	42	536	46	176	4.2	3.5	e1.1
25	35	28	e16	e55	46	37	187	39	173	5.1	3.5	e1.2
26	31	26	e18	e44	133	e34	104	33	51	4.9	3.9	e1.2
27	29	24	e17	e55	334	e33	1120	25	34	5.2	3.7	e1.9
28	26	23	e18	e70	348	32	2030	21	25	6.1	3.2	e2.3
29	37	25	e15	e55	---	32	1230	17	22	6.3	2.9	e2.6
30	35	26	e13	e50	---	30	623	13	19	5.2	2.7	e2.3
31	28	---	e12	e48	---	27	---	191	---	7.5	2.7	---
TOTAL	5151.9	5520	796	947	2855	4198	15951	10164	4873	397.7	1391.1	47.7
MEAN	166	184	25.7	30.5	102	135	532	328	162	12.8	44.9	1.59
MAX	2140	1080	48	85	378	1170	2160	1730	1040	50	458	2.7
MIN	2.8	23	12	11	41	27	25	13	16	3.6	2.4	1.1
CFSM	.91	1.01	.14	.17	.56	.74	2.92	1.80	.89	.07	.25	.01
IN.	1.05	1.13	.16	.19	.58	.86	3.26	2.08	1.00	.08	.28	.01

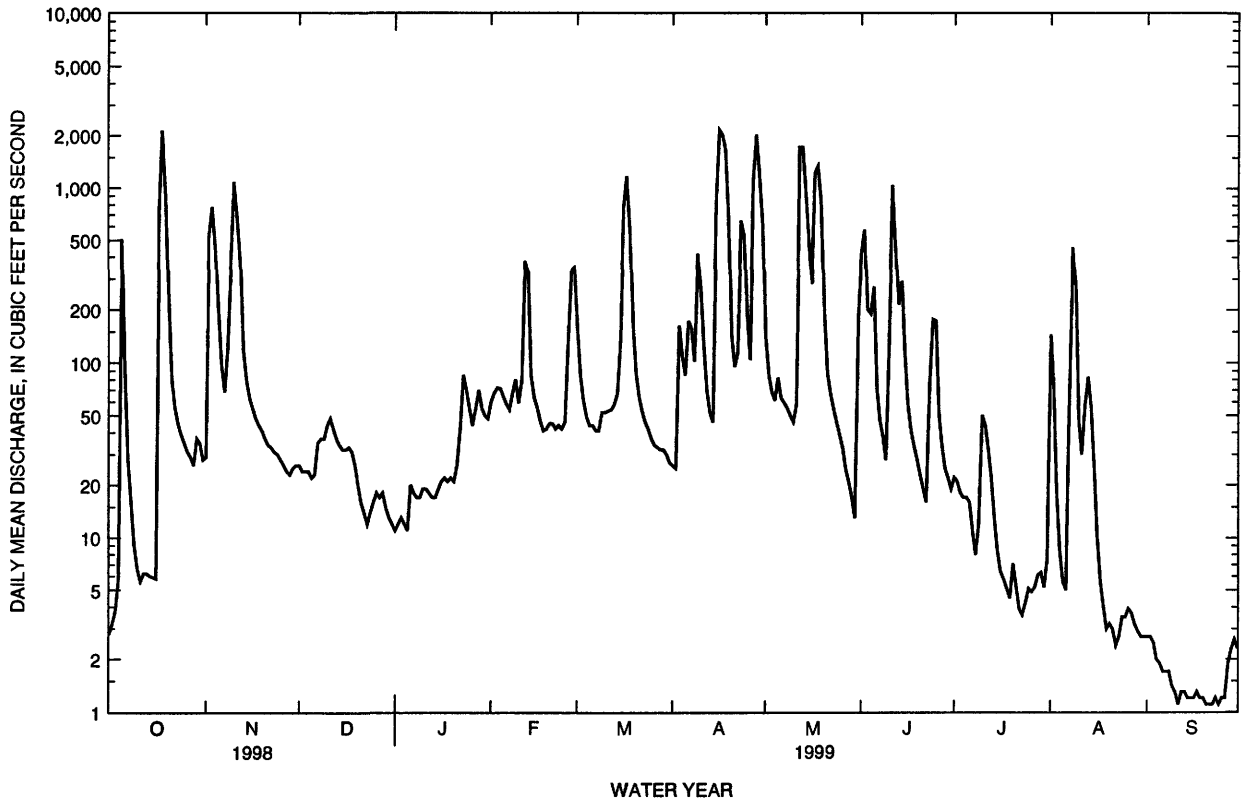
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1966 - 1999, BY WATER YEAR (WY)

MEAN	83.4	61.5	63.3	37.5	89.4	183	255	240	159	167	72.3	130
MAX	568	294	408	340	403	761	1093	1097	856	1711	618	1704
(WY)	1974	1993	1983	1974	1997	1979	1991	1995	1967	1993	1987	1992
MIN	.005	.003	.000	.23	.22	6.40	.068	3.91	.38	.000	.10	.086
(WY)	1990	1990	1990	1977	1989	1989	1989	1977	1988	1988	1989	1991

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1966 - 1999	
ANNUAL TOTAL	79904.2		52292.4			
ANNUAL MEAN	219		143		128	
HIGHEST ANNUAL MEAN					345	1993
LOWEST ANNUAL MEAN					9.71	1989
HIGHEST DAILY MEAN	3130	May 7	2160	Apr 16	24600	Sep 15 1992
LOWEST DAILY MEAN	1.4	Aug 4	1.1	Sep 11a	.00	Aug 1 1977
ANNUAL SEVEN-DAY MINIMUM	2.4	Jul 29	1.1	Sep 18	.00	Jun 21 1988
INSTANTANEOUS PEAK FLOW			2460	Oct 18	37700	Sep 15 1992
INSTANTANEOUS PEAK STAGE			17.41	Oct 18	29.32	Sep 15 1992
ANNUAL RUNOFF (CFSM)	1.20		.79		.71	
ANNUAL RUNOFF (INCHES)	16.33		10.69		9.59	
10 PERCENT EXCEEDS	687		393		294	
50 PERCENT EXCEEDS	37		37		14	
90 PERCENT EXCEEDS	4.8		3.0		.64	

a Also Sep 20-22, 24
e Estimated

06903400 CHARITON RIVER NEAR CHARITON, IA--Continued



06903700 SOUTH FORK CHARITON RIVER NEAR PROMISE CITY, IA

LOCATION.--Lat 40°48'02", long 93°11'32", in $SW^1/_4$ $SW^1/_4$ sec.5, T.69 N., R.20 W., Wayne County, Hydrologic Unit 10280201, on right bank 20 ft downstream from bridge on County Highway S50, 1.3 mi downstream from Jordan Creek, and 4.3 mi northwest of Promise City.

DRAINAGE AREA.--168 mi^2.

PERIOD OF RECORD.--October 1967 to current year. Occasional low-flow measurements, water years 1958-66, published as "near Bethlehem". Monthly discharge measurements for March 1965 to September 1967 available in files of Iowa City District Office.

GAGE.--Water-stage recorder. Datum of gage is 913.70 ft above sea level (U.S. Army Corps of Engineers bench mark).

REMARKS.--Records good except those for estimated daily discharges, which are poor. Periodic observations of water temperature and specific conductance are published in this report as miscellaneous water quality data. U.S. Army Corps of Engineers satellite data collection platform at station.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Sept. 21, 1965, reached a stage of 25.5 ft, from floodmarks, discharge, about 18,000 ft^3/s.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

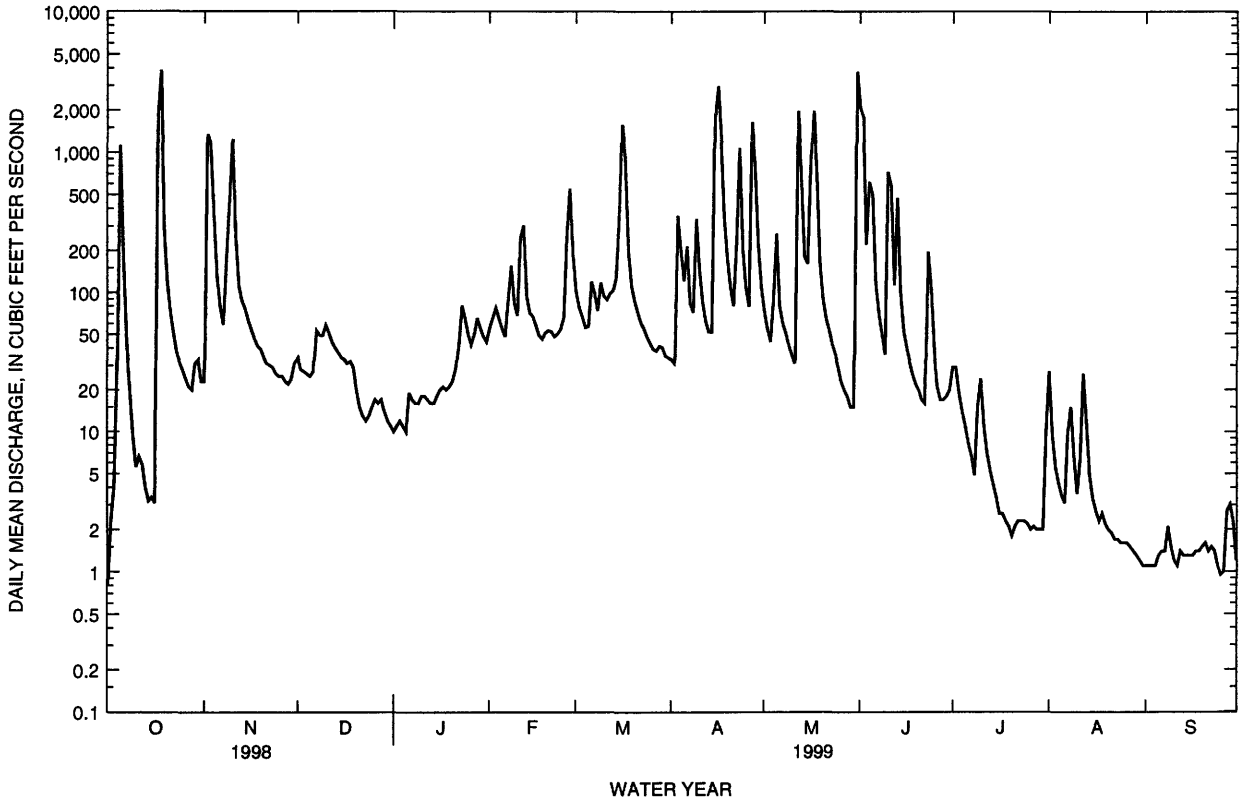
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.79	23	34	e10	e55	101	33	72	2070	29	27	1.1
2	2.3	1340	28	e11	e65	78	31	54	1770	29	9.5	1.1
3	4.0	1130	27	e12	e77	67	352	44	220	19	5.6	1.1
4	28	356	26	e11	e65	56	197	89	611	14	4.3	1.1
5	1120	129	25	e10	e55	57	121	262	501	11	3.5	1.3
6	162	78	27	e19	e48	119	213	79	115	8.3	3.1	1.4
7	43	59	53	e17	87	98	83	59	71	6.7	9.9	1.4
8	21	168	49	e16	155	74	72	50	50	4.9	15	2.1
9	9.6	437	49	e16	84	117	335	41	36	15	6.5	1.5
10	5.6	1240	58	e18	68	94	143	35	721	24	3.6	1.2
11	6.6	247	51	e18	247	89	85	31	575	11	6.5	1.1
12	5.8	110	44	e17	300	98	62	1970	113	7.0	26	1.4
13	4.0	87	40	e16	93	103	52	677	470	5.3	12	1.3
14	3.2	76	37	e16	71	126	52	179	100	4.2	4.9	1.3
15	3.4	63	34	e18	67	339	1750	160	53	3.4	3.3	1.3
16	3.1	54	33	e20	58	1570	2940	804	40	2.6	2.7	1.3
17	1870	46	31	e21	49	917	1190	1960	32	2.6	2.3	1.4
18	3840	41	32	e20	46	197	345	708	26	2.3	2.6	1.4
19	273	39	29	e21	51	111	175	163	22	2.1	2.2	1.5
20	115	34	e20	e23	53	87	109	90	20	1.8	2.0	1.6
21	72	31	e15	e28	52	72	80	64	17	2.1	1.9	1.4
22	51	30	e13	e42	48	61	220	53	16	2.3	1.7	1.5
23	37	29	e12	e80	50	55	1070	42	194	2.3	1.7	1.4
24	32	26	e13	e65	54	48	202	36	105	2.3	1.6	1.1
25	28	25	e15	e50	66	43	107	29	37	2.2	1.6	.95
26	24	25	e17	e42	254	39	79	23	21	2.0	1.6	1.0
27	21	23	e16	e50	548	38	1640	20	17	2.1	1.5	2.7
28	20	22	e17	e65	188	41	787	18	17	2.0	1.4	3.0
29	31	24	e14	e55	---	40	223	15	18	2.0	1.3	2.3
30	33	31	e12	e48	---	35	107	15	20	2.0	1.2	1.2
31	23	---	e11	e44	---	34	---	3750	---	10	1.1	---
TOTAL	7892.39	6023	882	899	3054	5004	12855	11592	8078	234.5	169.1	43.45
MEAN	255	201	28.5	29.0	109	161	428	374	269	7.56	5.45	1.45
MAX	3840	1340	58	80	548	1570	2940	3750	2070	29	27	3.0
MIN	.79	22	11	10	46	34	31	15	16	1.8	1.1	.95
AC-FT	15650	11950	1750	1780	6060	9930	25500	22990	16020	465	335	86
CFSM	1.52	1.20	.17	.17	.65	.96	2.55	2.23	1.60	.05	.03	.01
IN.	1.75	1.33	.20	.20	.68	1.11	2.85	2.57	1.79	.05	.04	.01

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1968 - 1999, BY WATER YEAR (WY)

MEAN	103	61.6	65.8	38.3	92.9	185	249	235	156	192	49.7	146
MAX	498	357	440	335	360	853	730	1043	580	2351	300	2227
(WY)	1978	1993	1983	1974	1997	1979	1991	1995	1980	1993	1993	1992
MIN	.15	.39	.40	.19	.88	3.21	1.21	5.14	1.18	.24	.76	.53
(WY)	1989	1990	1977	1977	1989	1989	1989	1980	1988	1977	1984	1991

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1968 - 1999	
ANNUAL TOTAL	74351.19		56726.44			
ANNUAL MEAN	204		155		131	
HIGHEST ANNUAL MEAN					446	1993
LOWEST ANNUAL MEAN					10.7	1989
HIGHEST DAILY MEAN	5810	May 7	3840	Oct 18	34700	Sep 15 1992
LOWEST DAILY MEAN	.79	Oct 1	.79	Oct 1	.00	Jul 6 1977a
ANNUAL SEVEN-DAY MINIMUM	1.3	Sep 7	1.1	Aug 29	.00	Aug 16 1989
INSTANTANEOUS PEAK FLOW			5940	Oct 18	70600	Sep 15 1992
INSTANTANEOUS PEAK STAGE			19.03	Oct 18	34.84	Sep 15 1992
INSTANTANEOUS LOW FLOW			.72	Oct 1		
ANNUAL RUNOFF (AC-FT)	147500		112500		95100	
ANNUAL RUNOFF (CFSM)	1.21		.93		.78	
ANNUAL RUNOFF (INCHES)	16.46		12.56		10.62	
10 PERCENT EXCEEDS	438		266		211	
50 PERCENT EXCEEDS	43		32		15	
90 PERCENT EXCEEDS	2.3		1.7		.98	

a Also July 7, 21-24, 28 to Aug 1, 1977, July 9-10, and Aug 14, 18-22, 1989
e Estimated


DAILY MEAN DISCHARGE, IN CUBIC FEET PER SECOND
10,000
5,000
2,000
1,000
500
200
100
50
20
10
5
2
1
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1998
1999
WATER YEAR

06903880 RATHBUN LAKE NEAR RATHBUN, IA

LOCATION.--Lat 40°49'30", long 92°53'33", in NW¼ NE¼ sec.35, T.70 N., R.18 W., Appanoose County, Hydrologic Unit 10280201, at control tower of Rathbun Dam, 1.8 mi north of Rathbun, 3.9 mi upstream from Walnut Creek, and at mile 142.3.

DRAINAGE AREA.--549 mi^2.

PERIOD OF RECORD.--October 1969 to current year.

GAGE.--Water-stage recorder. Datum of gage is sea level.

REMARKS.--Reservoir is formed by earthfill dam completed in 1969. Storage began in November 1969. Release is controlled by two hydraulically controlled slide gages, 6 ft wide and 12 ft high, into forechamber of an 11-ft diameter horseshoe conduit through the dam. No dead storage. Maximum design discharge through gates is 5,000 ft^3/s. Uncontrolled notch spillway is concrete overflow section 500 ft in length, located about 3,000 ft west of the right abutment of the dam and provides emergency discharge into the adjacent drainage area of Little Walnut Creek. Uncontrolled notch spillway is at elevation 926 ft, contents 545,621 acre-ft, surface area, 20,974 acres. Conservation pool level is at elevation 904.0 ft, contents 199,830 acre-ft, surface area, 10,989 acres. Reservoir is used for flood control, low-flow augumentation, conservation and recreation.

COOPERATION.--Records provided by U.S. Army Corps of Engineers.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily contents, 570,000 acre-ft July 28, 1993; maximum elevation, 927.16 ft July 28, 1993; minimum daily contents, 100 acre-ft Oct. 1- 15, Nov. 17-21, 1969; minimum elevation, 855.40 ft Oct. 6-10, 1969.

EXTREMES FOR CURRENT YEAR.--Maximum daily contents, 329,000 acre-ft June 14; maximum elevation 913.95 ft June 14; minimum daily contents, 198,000 acre-ft Jan.7-21; minimum elevation, 903.80 ft Jan. 8-13.

Capacity table (elevation in feet, contents in acre-feet)

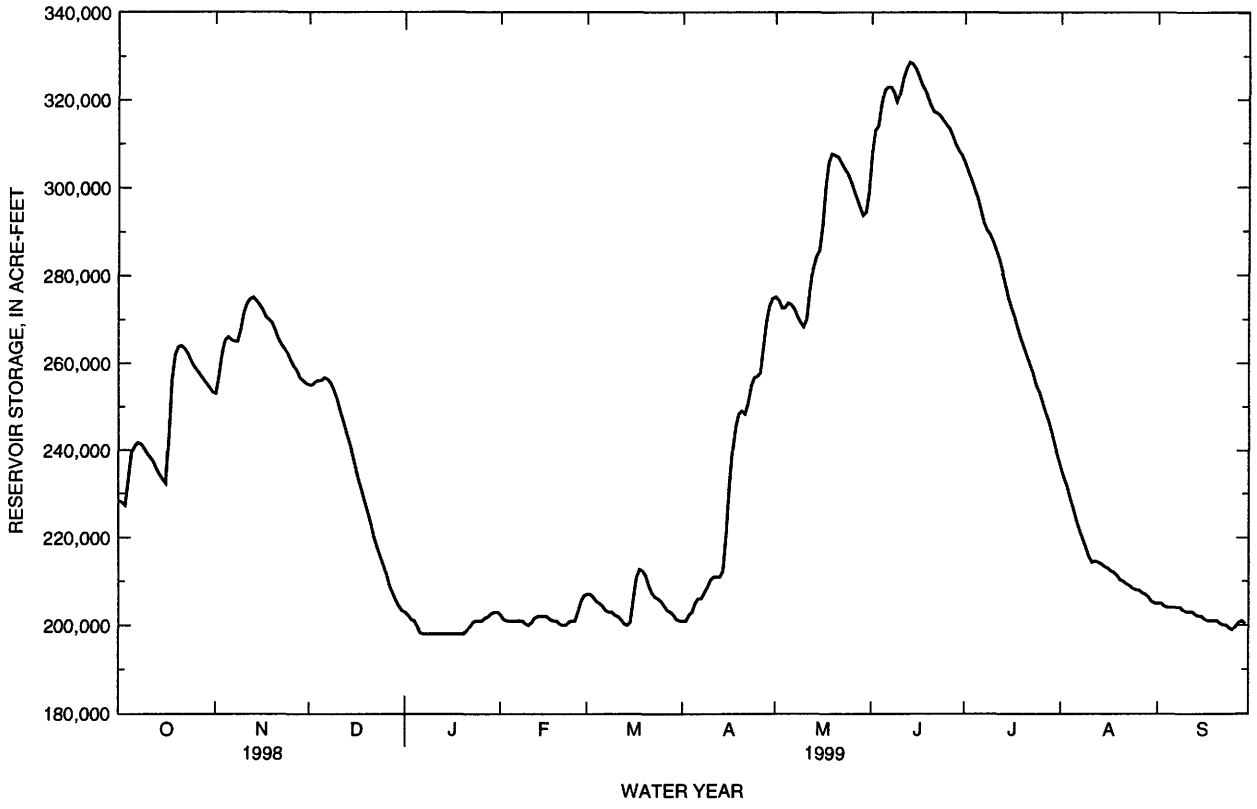
860	150	870	5,870	885	52,700	900	158,800	915	345,000
862	226	875	17,000	890	80,300	905	211,000	920	428,900
865	950	880	31,900	895	115,600	910	272,600	925	524,900

RESERVOIR STORAGE (ACRE-FEET), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY OBSERVATION AT 0800 HOURS

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	229000	253000	255000	203000	203000	207000	201000	275000	301000	307000	238000	205000
2	228000	253000	255000	203000	202000	207000	201000	275000	311000	305000	235000	205000
3	228000	259000	255000	202000	201000	207000	201000	274000	314000	303000	233000	205000
4	227000	264000	256000	201000	201000	206000	203000	272000	314000	301000	231000	204000
5	236000	266000	256000	201000	201000	205000	203000	273000	321000	299000	228000	204000
6	241000	266000	256000	199000	201000	205000	206000	274000	323000	297000	226000	204000
7	241000	265000	257000	198000	201000	204000	206000	273000	323000	294000	223000	204000
8	242000	265000	256000	198000	201000	203000	206000	272000	323000	291000	221000	204000
9	241000	265000	255000	198000	201000	203000	208000	270000	321000	290000	219000	204000
10	240000	269000	253000	198000	200000	203000	209000	269000	319000	289000	217000	203000
11	239000	273000	251000	198000	200000	202000	211000	268000	323000	287000	215000	203000
12	238000	274000	248000	198000	201000	202000	211000	271000	326000	285000	214000	203000
13	237000	275000	246000	198000	202000	201000	211000	279000	328000	283000	215000	203000
14	235000	275000	243000	198000	202000	200000	211000	283000	329000	280000	214000	202000
15	234000	274000	241000	198000	202000	200000	213000	285000	328000	277000	214000	202000
16	233000	273000	238000	198000	202000	201000	224000	286000	327000	274000	213000	202000
17	232000	272000	235000	198000	202000	208000	236000	294000	325000	272000	213000	201000
18	249000	270000	232000	198000	201000	212000	242000	303000	323000	270000	212000	201000
19	260000	270000	230000	198000	201000	213000	247000	307000	322000	267000	212000	201000
20	263000	269000	227000	198000	201000	212000	249000	308000	320000	265000	211000	201000
21	264000	267000	225000	198000	200000	211000	249000	307000	318000	263000	210000	201000
22	264000	265000	222000	199000	200000	208000	248000	307000	317000	261000	210000	200000
23	263000	264000	219000	200000	200000	207000	252000	305000	317000	259000	209000	200000
24	262000	263000	217000	201000	201000	206000	256000	304000	316000	257000	209000	200000
25	260000	262000	215000	201000	201000	206000	257000	303000	315000	254000	208000	199000
26	259000	260000	213000	201000	201000	205000	257000	301000	314000	253000	208000	199000
27	258000	259000	211000	201000	204000	204000	258000	299000	313000	250000	208000	200000
28	257000	258000	208000	202000	206000	203000	266000	297000	311000	248000	207000	201000
29	256000	256000	207000	202000	---	203000	271000	295000	309000	246000	207000	201000
30	255000	256000	205000	203000	---	202000	274000	293000	308000	243000	206000	200000
31	254000	---	204000	203000	---	201000	---	295000	---	240000	205000	---
MEAN	246000	265000	235000	200000	201000	205000	230000	288000	319000	275000	216000	202000
MAX	264000	275000	257000	203000	206000	213000	274000	308000	329000	307000	238000	205000
MIN	227000	253000	204000	198000	200000	200000	201000	268000	301000	240000	205000	199000

CAL YR 1998 MEAN 278000 MAX 399000 MIN 201000
WTR YR 1999 MEAN 240000 MAX 329000 MIN 198000

06903880 RATHBUN LAKE NEAR RATHBUN, IA--Continued



06903900 CHARITON RIVER NEAR RATHBUN, IA

LOCATION.--Lat 40°49'22", long 92°53'22", in $SE^1/_4$ $NE^1/_4$ sec.35, T.70 N., R.18 W., Appanoose County, Hydrologic Unit 10280201, on left bank 600 ft downstream from outlet of Rathbun Dam, 1.8 mi north of Rathbun, 3.7 mi upstream from Walnut Creek, and at mile 142.1.

DRAINAGE AREA.--549 mi^2.

PERIOD OF RECORD.--October 1956 to current year. Monthly discharge only for some periods, published in WSP 1730.

REVISED RECORDS.--WSP 1560: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 847.92 ft above sea level. Prior to Nov. 16, 1960, nonrecording gage and Nov. 17, 1960 to Sept. 30, 1969, recording gage, at site 3.1 mi downstream at datum 4.65 ft lower.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 21,800 ft^3/s Mar. 31, 1960, gage height, 25.3 ft from floodmark, site and datum then in use.

REMARKS.--Records good except for those periods of estimated daily discharge, which are poor. Periodic observations of water temperature and specific conductance are published in this report as miscellaneous water quality data. U.S. Army Corps of Engineers data collection platform with telephone modem at station. Flow regulated by Rathbun Lake (station 06903880) since Nov. 21, 1969. Records of discharge include diversion of:

Diversions
October 1, 1998 to September 30, 1999 10 ft^3/s

The diversion goes from the reservoir through fish ponds on left bank downstream from dam. Diverted flow returns to stream 0.1 mi downstream from gage. Rathbun Regional Water Association permit No. 0400900 allows withdrawal from Rathbun Dam discharge immediately downstream from gage for maximum rate of 4,200 gpm (9.36 ft^3/s). In the 1999 water year 1.66 billion gallons were withdrawn from the river.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	228	646	21	516	e330	210	121	609	106	746	1180	59
2	229	421	22	515	e330	533	21	610	314	1020	1170	59
3	229	38	21	512	e330	636	21	707	686	1020	1170	60
4	227	24	21	515	e330	635	21	740	585	1020	1170	59
5	e230	227	21	515	327	636	22	220	21	1010	1170	59
6	e21	514	21	e510	327	636	21	517	360	1080	1170	59
7	24	641	171	e510	328	636	21	704	702	1150	1170	59
8	231	641	619	e21	328	637	21	822	813	1120	1160	60
9	428	640	1050	e21	327	636	21	821	811	388	1150	58
10	538	e640	1320	e21	328	637	21	588	509	1040	1150	59
11	611	e160	1400	e21	329	636	20	718	184	1220	807	60
12	614	e44	1400	e21	328	636	20	769	514	1220	304	60
13	614	e450	1390	e21	329	636	20	662	619	1210	204	58
14	615	e640	1390	e21	329	637	20	824	684	1210	205	34
15	618	e640	1430	e21	329	622	31	820	816	1210	205	21
16	521	e750	1510	e21	329	254	e21	513	814	1230	205	21
17	e410	777	1510	e21	331	259	e21	e21	814	1250	204	21
18	e21	778	1500	e21	330	653	21	198	816	1240	204	22
19	63	778	1500	e21	329	1010	285	607	814	1240	205	23
20	195	775	1490	e21	328	1220	612	826	812	1220	203	24
21	540	771	1300	e21	328	1210	613	825	824	987	203	24
22	626	772	1110	e21	181	1070	513	824	703	1040	203	22
23	626	771	1110	e21	22	595	112	821	419	1220	201	22
24	627	770	1110	e21	22	414	218	820	613	1230	201	22
25	628	769	1110	e330	22	413	340	817	809	1220	150	23
26	630	768	1110	e330	22	413	421	818	806	1220	105	24
27	634	766	1100	e330	22	412	460	855	806	1220	105	23
28	639	762	1100	e330	22	413	457	877	807	1210	104	22
29	646	766	820	e330	---	412	431	875	803	1200	104	21
30	650	367	511	e330	---	412	505	872	787	1200	79	22
31	643	---	514	e330	---	323	---	686	---	1190	56	---
TOTAL	13556	17506	28702	6260	7217	18482	5452	21386	19171	34781	15917	1160
MEAN	437	584	926	202	258	596	182	690	639	1122	513	38.7
MAX	650	778	1510	516	331	1220	613	877	824	1250	1180	60
MIN	21	24	21	21	22	210	20	21	21	388	56	21
AC-FT	26890	34720	56930	12420	14310	36660	10810	42420	38030	68990	31570	2300

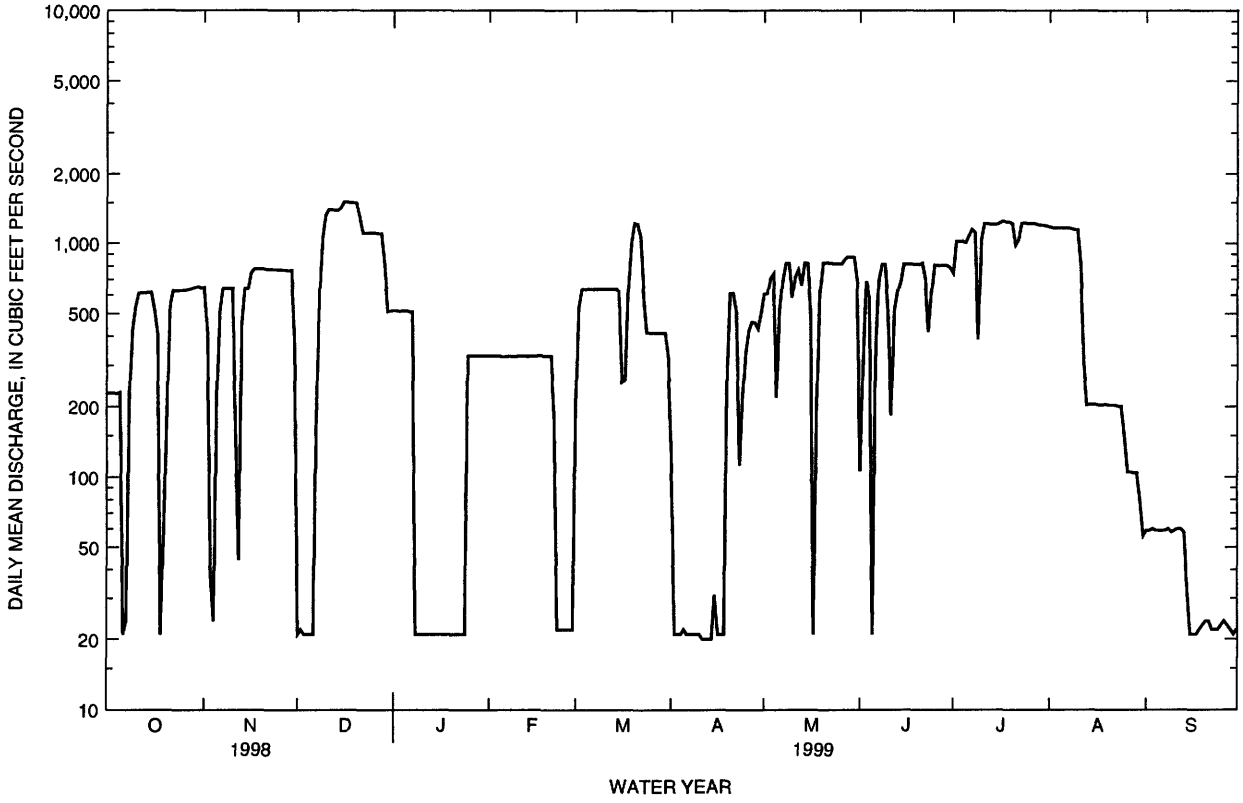
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1970 - 1999, BY WATER YEAR (WY)

MEAN	288	301	437	257	340	457	352	436	484	583	518	331
MAX	1790	1828	1364	1546	1550	1271	1132	1281	1573	1162	1826	1707
(WY)	1994	1994	1993	1993	1993	1993	1993	1973	1973	1991	1993	1993
MIN	11.5	9.97	5.54	8.98	5.60	9.40	6.74	19.3	16.6	6.53	9.10	11.0
(WY)	1975	1975	1970	1970	1970	1970	1970	1977	1988	1970	1970	1974

06903900 CHARITON RIVER NEAR RATHBUN, IA--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1970 - 1999a	
ANNUAL TOTAL	245773		189590			
ANNUAL MEAN	673		519		399	
HIGHEST ANNUAL MEAN					1164	1993
LOWEST ANNUAL MEAN					20.4	1989
HIGHEST DAILY MEAN	1510	Dec 16	1510	Dec 16b	1950	Oct 17 1993
LOWEST DAILY MEAN	21	Oct 6	20	Apr 11c	.00	Oct 26 1977
ANNUAL SEVEN-DAY MINIMUM	43	Dec 1	20	Apr 8	1.0	Apr 1 1970
INSTANTANEOUS PEAK FLOW			1520	Dec 15d	2780	Dec 14 1993
INSTANTANEOUS PEAK STAGE			11.54	Dec 15d	14.94	Dec 14 1993
ANNUAL RUNOFF (AC-FT)	487500		376100		289400	
10 PERCENT EXCEEDS	1200		1170		1200	
50 PERCENT EXCEEDS	639		512		90	
90 PERCENT EXCEEDS	123		21		16	

a Post regulation
b Also Dec 17
c Also Apr 12-14
d Also Dec 16, 17
e Estimated



06904010 CHARITON RIVER NEAR MOULTON, IA

LOCATION.--Lat 40°41'30", long 92°46'15", in $SE^1/_4$ $NE^1/_4$ sec.14, T.68 N., R.17 W., Appanoose County, Hydrologic Unit 10280201, on right bank 6 ft downstream from bridge on County Highway J45 (543rd St.), 0.7 mi downstream from Hickory Creek, 5.0 mi west of Moulton, 8.0 mi upstream from Iowa-Missouri border, 20.8 mi downstream from Rathbun Dam, and at mile 121.5.

DRAINAGE AREA.--740 mi^2.

PERIOD OF RECORD--August 1979 to current year.

GAGE--Water stage recorder. Datum of gage is 800.00 ft above sea level (U.S. Army Corps of Engineers bench mark).

REMARKS.--Records good except those for estimated daily discharges, which are poor. Flow regulated by Rathbun Reservoir (station 06903880) 20.8 mi upstream. Periodic observations of water temperature and specific conductance are published in this report as miscellaneous water quality data. U.S. Geological Survey satellite and telephone modem data collection platform and U.S. Army Corps of Engineers rain gage at station.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in June 1947 reached a stage of about 45 ft, discharge unknown, from information by U.S. Army Corps of Engineers.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

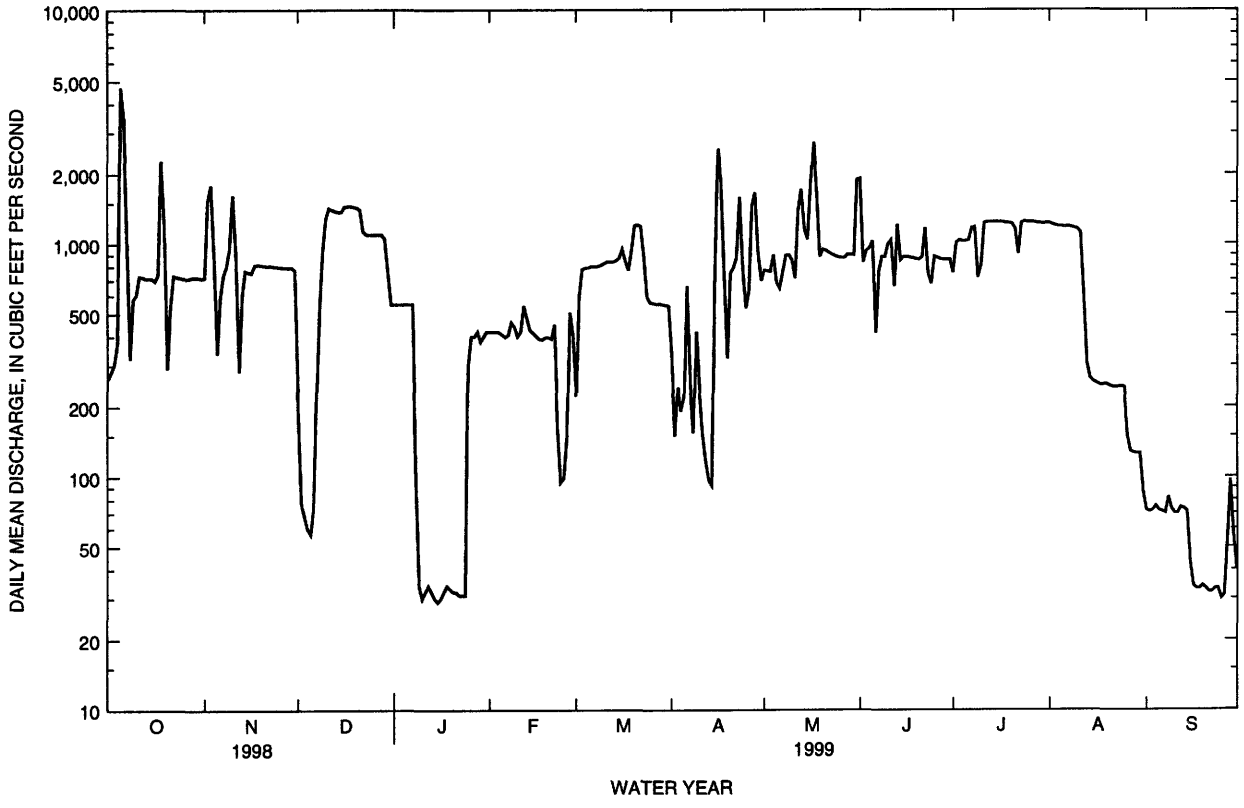
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	264	718	200	e550	e420	223	334	771	1910	752	1230	72
2	283	1530	77	e550	e420	597	150	767	835	1010	1210	71
3	305	1790	68	e550	e420	779	242	762	936	1040	1200	72
4	377	868	60	e550	417	790	192	898	958	1030	1190	75
5	4700	338	57	e550	408	792	220	684	1030	1030	1190	72
6	3450	593	74	e550	398	804	659	646	415	1040	1180	71
7	1050	734	215	e550	406	801	251	762	761	1170	1190	70
8	322	798	548	e100	460	804	155	892	882	1180	1180	82
9	579	963	937	e34	441	812	420	898	883	717	1170	73
10	605	1620	1290	e30	401	825	232	852	1000	815	1160	70
11	726	903	1430	e32	420	e840	152	711	1040	1230	1120	70
12	723	283	1410	e34	542	e840	117	1390	658	1240	603	74
13	711	597	1390	e32	480	e840	97	1720	1210	1240	307	73
14	711	767	1380	e30	427	e850	92	1150	852	1240	265	71
15	711	758	1380	e29	415	870	746	1050	882	1240	256	43
16	694	750	1450	e30	403	e950	2560	1810	882	1240	252	34
17	740	813	1460	e32	390	849	1860	2720	876	1240	248	33
18	2280	816	1460	e34	388	772	722	1670	871	1230	248	33
19	1200	814	1450	e33	396	941	324	883	862	1230	250	34
20	291	808	1440	e32	397	1200	749	949	858	1220	246	33
21	539	807	1410	e32	391	1210	790	936	878	1160	243	32
22	730	808	1140	e31	451	1190	872	917	1170	908	242	32
23	724	804	1100	e31	165	895	1590	901	743	1230	243	33
24	718	800	1100	e31	95	593	774	888	675	1250	244	33
25	714	798	1100	e300	99	559	529	878	884	1240	242	30
26	709	795	1100	e400	147	555	628	873	872	1240	149	31
27	711	793	1100	e400	508	551	1460	873	861	1240	129	54
28	720	792	1100	e420	400	552	1660	903	857	1230	127	97
29	719	795	1060	e380	---	549	919	901	857	1230	126	56
30	718	772	e750	e400	---	545	696	897	857	1220	126	40
31	711	---	e550	e420	---	542	---	1890	---	1230	86	---
TOTAL	28435	25225	29286	7177	10705	23920	20192	32842	27255	35312	17652	1664
MEAN	917	841	945	232	382	772	673	1059	908	1139	569	55.5
MAX	4700	1790	1460	550	542	1210	2560	2720	1910	1250	1230	97
MIN	264	283	57	29	95	223	92	646	415	717	86	30
AC-FT	56400	50030	58090	14240	21230	47450	40050	65140	54060	70040	35010	3300
CFSM	1.24	1.14	1.28	.31	.52	1.04	.91	1.43	1.23	1.54	.77	.07
IN.	1.43	1.27	1.47	.36	.54	1.20	1.02	1.65	1.37	1.78	.89	.08

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1980 - 1999, BY WATER YEAR (WY)

MEAN	442	435	564	346	479	708	651	723	679	953	717	507
MAX	1874	1931	1557	1696	1772	1831	1481	1421	1341	2849	2004	1976
(WY)	1994	1994	1983	1993	1983	1993	1993	1995	1980	1982	1993	1993
MIN	24.2	23.0	20.1	22.2	20.6	24.3	22.7	33.0	20.3	17.9	21.0	26.6
(WY)	1989	1989	1990	1989	1989	1989	1989	1980	1988	1988	1988	1988

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1980 - 1999	
ANNUAL TOTAL	341005		259665			
ANNUAL MEAN	934		711		601	
HIGHEST ANNUAL MEAN					1555	1993
LOWEST ANNUAL MEAN					43.6	1989
HIGHEST DAILY MEAN	4700	Oct 5	4700	Oct 5	8720	Jul 17 1982
LOWEST DAILY MEAN	43	Sep 10	29	Jan 15	14	Jun 22 1988a
ANNUAL SEVEN-DAY MINIMUM	84	Feb 4	31	Jan 10	15	Jun 22 1988
INSTANTANEOUS PEAK FLOW			5520	Oct 5	11200	Jul 16 1982
INSTANTANEOUS PEAK STAGE			33.85	Oct 5	36.83	Jul 16 1982
ANNUAL RUNOFF (AC-FT)	676400		515000		435700	
ANNUAL RUNOFF (CFSM)	1.26		.96		.81	
ANNUAL RUNOFF (INCHES)	17.14		13.05		11.04	
10 PERCENT EXCEEDS	1380		1240		1390	
50 PERCENT EXCEEDS	874		726		389	
90 PERCENT EXCEEDS	283		70		27	

a Also June 23, 27, and July 9, 1988
e Estimated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DAILY MEAN DISCHARGE, IN CUBIC FEET PER SECOND
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WATER YEAR

The following table contains annual maximum discharge for crest-stage stations. A crest-stage gage is a device which will register the peak stage occurring between inspections of the gage. A stage-discharge relation for each gage is developed from discharge measurements made by indirect measurements of peak flow or by current meter. The date of the maximum discharge is not always certain but is usually determined by comparison with nearby continuous-record stations, weather records, or local inquiry. Only the maximum discharge for each water year is given. Information on some lower floods may have been obtained, but is not published herein. The years given in the period of record represent water years up to the current year for which the annual maximum has been determined.

MAXIMUM DISCHARGE AT CREST-STAGE PARTIAL-RECORD STATIONS

[+--Not determined, a--peak stage did not reach bottom of gage, b--ice affected, c--old gage datum, d--estimate, e--peak affected by backwater]

Station name and number	Location and drainage area	Period of record	Water year 1999 maximum			Period of record maximum		
			Date	Gage height (ft)	Discharge (ft^3/s)	Date	Gage height (ft)	Discharge (ft^3/s)
BIG SIOUX RIVER BASIN								
Dawson Creek near Sibley, IA (06483440)	Lat 43°23'23", long 95°42'53", near NW corner sec.20, T.99 N., R.41 W., Osceola County, Hydrologic Unit 10170204, at culvert on County Highway A30, 2 mi southeast of Sibley. Drainage area 4.35 mi^2.	1952-	04-09-99	4.58	(+)	06-29-93	8.84	(+)
Burr Oak Creek near Perkins, IA (06483495)	Lat 43°14'43", long 96°10'38", in SE1/4, sec.5, T.97 N., R.45 W., Sioux County, Hydrologic Unit 10170204, at bridge on U.S. Highway 75, 4 mi north of Perkins. Drainage area 30.9 mi^2.	1966-	1999	(a)	<78.3	06-20-83	88.37	(+)
PERRY CREEK BASIN								
Perry Creek near Merrill, IA (06599800)	Lat 42°43'15", long 96°20'33", in NW1/4, sec.12, T.91, N., R.47 W., Plymouth County, Hydrologic Unit 10230001, at bridge on County Highway C44, 5 mi west of Merrill. Drainage area 8.17 mi^2.	1953-1995, 1996-	11-10-98	5.94	73.3	03-27-62	12.22	(+)
Perry Creek near Hinton, IA (06599950)	Lat 42°37'11", long 96°22'20", in NE1/4, sec.15, T.90 N., R.47 W., Plymouth County, Hydrologic Unit 10230001, at bridge on county highway, 4 mi west of Hinton. Drainage area 33.1 mi^2.	1953-	06-27-99	18.80	(+)	06-14-81	38.68	d5,500
FLOYD RIVER BASIN								
Little Floyd River near Sanborn, IA (06600030)	Lat 43°11'10", long 95°43'30", in NE1/4, sec.31, T.97 N., R.41 W., O'Brien County, Hydrologic Unit 10230002, at bridge on U.S. Highway 18, 3.5 mi west of Sanborn. Drainage area 8.44 mi^2.	1966-	1999	(a)	<104	03-02-70	89.04	(+)
Sweeney Creek tributary near Sheldon, IA	Lat 43°11'10", long 95°44'38", in SW1/4, sec.25, T.97 N., R.42 W., O'Brien County, Hydrologic Unit 10230002, at culvert on U.S. Highway 18, 4.8 mi east of Sheldon. Drainage area 0.62 mi^2.	1991-	06-10-99	95.01	(+)	07-14-93	99.27	(+)
West Branch Floyd River near Struble, IA (06600300)	Lat 42°55'26", long 96°10'36", in SE1/4, sec.29, T.94 N., R.45 W., Sioux County, Hydrologic Unit 10230002, at bridge on county highway B62, 0.1 mi west of U.S. Highway 75, 2.2 mi northeast of Struble. Drainage area 180 mi^2	1996-0	07-21-99	13.25	2,620	03-04-94	15.86	8,920
MONONA-HARRISON DITCH BASIN								
Big Whiskey Slough near Remsen, IA (06601480)	Lat 42°48'28", long 95°53'21", in NW1/4, sec.11, T.92 N., R.43 W., Plymouth County, Hydrologic Unit 10230004, at bridge on State Highway 3, 4.2 mi east of Remsen. Drainage area 12.9 mi^2.	1966-	1999	(a)	(+)	03-22-79	94.87	(+)

Station name and number	Location and drainage area	Period of record	Water year 1999 maximum			Period of record maximum		
			Date	Gage height (ft)	Discharge (ft^3/s)	Date	Gage height (ft)	Discharge (ft^3/s)
MONONA-HARRISON DITCH BASIN--continued								
Elliott Creek at Lawton, IA (06602190)	Lat 42°28'30", long 96°11'22", in NW1/4, sec.3, T.88 N., R.46 W. Woodbury County, Hydrologic Unit 10230004, at bridge on U.S. Highway 20, at west edge of Lawton. Drainage area 34.8 mi^2.	1966-	1999	(a)	<356	06-12-84	86.14	3,150
LITTLE SIOUX RIVER BASIN								
Ocheyedan River near Ocheyedan, IA (06604510)	Lat 43°25'58", long 95°36'41", in NE1/4, sec.6, T.99 N., R.40 W., Osceola County, Hydrologic Unit 10230003, at bridge on State Highway 9, 4 mi northwest of Ocheyedan. Drainage area 73.5 mi^2.	1966-	1999	(a)	<350	06-29-93	86.79	2,200
Dry Run Creek near Harris, IA (06604584)	Lat 43°26'42", long 95°27'21", in NE1/4, sec.33, T.100 N., R.39 W., Osceola County, Hydrologic Unit 10230003, at culvert on county highway M12, 1 mi west of Harris. Drainage area 4.30 mi^2.	1990-	07-21-99	11.76	10.1	06-29-93	16.44	419
Prairie Creek near Spencer, IA (06605340)	Lat 43°05'16", long 95°09'40", in SE1/4, sec.36, T.96 N., R.37 W., Clay County, Hydrologic Unit 10230003, at bridge on U.S. Highway 71, 4 mi south of Spencer. Drainage area 22.3 mi^2.	1966-	06-06-99	88.05	297	07-04-71	90.77	2,200
Willow Creek near Cornell, IA (06605750)	Lat 42°58'21", long 95°09'40", in SE1/4, sec.12, T.94 N., R.37 W., Clay County, Hydrologic Unit 10230003, at bridge on U.S. Highway 71, 2 mi northwest of Cornell. Drainage area 78.6 mi^2.	1966-	06-06-99	84.97	386	03-22-79	91.49	4,200
Little Sioux River tributary near Peterson, IA (06605868)	Lat 42°55'25", long 95°21'55", in NW1/4, sec.32, T.94 N., R.38 W., Clay County, Hydrologic Unit, 10230003, at culvert on State Highway 10, 1.2 mi northwest of Peterson. Drainage area 0.29 mi^2.	1991-	1999	(a)	(+)	05-31-93	91.81	(+)
Willow Creek near Calumet, IA (06606231)	Lat 42°58'05", long 95°32'56" in NE1/4, sec. 15, T.94 N., R.40 W., Sac County, Hydrologic Unit 10230003, at culvert on State Highway10, 1.2 mi north of Calumet. Drainage area 4.13 mi^2.	1991-	06-06-99	98.78	(+)	07-14-93	100.92	(+)
Halfway Creek at Schaller, IA (0660683710)	Lat 42°30'18", long 95°17'19", in SW1/4, sec.24, T.89 N., R.38 W., Sac County, Hydrologic Unit 10230005, at culvert on State Highway 110, 0.1 mi north of Schaller. Drainage area 1.74 mi^2.	1990-	06-11-99	>94.13	(+)	07-14-92	94.11	(+)
BOYER RIVER BASIN								
Boyer River tributary at Woodbine, IA (06609482)	Lat 41°43'58", long 95°43'19", in SE1/4, sec.15, T.80 N., R.42 W., Harrison County, Hydrologic Unit 10230007, at culvert on county highway F32, 0.5 mi west of Woodbine. Drainage area 0.67 mi^2.	1990-	05-16-99	84.59	(+)	05-18-91	90.84	(+)
Willow Creek near Soldier, IA (06609560)	Lat 41°55'17", long 95°42'05", near S1/4 corner sec.11, T.82 N., R.42 W., Monona County, Hydrologic Unit 10230001, at bridge on State Highway 37, 6 mi southeast of Soldier. Drainage area 29.1 mi^2.	1966-	07-02-99	76.88	2,280	07-09-93	84.66	6,840

Station name and number	Location and drainage area	Period of record	Water year 1999 maximum			Period of record maximum		
			Date	Gage height (ft)	Discharge (ft^3/s)	Date	Gage height (ft)	Discharge (ft^3/s)
MOSQUITO CREEK BASIN								
Moser Creek near Earling, IA (06610510)	Lat 41°46'35", long 95°26'55", in NE1/4, sec.1, T.80 N., R.40 W., Shelby County, Hydrologic Unit 10230006, at bridge on State Highway 37, 1.5 mi west of Earling. Drainage area 21.6 mi^2.	1966-	07-02-99	78.60	2,830	06-15-84	87.89	(+)
Mosquito Creek tributary near Neola, IA (06610581)	Lat 41°30'06", long 95°35'44", in NE1/4, sec.6, T.77 N., R.41 W., Pottawattamie County, Hydrologic Unit 10230006, at culvert on State Highway 191, 3.8 mi north of Neola. Drainage area 3.22 mi^2.	1991-	08-07-99	82.44	(+)	08-07-99	82.44	(+)
Keg Creek tributary near Mineola, IA (06805849)	Lat 41°07'53", long 95°43'31", in SW1/4, sec.7, T.73 N., R.42 W., Mills County, Hydrologic Unit 10240001, at culvert on county highway H12, 2.4 mi southwest of Mineola. Drainage area 2.01 mi^2.	1991-	07-10-99	82.97	602	07-10-99	82.97	602
NISHNABOTNA RIVER BASIN								
Elm Creek near Jacksonville, IA (0680737930)	Lat 41°38'44", long 95°12'18", in SW1/4, sec.18, T.79 N., R.37 W., Shelby County, Hydrologic Unit 10240002, at culvert on State Highway 44, 2.8 mi west of Jacksonville. Drainage area 9.43 mi^2.	1990-	07-09-99	90.83	(+)	06-17-90	95.01	(+)
Indian Creek near Emerson, IA (06807470)	Lat 41°01'50", long 95°22'51", in NW1/4, sec.19, T.72 N., R.39 W., Montgomery County, Hydrologic Unit 10240002, at bridge on U.S. State Highway 34, 1 mi east of Emerson. Drainage area 37.3 mi^2.	1966-	08-07-99	94.32	13,600	06-15-82 08-07-99	92.63 94.32	15,800 13,600
Middle Silver Creek near Oakland, Ia (06807760)	Lat 41°19'28", long 95°33'19", in E1/4 corner, sec.4, T.75 N., R.41 W., Pottawattamie County, Hydrologic Unit 10240002, at bridge on county highway, 8.5 mi northwest of Oakland. Drainage area 25.7 mi^2.	1953-	08-07-99	14.00	1,790	07-04-73	14.73	2,110
Bluegrass Creek at Audubon, IA (06808880)	Lat 41°42'46", long 94°44'46", in NW1/4, sec.28, T.80 N., R.35 W., Audubon County, Hydrologic Unit 10240003, at bridge on U.S. Highway 71, near south edge of Audubon. Drainage area 15.4 mi^2.	1966-	07-09-99	80.68	1,310	07-09-93	88.55	(+)
TARKIO RIVER BASIN								
Tarkio River near Elliott, IA (06811760)	Lat 41°06'06", long, 95°06'09", near NE corner sec.28, T.73 N., R.37 W., Montgomery County, Hydrologic Unit 10240005, at bridge on county highway, 4.5 mi southeast of Elliott. Drainage area 10.7 mi^2.	1952-	08-07-99	11.59	1,860	08-29-93	12.98	4,640
East Tarkio Creek near Stanton, IA (06811800)	Lat 41°04'48", long 95°05'34", in W1/2 sec.34, T.73 N., R.37 W., Montgomery County, Hydrologic Unit 10240005, at bridge on county highway H24, 7 mi north of Stanton. Drainage area 4.66 mi^2.	1952-	06-10-99	9.75	979	06-09-67	13.74	4,790
Tarkio River tributary near Stanton, IA (06811820)	Lat 41°02'38", long 95°05'55", in NE1/4 sec.16, T.72 N., R.37 W., Montgomery County, Hydrologic Unit 10240005, at box culvert on county highway H63, 4 mi north of Stanton. Drainage area 0.67 mi^2.	1952-	06-23-99	5.56	1,070	06-23-99	5.56	1,070

Station name and number	Location and drainage area	Period of record	Water year 1999 maximum			Period of record maximum		
			Date	Gage height (ft)	Discharge (ft^3/s)	Date	Gage height (ft)	Discharge (ft^3/s)
TARKIO RIVER BASIN--continued								
Snake Creek near Yorktown, IA (06811875)	Lat 40°44'33", long 95°07'46", in NW1/4, sec.32, T.69 N., R.37 W., Page County, Hydrologic Unit 10240005, at bridge on State Highway 2, 1.5 mi northeast of Yorktown. Drainage area 9.10 mi^2.	1966-1991, 1997-	1999	(a)	(+)	07-09-87	95.24	3,080
NODAWAY RIVER BASIN								
West Nodaway River at Massena, IA (06816290)	Lat 41°14'44", long 94°45'27", in SE1/4, sec.33, T.75 N., R.34 W., Cass County, Hydrologic Unit 10240009, at bridge on State Highway 148, at southeast corner of Massena. Drainage area 23.4 mi^2.	1966-	06-23-99	75.09	658	02-01-73	82.39	(+)
PLATTE RIVER BASIN								
Platte River near Diagonal, IA (06818750)	Lat 40°46'02", long 94°24'46", in NW1/4, sec. 22, T.69 N., R.31 W., Ringgold County, Hydrologic Unit 10240012, at bridge on county highway, 2.2 mi upstream from Turkey Creek, 4.6 mi. southwest of Diagonal, and 4.9 mi downstream from Gard Creek. Drainage area 217 mi^2.	1968-1991, 1997-	06-12-99	17.80	4,200	09-09-89	23.60	8,630
Middle Branch 102 River near Gravity, IA (06819110)	Lat 40°49'40", long 94°44'18", in SE1/4, sec.27, T.70 N., R.34 W., Taylor County, Hydrologic Unit 10240013, at bridge on State Highway 148, 4.8 mi north of Gravity. Drainage area 34.5 mi^2.	1966-	06-13-99	64.68	1,172	02-01-73 07-05-93	c83.65 76.83	(+) d4,790
GRAND RIVER BASIN								
Sevenmile Creek, near Thayer, IA (06897858)	Lat 41°01'37", long 94°00'03", in SE1/4, sec.18, T.72 N., R.27 W., Clarke County, Hydrologic Unit 10280102, at culvert on U.S. Highway 34, 2.6 mi east of Thayer. Drainage area 6.61 mi^2.	1991-	04-15-99	16.70	(+)	09-15-92	24.92	d1,330
Elk Creek near Decatur City, IA (06897950)	Lat 40°43'18", long 93°56'12", in SE1/4, sec. 34, T.69 N., R.27 W., Decatur County, Hydrologic Unit 10280102, at bridge on county Highway, 1,000 ft. downstream from West Elk Creek, 5.8 mi. upstream from mouth, and 5.5 mi. (Revised) west of Decatur City. Drainage area 52.5 mi^2.	1968-	04-16-99	18.08	3,190	07-05-93	29.93	32,800

The following water temperature and specific conductance measurements were made at the indicated sites during water year 1999.

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	TEMPER-ATURE WATER (DEG C) (00010)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)
06483500 Rock River near Rock Valley, IA				
OCT				
07...	1005	293	10.5	643
NOV				
24...	1120	1530	3.5	864
JAN				
07...	1020	213	-.2	925
FEB				
19...	0930	578	4.2	660
MAR				
24...	1105	676	6.5	826
MAY				
05...	1120	1220	15.0	820
JUN				
16...	0925	1230	14.6	881
JUL				
29...	1120	407	28.0	837
SEP				
08...	1135	104	18.0	583
06600000 Perry Creek at 38th Street, Sioux City, IA				
OCT				
08...	1130	17	9.2	793
NOV				
19...	1350	31	3.0	764
JAN				
08...	0930	25	.0	818
FEB				
08...	1330	39	4.3	622
MAR				
22...	1500	25	6.5	866
MAY				
03...	1310	29	13.0	790
JUN				
14...	1155	31	16.0	809
JUL				
27...	1125	24	21.7	802
SEP				
07...	1100	14	18.5	797
06600100 Floyd River at Alton, IA				
OCT				
07...	1335	15	13.1	848
NOV				
18...	1350	96	5.9	854
JAN				
07...	1400	17	.0	999
FEB				
09...	1220	95	.4	699
MAR				
24...	1450	62	6.0	847
MAY				
05...	1435	172	15.0	856
JUN				
16...	1320	242	13.5	859
JUL				
29...	1100	90	28.0	863
SEP				
07...	1725	12	23.5	938
06600500 Floyd River at James, IA				
OCT				
09...	1150	133	12.5	967
NOV				
18...	1140	519	2.8	948
JAN				
07...	1635	146	.0	1010
FEB				
09...	1025	588	.5	744
11...	1035	425	1.5	817
MAR				
22...	1200	303	7.0	958
MAY				
06...	1000	531	12.5	925
JUN				
16...	1555	1050	16.0	893
JUL				
27...	1530	581	28.0	835
SEP				
07...	1310	132	21.5	944
06601200 Missouri River at Decatur, NE				
OCT				
13...	1530	33500	14.0	772
27...	1300	37500	15.1	755
NOV				
12...	1340	42600	5.0	757
24...	1045	45700	6.0	820
DEC				
08...	1225	37400	5.5	844
JAN				
19...	1350	25800	1.0	844
FEB				
05...	1100	30200	1.0	786
16...	1230	30800	2.5	745
MAR				
04...	1305	31400	5.0	839
16...	1330	34200	--	--
30...	1215	33900	9.0	796
APR				
15...	1315	42200	10.0	869
26...	1150	34900	13.0	1020
MAY				
10...	1120	35500	14.5	925
26...	1240	44300	18.5	871
JUN				
07...	1215	43300	21.5	906
22...	1015	46500	20.0	906
JUL				
06...	1130	50500	25.5	912
19...	1240	43700	26.0	940
AUG				
05...	1335	42800	26.5	916
20...	1030	41200	24.0	890
SEP				
02...	0920	47100	25.0	863
13...	1225	49300	20.0	775

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	TEMPER-ATURE WATER (DEG C) (00010)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)
06602020 West Fork Ditch at Hornick, IA				
OCT				
01...	0850	73	12.0	757
NOV				
09...	1520	99	5.0	773
DEC				
29...	1340	93	.0	799
FEB				
18...	0905	128	.0	767
APR				
05...	1150	115	9.0	739
MAY				
20...	1350	160	15.0	757
JUL				
07...	1035	239	20.0	806
AUG				
02...	1105	150	22.0	789
SEP				
17...	1035	63	14.0	726
06602400 Monona-Harrison Ditch near Turin, IA				
NOV				
09...	1050	199	6.0	790
JAN				
05...	1630	144	.0	778
FEB				
18...	1150	241	1.0	754
APR				
07...	1130	343	12.0	727
22...	1150	4270	11.0	204
MAY				
19...	1250	337	18.0	776
JUN				
28...	1545	1870	21.0	346
AUG				
02...	1550	274	23.0	789
SEP				
15...	1310	154	16.0	764
06605000 Ocheyedan River near Spencer, IA				
OCT				
06...	1230	20	13.1	789
NOV				
17...	1655	163	5.1	803
JAN				
06...	1600	23	.0	432
FEB				
10...	1115	107	.0	646
MAR				
23...	1550	155	10.5	788
MAY				
04...	1510	355	15.6	783
JUN				
15...	1540	562	14.4	810
JUL				
28...	1915	135	31.0	779
SEP				
09...	1525	17	21.0	646
06605850 Little Sioux River at Linn Grove, IA				
OCT				
06...	0940	118	12.1	666
NOV				
17...	1455	740	5.0	770
JAN				
06...	1300	129	.0	710
FEB				
10...	1425	371	.5	617
MAR				
23...	1345	843	8.0	765
MAY				
04...	1155	1670	15.0	724
JUN				
15...	1055	4580	18.9	615
JUL				
28...	1630	795	29.5	650
SEP				
09...	1300	84	21.8	542
06606600 Little Sioux River at Correctionville, IA				
OCT				
05...	1430	314	14.0	677
NOV				
17...	1100	1240	4.7	740
JAN				
06...	0940	297	.0	846
FEB				
18...	1630	1150	2.6	669
MAR				
23...	1000	1340	6.2	705
MAY				
04...	1035	2880	15.0	728
JUN				
15...	1115	5020	19.5	579
JUL				
27...	1730	1810	28.9	676
SEP				
09...	0915	194	17.5	592
06607200 Maple River at Mapleton, IA				
NOV				
09...	1305	236	5.0	734
JAN				
08...	1230	135	.0	768
FEB				
17...	1605	283	.5	680
APR				
05...	1340	278	9.5	657
MAY				
20...	1150	768	16.0	679
JUL				
07...	1310	487	21.0	723
AUG				
02...	1320	300	24.0	710
SEP				
17...	1250	131	18.0	695

DATE	TIME	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	TEMPERATURE WATER (DEG C) (00010)	SPECIFIC CONDUCTANCE (US/CM) (00095)
06607500 Little Sioux River near Turin, IA				
NOV				
12...	1105	1110	3.0	714
JAN				
05...	1415	547	.0	832
FEB				
16...	1350	1640	2.0	669
APR				
07...	1100	1790	11.5	663
MAY				
19...	1115	3600	16.0	666
JUN				
28...	1345	3510	23.0	558
AUG				
05...	1040	1230	24.0	685
SEP				
15...	1120	373	16.0	630
06608500 Soldier River at Pisgah, IA				
NOV				
13...	1050	176	4.0	728
DEC				
22...	1215	98	.0	650
28...	1520	110	.0	756
JAN				
05...	1230	109	.0	756
11...	1010	126	.0	735
20...	1155	134	1.0	735
FEB				
05...	1245	243	3.0	580
18...	1405	170	.5	694
APR				
07...	1420	241	15.0	658
22...	1340	2500	10.0	308
22...	1400	2240	10.0	308
MAY				
24...	1135	332	17.0	661
JUN				
27...	1450	3080	20.0	258
AUG				
04...	1050	232	22.0	702
SEP				
23...	1135	152	15.0	719
06609500 Boyer River at Logan, IA				
NOV				
13...	1335	352	5.5	714
JAN				
05...	1005	150	.0	774
FEB				
19...	1405	301	1.5	680
APR				
08...	1050	929	12.5	630
MAY				
24...	1500	1000	19.0	642
JUN				
27...	1700	4860	22.0	348
AUG				
04...	1330	425	24.0	677
SEP				
23...	1435	219	19.0	674
06807410 West Nishnabotna River at Hancock, IA				
OCT				
08...	1255	232	12.0	670
NOV				
17...	0930	234	5.0	653
JAN				
13...	1220	129	.0	648
FEB				
18...	1145	184	.0	618
MAR				
31...	1100	255	12.0	609
MAY				
10...	1130	712	16.0	586
JUN				
28...	1025	1900	20.0	307
AUG				
03...	1115	442	17.0	656
SEP				
14...	0940	232	14.0	650
06808500 West Nishnabotna River at Randolph, IA				
OCT				
07...	1415	632	15.0	609
NOV				
20...	1025	658	6.0	656
JAN				
14...	1230	338	.0	644
FEB				
19...	1150	450	1.0	602
APR				
01...	1215	574	15.0	600
MAY				
12...	1340	1830	15.0	583
17...	1215	13700	17.0	213
17...	1315	12800	17.0	213
JUL				
01...	1255	4270	19.0	334
AUG				
06...	1145	852	22.0	601
SEP				
16...	1000	666	14.0	631
06809210 East Nishnabotna River near Atlantic, IA				
OCT				
08...	1055	154	10.0	558
NOV				
17...	1110	215	6.0	527
JAN				
13...	1055	99	-.1	536
FEB				
18...	0930	178	1.0	516
MAR				
29...	1240	223	13.0	500
MAY				
10...	1015	562	16.0	486
JUN				
23...	1225	6900	19.5	195
AUG				
03...	0920	329	19.0	516
SEP				
14...	1145	132	15.0	554

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	TEMPER-ATURE WATER (DEG C) (00010)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)
06809500 East Nishnabotna River at Red Oak, IA				
OCT				
06...	1235	434	13.0	496
NOV				
20...	0930	340	3.0	516
FEB				
17...	1230	254	2.0	492
MAR				
29...	1015	411	10.0	486
MAY				
17...	0905	11100	--	--
17...	0950	12900	--	--
JUN				
29...	1050	2230	--	--
AUG				
06...	0920	550	23.0	510
SEP				
15...	1320	268	17.0	521
06810000 Nishnabotna River above Hamburg, IA				
OCT				
07...	0905	1160	12.0	525
NOV				
19...	1110	1090	7.0	546
JAN				
14...	1000	709	.0	467
FEB				
19...	1040	814	.0	508
APR				
01...	1005	1070	14.0	502
MAY				
12...	1120	3560	15.0	470
18...	1025	16000	13.0	239
18...	1030	15100	13.0	239
JUL				
01...	0955	8780	18.0	386
AUG				
05...	1235	1900	28.0	410
SEP				
15...	0945	1120	16.0	536
06813500 Missouri River at Rulo, NE				
OCT				
05...	1225	49800	16.5	750
14...	1230	43700	16.0	761
21...	1155	42600	15.5	762
28...	1140	46400	16.0	739
NOV				
04...	1135	59400	11.0	766
13...	1115	62000	6.0	710
17...	1425	65900	7.0	752
25...	1110	62800	6.7	792
DEC				
01...	1430	60400	9.0	808
09...	1150	53900	7.0	830
14...	1200	49300	5.0	840
JAN				
20...	1100	38700	1.5	834
FEB				
03...	1145	38700	2.0	778
09...	1100	47300	3.5	724
18...	1220	45300	3.5	749
26...	1130	43100	3.0	798
MAR				
02...	1140	43600	5.0	783
10...	1235	49600	4.0	780
17...	1130	49600	6.0	782
23...	1000	52300	8.0	807
APR				
01...	1230	45800	12.0	784
07...	1120	62200	11.0	708
14...	1150	57100	12.0	795
21...	1135	65900	12.0	810
29...	1120	74200	13.0	777
MAY				
05...	1100	63800	16.0	832
12...	1105	69700	16.5	773
19...	1215	87000	18.5	757
24...	1130	86000	20.0	730
JUN				
04...	1230	95600	21.0	675
09...	1220	77100	25.0	759
14...	1240	90800	22.5	665
24...	1315	80700	22.5	790
JUL				
01...	1050	112000	19.0	671
09...	1110	82800	27.0	825
14...	1135	67000	26.0	853
20...	1200	65600	27.5	878
28...	1150	62000	30.0	834
AUG				
04...	1200	58800	27.0	869
11...	1000	66400	25.0	732
18...	1145	59000	27.0	834
27...	1010	54400	26.0	847
31...	1135	56500	27.0	854
SEP				
09...	1000	60200	24.0	794
14...	1020	60300	21.0	777
23...	1120	56300	19.0	812
30...	1130	55500	18.0	803
06817000 Nodaway River at Clarinda, IA				
OCT				
06...	0955	124	12.0	406
NOV				
17...	1500	176	9.0	435
JAN				
12...	1455	126	.0	387
FEB				
17...	0900	106	.0	416
MAR				
31...	0825	174	11.0	404
APR				
15...	--	6790	--	--
15...	1450	7470	8.0	253
MAY				
13...	1100	1050	15.0	464
JUN				
30...	1650	671	22.0	410
AUG				
02...	1435	176	25.0	408
SEP				
14...	1445	87	14.0	417

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	TEMPER-ATURE WATER (DEG C) (00010)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)
06819185 East Fork 102 River at Bedford, IA				
OCT				
05...	1240	4.4	15.0	445
NOV				
17...	1400	7.0	9.0	362
JAN				
12...	1225	1.1	3.0	573
FEB				
16...	1600	8.5	5.0	387
MAR				
30...	1300	13	14.0	351
APR				
15...	1135	2360	7.0	220
15...	1155	2140	--	--
15...	1210	2290	--	--
MAY				
11...	1330	44	17.0	346
JUN				
23...	1430	1390	20.5	143
30...	1345	64	20.0	324
AUG				
02...	1415	58	25.0	230
SEP				
13...	1340	.70	23.0	404
06898000 Thompson River at Davis City, IA				
OCT				
05...	1105	376	16.0	233
NOV				
17...	1115	154	8.0	460
JAN				
11...	0945	21	-.1	620
FEB				
16...	1300	209	4.0	444
MAR				
30...	1025	168	13.0	459
APR				
27...	1325	4090	13.0	238
MAY				
11...	1050	340	19.0	444
JUN				
30...	1110	338	22.0	398
AUG				
02...	1125	69	24.0	393
SEP				
13...	1050	42	17.0	327
06903400 Chariton River near Chariton, IA				
OCT				
13...	0945	8.3	11.4	334
NOV				
10...	0952	1280	7.5	199
DEC				
15...	1004	33	1.4	443
FEB				
03...	0826	72	.0	388
MAR				
16...	0940	662	2.7	240
APR				
03...	1430	308	16.3	324
28...	1247	2180	12.4	163
JUN				
09...	0935	29	24.1	565
JUL				
21...	0640	5.4	27.2	328
AUG				
31...	0950	2.8	21.0	338
SEP				
30...	0810	2.9	20.0	421
06903700 South Fork Chariton River near Promise City, IA				
OCT				
14...	1245	3.6	11.4	413
NOV				
10...	0700	1790	7.9	227
DEC				
15...	0802	35	2.0	454
FEB				
03...	1450	77	.4	407
MAR				
16...	0832	1410	2.1	227
APR				
16...	1448	2680	4.7	231
28...	1547	572	12.3	267
JUN				
09...	1130	35	24.5	378
JUL				
21...	1005	2.5	27.5	478
AUG				
31...	0810	1.1	20.3	497
06903900 Chariton River near Rathbun, IA				
NOV				
09...	1240	606	11.1	229
DEC				
14...	1452	1380	7.8	228
FEB				
04...	1030	316	2.2	253
MAR				
15...	1330	627	3.6	243
APR				
02...	0725	11	7.9	252
29...	0930	430	11.4	260
JUN				
10...	0640	787	19.5	256
JUL				
22...	0615	825	23.7	255
AUG				
30...	1300	52	24.3	253
06904010 Chariton River near Moulton, IA				
OCT				
01...	0841	261	18.3	258
NOV				
09...	1510	1000	8.8	323
DEC				
14...	1704	1400	8.1	243
FEB				
04...	0730	427	1.8	430
MAR				
15...	1650	867	4.6	296
APR				
29...	0745	969	11.6	275
JUN				
09...	1400	892	21.6	271
JUL				
21...	1205	1210	25.7	251
AUG				
30...	1555	124	24.8	269

ADAMS COUNTY

410247094324801. Local number, 72-32-09 CBCC.
LOCATION.--Lat 41°02'48", long 94°32'48", Hydrologic Unit 10240010, on the east side of county road, approximately 4 mi northeast of the City of Prescott. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Glacial drift of Pleistocene age (might be in Albany buried-channel).
WELL CHARACTERISTICS.--Drilled observation water-table well, diameter 2 in., depth 276 ft, screened 266-276 ft, gravel packed.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,220 ft above sea level, from topographic map. Measuring point: Top of casing, 1.40 ft above land-surface datum.
REMARKS.--Well SW-78.
PERIOD OF RECORD.--October 1987 to November 1987, June 1990, and November 1992 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured,1.38 feet below land-surface datum, May 09, 1996; lowest measured, 3.08 ft below land-surface datum, December 06, 1996.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 05	2.52	FEB 12	2.38	MAY 14	2.19	AUG 12	2.41

WATER YEAR 1999 HIGHEST 2.19 MAY 14, 1999 LOWEST 2.52 NOV 05, 1998

410248094324801. Local number, 72-32-09 CCBB.
LOCATION.--Lat 41°02'48", long 94°32'48", Hydrologic Unit 10240010, on the east side of county road, approximately 4 mi northeast of the City of Prescott. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Glacial drift of Pleistocene age.
WELL CHARACTERISTICS.--Drilled observation water-table well, diameter 2 in., depth 136 ft, screened 130-136 ft, gravel packed.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,220 ft above sea level, from topographic map. Measuring point: Top of casing, 2.65 ft above land-surface datum.
REMARKS.--Well SW-83.
PERIOD OF RECORD.--August 1988, June 1990, and November 1992 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 3.72 feet below land-surface datum, February 3, 1994; lowest measured, 5.30 ft below land-surface datum, August 4, 1997.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 05	5.07	FEB 12	5.08	MAY 14	4.84	AUG 12	5.10

WATER YEAR 1999 HIGHEST 4.84 MAY 14, 1999 LOWEST 5.10 AUG 12, 1999

APPANOOSE COUNTY

404103092404001. Local number, 68-16-15 DDAD.
LOCATION.--Lat 40°41'03", long 92°40'40", Hydrologic Unit 10280201, located approximately 4 mi south of State Highway 2 on State Highway 202 beneath water tower in the Town of Moulton. Owner: Town of Moulton.
AQUIFER.--Cambrian/Ordovician.
WELL CHARACTERISTICS.-- Drilled observation water-table well, diameter 8 and 12.75 in., depth 2377 ft, screened 1713-1736 ft.
INSTRUMENTATION.-- Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 992.00 ft above sea level, by unknown method. Measuring point: Top of well cover, 1.07 ft above land-surface datum.
REMARKS.-- Moulton Town Well.
PERIOD OF RECORD.--October 1996 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 381.37 feet below land surface datum, October 10, 1996; lowest measured, 389.00 feet below land-surface datum February 08, 1999.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	384.31	FEB 08	389.00	MAY 05	383.82	AUG 05	385.03

WATER YEAR 1999 HIGHEST 383.82 MAY 05, 1999 LOWEST 389.00 FEB 08, 1999

AUDUBON COUNTY

413044094565601. Local number, 78-36-35 ADCC1.
LOCATION.--Lat 41°30'44", long 94°56'56", Hydrologic Unit 10240003, 2.5 mi south of the Town of Brayton on Highway 71, and 0.3 mi west on the north side of County Road F-67. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Dakota: sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 115 ft, screened 94-101 ft, open hole 101-115 ft., gravel-packed.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,230 ft above sea level, from topographic map. Measuring point: Top of casing, 2.37 ft above land-surface datum.
REMARKS.--Well WC-69.
PERIOD OF RECORD.--June 1982 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 29.43 ft below land-surface datum, August 11, 1993; lowest measured, 53.55 ft below land-surface datum, April 12, 1990.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	42.44	FEB 12	45.83	MAY 14	43.15	AUG 09	37.83

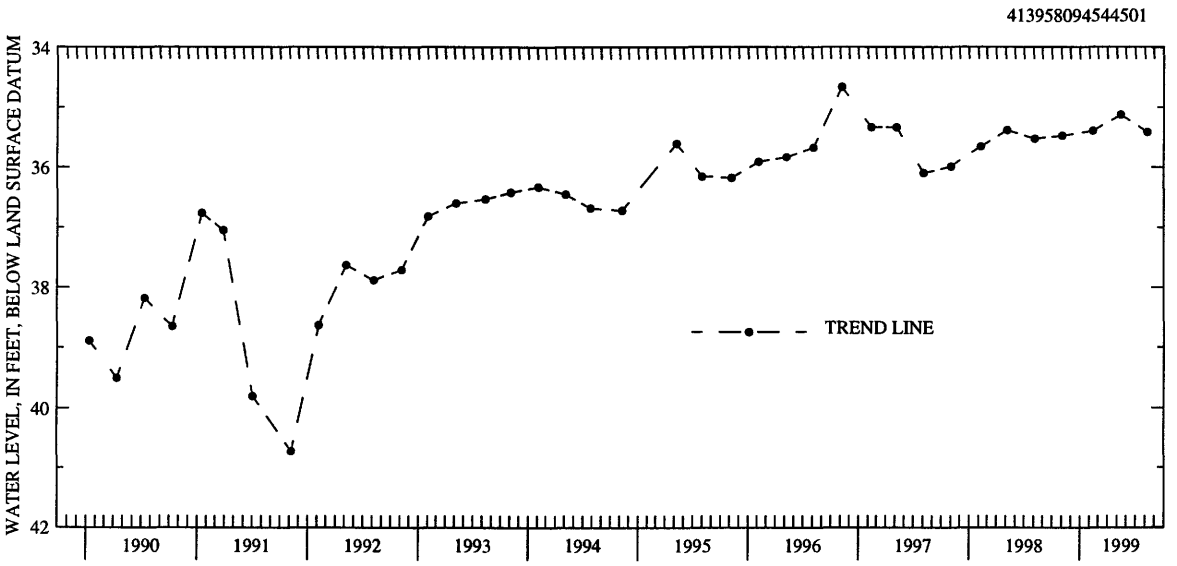
WATER YEAR 1999 HIGHEST 37.83 AUG 09, 1999 LOWEST 45.83 FEB 12, 1999

413958094544501. Local number, 79-35-10 CABB.
LOCATION.--Lat 41°39'58", long 94°54'45", Hydrologic Unit 10240003, approximately 0.3 mi west of the Town of Hamlin, on the south side of Highway 44. Owner: Geological Survey Bureau/DNR and U.S. Geological Survey.
AQUIFER.--Dakota: sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 221 ft, screened 168-188 ft, open hole 210-221 ft, gravel-packed.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,280 ft above sea level, from topographic map. Measuring point: Top of casing, 5.37 ft above land-surface datum.
REMARKS.--Well WC-17.
PERIOD OF RECORD.--August 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 34.66 ft below land-surface datum, November 6, 1997 and May 09, 1995; lowest measured, 42.40 ft below land-surface datum, November 8, 1991.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	35.47	FEB 12	35.39	MAY 14	35.12	AUG 09	35.41

WATER YEAR 1999 HIGHEST 35.12 MAY 14, 1999 LOWEST 35.47 NOV 04, 1998



AUDUBON COUNTY--Continued

415023094593801. Local number, 81-36-12 CBCA
LOCATION.--Lat 41°50'23", long 94°59'38", Hydrologic Unit 10240002, approximately 0.5 mi west of the Town of Gray on the east side
of County Road N-14, south of the Gray Cemetery. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Dakota: sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 315 ft, screened 279-295 ft, gravel-packed.
INSTRUMENTATION.--Quarterly measurement with chalked tape or electric line by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,393 ft above sea level, from topographic map. Measuring point: Top of casing, 1.40 ft above land-surface datum.
REMARKS.--Well WC-18.
PERIOD OF RECORD.--August 1981 to current year.
REVISION.--Measuring point revised February 13, 1990 to August 4, 1992.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 159 ft below land-surface datum, August 05, 1998; lowest measured, 168.52 ft below land-surface datum, October 6, 1987.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	160.06	FEB 11	159.91	MAY 10	159.84	AUG 09	160.25

WATER YEAR 1999 HIGHEST 159.84 MAY 10, 1999 LOWEST 160.25 AUG 09, 1999

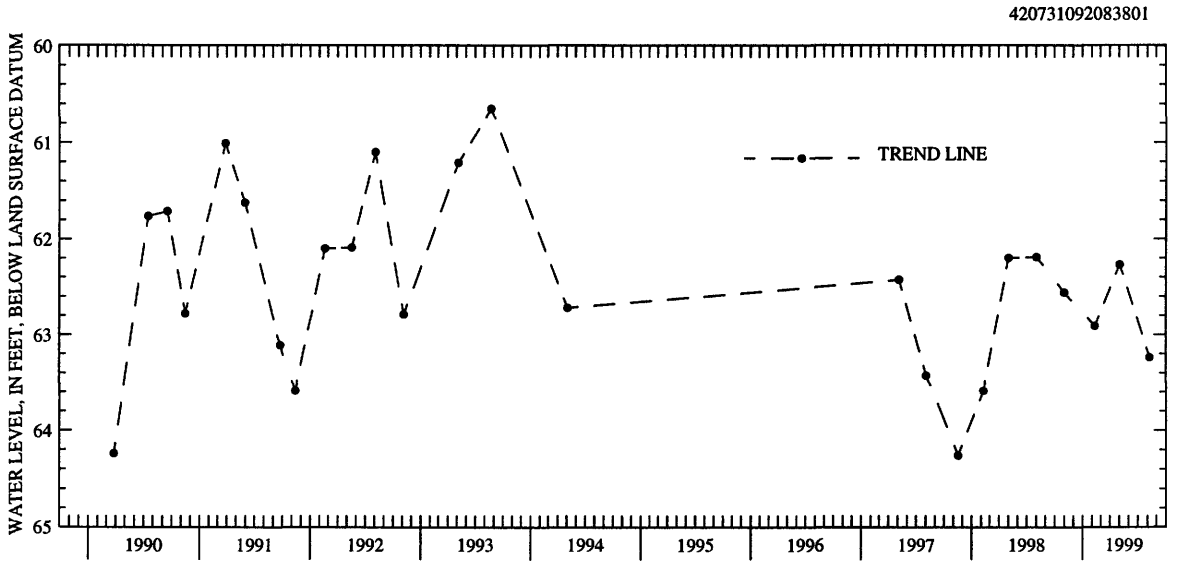
BENTON COUNTY

420731092083801. Local number, 85-11-33 CCBC1.
LOCATION.--Lat 42°07'31", long 92°08'38", Hydrologic Unit 07080205, approximately 1 mi south of the Town of Garrison, just east of County Road V-56. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Devonian: Cedar Valley limestone of Middle Devonian age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 0.75 in., depth 237 ft, cement plug 97-100 ft, screened below cement plug, open hole 170-237 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 905 ft above sea level, from topographic map. Measuring point: Top of 6 in. casing, 2.20 ft above land-surface datum.
REMARKS.--Garrison 170 well; Garrison wells 109 and 340 also in this hole.
PERIOD OF RECORD.--June 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 60.18 ft below land-surface datum, April 19, 1983; lowest measured, 87.50 ft below land-surface datum, August 2, 1994.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	62.56	FEB 10	62.91	MAY 03	62.27	AUG 09	63.24

WATER YEAR 1999 HIGHEST 62.27 MAY 03, 1999 LOWEST 63.24 AUG 09, 1999



BENTON COUNTY--Continued

420731092083803. Local number, 85-11-33 CCBC3.
LOCATION.--Lat 42°07'31", long 92°08'38", Hydrologic Unit 07080205, approximately 1 mi south of the Town of Garrison, just east of County Road V-56. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Devonian: Cedar Valley limestone of Middle Devonian age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 6 in., depth 97 ft, open hole 90-97 ft, cement plug 97-100 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 905 ft above sea level, from topographic map. Measuring point: Top of 6 in. casing, 2.20 ft above land-surface datum.
REMARKS.--Garrison 109 well; Garrison wells 170 and 340 also in this hole.
PERIOD OF RECORD.--June 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 60.63 ft below land-surface datum, March 23, 1979; lowest measured, 66.87 ft below land-surface datum, August 4, 1997.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	62.59	FEB 10	63.02	MAY 03	65.48	AUG 09	63.03

WATER YEAR 1999 HIGHEST 62.59 NOV 02, 1998 LOWEST 65.48 MAY 03, 1999

420731092083802. Local number 85-11-33 CCBC.
LOCATION.--Lat 42°07'31", long 92°08'38", Hydrologic Unit 07080205, approximately 1 mi south of the Town of Garrison, just east of County Road V-56. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Silurian
WELL CHARACTERISTCS.-- Drilled observation artesian water well, diameter 6in., depth 538 ft, casing information unknown
IINSTRUMENTATION.-- Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 905 ft above sea level, from topographic map. Measuring point: Top of 6 in. casing, 2.20 ft above
land-surface datum.
REMARKS.--Garrison 340 well; Garrison wells 170 and 109 also in this hole.
PERIOD OF RECORD.--October 1975 to March 1981; November 1982 to November 1990; November 1993 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 67.50 ft below land-surface datum, August 4 1997; lowest measured, 104.94 ft below land-surface datum, August 21, 1985.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	82.54	FEB 10	85.47	MAY 03	86.24	AUG 09	86.27

WATER YEAR 1999 HIGHEST 82.54 NOV 02, 1998 LOWEST 86.27 AUG 09, 1999

BREMER COUNTY

424224092133901. Local number, 91-12-11 DBB.
LOCATION.--Lat 42°42'15", long 92°13'29", Hydrologic Unit 07080102, located in the town of Readlyn, approximately 0.5 mi south of State Highway 3, in the northwest corner of town limits. Owner: Town of Readlyn.
AQUIFER.--Silurian, Alexanderian Series dolomite.
WELL CHARACTERISTICS.--Drilled public-use well, diameter 16 in, depth 154 ft, casing open from 99-154 ft.
INSTRUMENTATION.--Quarterly measurement with airline by USGS personnel
DATUM.--Elevation of land-surface is 1038 feet above sea level, by topographic map.
REMARKS.--Readlyn No. 2
PERIOD OF RECORD.--August 1997 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 86 feet below land-surface datum, November 05, 1998, lowest measured, 92 feet below land-surface datum, May 05, 1998.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 05	86	FEB 08	88	MAY 04	89	AUG 02	89

WATER YEAR 1999 HIGHEST 86 NOV 05, 1998 LOWEST 89 MAY 04, 1999 AUG 02, 1999

BUCHANAN COUNTY

422836092034401. Local number, 89-10-32 BCC.
LOCATION.--Lat 42°28'36", long 92°03'44", Hydrologic Unit 07080205, approximately 1.7 miles north of U.S. Highway 20 in the east central section of the Town of Jesup. Owner: Town of Jesup.
AQUIFER.--Silurian.
WELL CHARACTERISTICS.--Drilled public supply well, diameter 10 in., depth 365 ft, steel casing to 206 ft, open interval 206-365 ft.
INSTRUMENTATION.--Quarterly measurement with airline by USGS personnel.
DATUM.--Elevation of land-surface datum is 995 ft above sea level, from topographic map.
REMARKS.--Jesup No.4
PERIOD OF RECORD.--August 1997 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 85 ft below land-surface datum, August 4,1997; lowest measured, 185 ft below land-surface datum, November 25, 1997.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 08	143	FEB 19	140	MAY 05	140

WATER YEAR 1999 HIGHEST 140 MAY 05, 1999 FEB 19, 1999 LOWEST 143 NOV 08, 1998

BUENA VISTA COUNTY

424023095571401. Local number, 91-35-26 BCCC
LOCATION.--Lat 42°40'09", long 94°57'15", Hydrologic Unit 07100006, approximately 2.7 mi west and 0.5 mi north of the village of Varina. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Dakota: in sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 2 in., depth 357 ft, cased tp 357 ft. screened interval 338-347 ft. Paleozoic rock present at 347 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by U.S.G.S. personnel.
DATUM.--Elevation of land-surface datum is 1,291 ft above sea level, from topographic map. Measuring point: Top of casing, 2.00 ft above land-surface datum.
REMARKS.--Well D-24.
PERIOD OF RECORD.--December 1978 to August 1994, November 1996 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 18.04 ft below land-surface datum, January 7,1980; lowest measured, 96.16 ft below land-surface datum, August 04, 1999.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	95.85	FEB 09	95.59	MAY 05	95.19	AUG 04	96.16

WATER YEAR 1999 HIGHEST 95.19 MAY 05, 1999 LOWEST 96.16 AUG 04, 1999

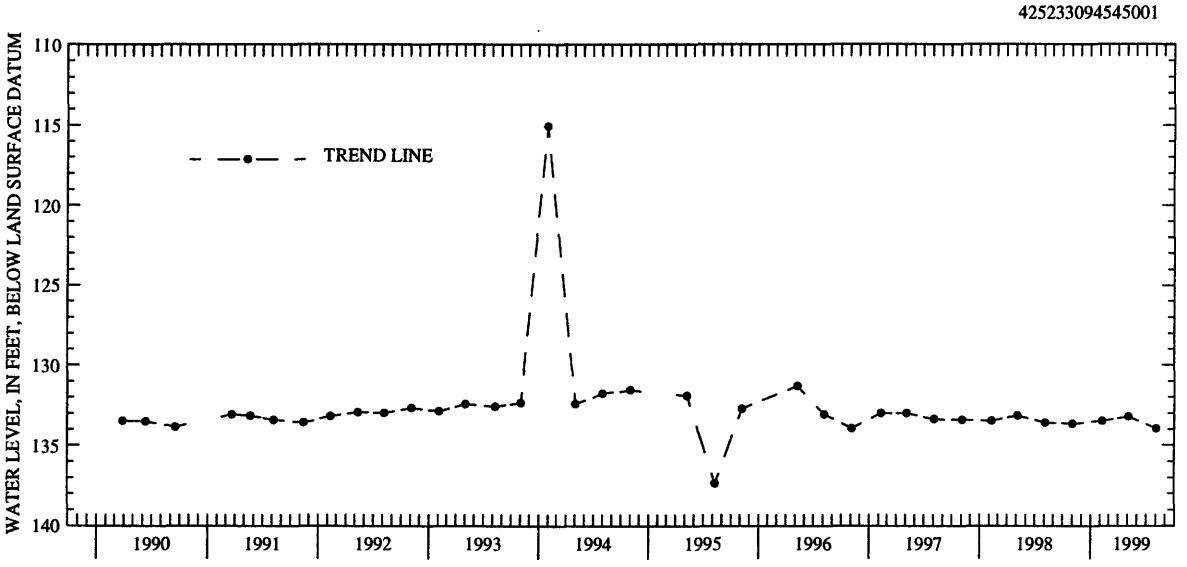
BUENA VISTA COUNTY--Continued

425233094545001. Local number, 93-35-13 ADAA.
LOCATION.--Lat 42°52'33", long 94°54'50", Hydrologic Unit 07100006, south of the Chicago, Rock Island and Pacific Railroad track, approximately 3.5 mi east and 0.75 mi north of the Town of Marathon. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Dakota: sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 1.50 in., depth 381 ft, screened 350-360 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape or electric line by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,330 ft above sea level, from topographic map. Measuring point: Top of casing, 3.00 ft above land-surface datum.
REMARKS.--Well D-36.
PERIOD OF RECORD.--February 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 115.06 ft below land-surface datum, January 31, 1994; lowest measured, 137.37 ft below land-surface datum, August 10, 1995.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	133.67	FEB 09	133.49	MAY 05	133.22	AUG 04	133.96

WATER YEAR 1999 HIGHEST 133.22 MAY 05, 1999 LOWEST 133.96 AUG 04, 1999



CALHOUN COUNTY

422812094383501. Local number, 88-32-01 BACD.
LOCATION.--Lat 42°28'12", long 94°38'35", Hydrologic Unit 07100006, located approximately 4.5 mi north of Rockwell City, in a trailer park at the south end of North Twin Lake in Twin Lakes State Park. Owner: Pauline Goins.
AQUIFER.--Glacial drift of Pleistocene age.
WELL CHARACTERISTICS.--Dug unused water-table well, diameter 24 in., depth 35 ft, casing interval unknown.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,222 ft above sea level, from topographic map. Measuring point: Top of casing, 1.12 ft above land-surface datum.
REMARKS.--Twin Lakes (33F2) well.
PERIOD OF RECORD.--May 1989 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 1.86 ft below land-surface datum, April 19, 1991; lowest measured, 16.96 ft below land-surface datum, February 28, 1990.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	8.51	FEB 10	6.48	MAY 06	5.2	AUG 04	8.44

WATER YEAR 1999 HIGHEST 5.2 MAY 06, 1999 LOWEST 8.51 NOV 03, 1998

422339094375101. Local number, 88-33-36 ADAA.
LOCATION.-- Lat 42°23'47", long 94°37'57", Hydrologic Unit 07100006, located at the corner of main and 3rd street, three blocks south of U.S. Highway 20. Owner: City of Rockwell.
AQUIFER.-- Cambrian/Ordovician: Prairie du Chen Formation dolomite
WELL CHARACTERISTICS.-- Drilled public supply well, diameter 16 in., depth 1970 ft., casing interval 1592-1970? ft, gravel packed.
INSTRUMENTATION.-- Quarterly measurements with airline by USGS personnel.
DATUM.-- Elevation of land-surface datum is 1,227 ft above sea level, from topographic map.
REMARKS.--Rockwell City Well No. 4
PERIOD OF RECORD.--February 1997 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 199 ft below land-surface datum, Oct. 07, 1997 and Feb. 10, 1998; lowest measured, 287 ft below land-surface datum, February 10, 1999.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	217	FEB 10	287	MAY 06	262	AUG 04	252

WATER YEAR 1999 HIGHEST 217 NOV 03, 1998 LOWEST 287 FEB 10, 1999

CARROLL COUNTY

420230094455101. Local number, 84-34-35 DAAA.
LOCATION.--Lat 42°02'30", long 94°45'51", Hydrologic Unit 07100007, on the south side of county road, approximately 1 mi east of Arthur N. Neu County Airport. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Alluvial and glacial drift: Middle Raccoon River sand and gravel and glacial drift of Quaternary age.
WELL CHARACTERISTICS.--Drilled observation water-table well, diameter 2 in., depth 40 ft, screened 28-40 ft, gravel packed. Glacial till 31-36 ft and 37-40 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,185 ft above sea level, from topographic map. Measuring point: Top of casing, 2.35 ft above land-surface datum.
REMARKS.--Well WC-146.
PERIOD OF RECORD.--August 1992 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 1.50 feet below land-surface datum, May 10, 1995; lowest measured, 8.27 ft below land-surface datum, November 07, 1995.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	6.09	FEB 10	6.05	MAY 06	3.47	AUG 04	4.33

WATER YEAR 1999 HIGHEST 3.47 MAY 06, 1999 LOWEST 6.09 NOV 03, 1998

CARROLL COUNTY--Continued

420233094475901. Local number, 83-35-34 BCDC.
LOCATION.--Lat 42°02'33", long 94°47'59", Hydrologic Unit 07100007, approximately 3.5 mi west and 1.5 mi south of the Town of Glidden near the airport, west of County Road N-38. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Dakota: sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 100 ft, screened 72-76 ft; gravel packed, open hole 99-100 ft. Pennsylvanian rock 80-100 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,225 ft above sea level, from topographic map. Measuring point: Top of casing, 2.85 ft above land-surface datum.
REMARKS.--Well WC-148.
PERIOD OF RECORD.--October 1982 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 15.56 ft below land-surface datum, May 4, 1983; lowest measured, 23.72 ft below land-surface datum, November 07, 1995.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	21.63	FEB 10	22.20	MAY 06	18.09	AUG 04	19.26

WATER YEAR 1999 HIGHEST 18.09 MAY 06, 1999 LOWEST 22.20 FEB 10, 1999

420643094403701. Local number, 84-33-03 CADA.
LOCATION.--Lat 42°06'43", long 94°40'37", Hydrologic Unit 07100006, 3.5 mi north and 2.5 mi east of the Town of Glidden, on the west side of County Road N-50. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Alluvial: North Raccoon River sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled observation water-table well, diameter 2 in., depth 15 ft, screened 13-15 ft, gravel-packed.
INSTRUMENTATION.--Quarterly measurement with chalked tape or electric line by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,090 ft above sea level, from topographic map. Measuring point: Top of casing, 2.31 ft above land-surface datum.
REMARKS.--Well WC-131.
PERIOD OF RECORD.--September 1982 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 7.06 ft below land-surface datum, July 10, 1990; lowest measured, 11.99 ft below land-surface datum, May 07, 1996.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	10.63	FEB 10	11.35	MAY 06	8.02	AUG 04	8.99

WATER YEAR 1999 HIGHEST 8.02 MAY 06, 1999 LOWEST 11.35 FEB 10, 1999

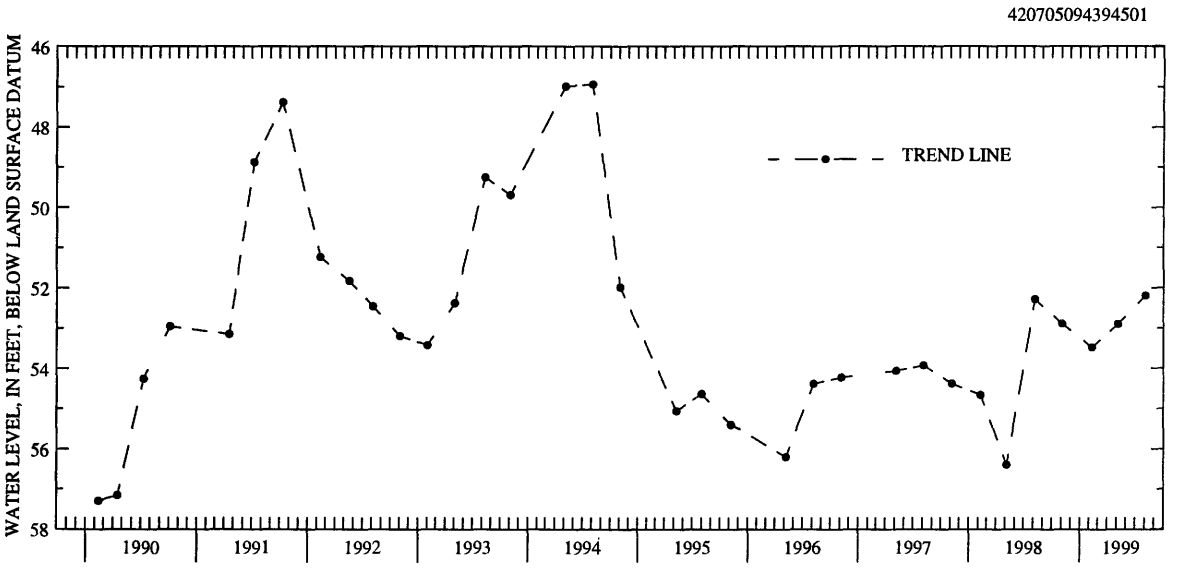
CARROLL COUNTY--Continued

420705094394501. Local number, 84-33-02 BDBA.
LOCATION.--Lat 42°07'05", long 94°39'45", Hydrologic Unit 07100006, 3.75 mi north and 3.25 mi east of the Town of Glidden, east of County Road N-50 and the Kendal Bridge. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Dakota: sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 76 ft., screened 73-76 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape or electric line by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,110 ft above sea level, from topographic map. Measuring point: Top of casing, 2.00 ft above land-surface datum.
REMARKS.--Well WC-132.
PERIOD OF RECORD.--September 1982 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 46.93 ft below land-surface datum, August 3, 1994; lowest measured, 57.30 ft below land-surface datum, February 13, 1990.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	52.89	FEB 10	53.48	MAY 06	52.90	AUG 04	52.19

WATER YEAR 1999 HIGHEST 52.19 AUG 04, 1999 LOWEST 53.48 FEB 10, 1999



421058094582701. Local number, 85-35-07 CCCC.
LOCATION.--Lat 42°10'58", long 94°58'27", Hydrologic Unit 07100006, approximately 1 block north of Iowa Highway 217, next to the town maintenance building, Breda. Owner: Town of Breda.
AQUIFER.--Dakota: sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled municipal artesian water well, diameter 10 in., depth 340 ft, screened 320-340 ft. Original depth 349 ft.
INSTRUMENTATION.--Quarterly measurement with chalked taped by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,362 ft above sea level, from topographic map. Measuring point: Vent pipe, 1.60 ft above land-surface datum.
REMARKS.--City of Breda Well No. 3, previously referred to as Town Well No. 2.
PERIOD OF RECORD.--March 1942 to August 1966, March 1968 to November 1971, June 1975 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 187.70 ft below land-surface datum, March 25, 1948; lowest measured, 250.40 ft below land-surface datum, May 24, 1977.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	202.45	FEB 10	201.74	MAY 06	201.45	AUG 04	210.86

WATER YEAR 1999 HIGHEST 201.45 MAY 06, 1999 LOWEST 210.86 AUG 04, 1999

CASS COUNTY

411900094530101. Local number, 75-35-07 BBAB.
LOCATION.--Lat 41°19'00", long 94°53'01", Hydrologic Unit 10240003, approximately 3 mi north and 2.9 mi west of the Town of Cumberland, 2 mi south of County Road G-35 and 2.9 mi west of County Road N-28. Owner: Geological Survey Bureau/DNR and U.S. Geological Survey.
AQUIFER.--Dakota: sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 2 in., depth 218 ft, screened 189-209 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,295 ft above sea level, from topographic map. Measuring point: Top of casing, 2.35 ft above land-surface datum.
REMARKS.--Well SW-17.
PERIOD OF RECORD.--July 1986 to October 1987, February 1990 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 111.65 ft below land-surface datum, August 5, 1993; lowest measured, 125.75 ft below land-surface datum, March 14, 1990.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 05	115.68	FEB 12	117.91	MAY 14	116.39	AUG 09	114.71

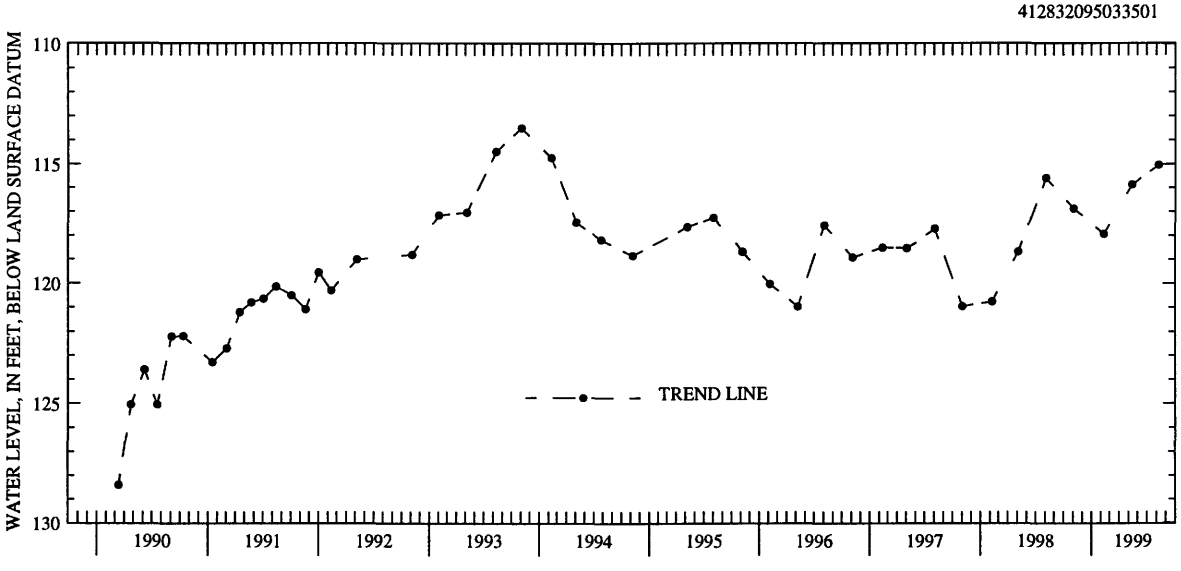
WATER YEAR 1999 HIGHEST 114.71 AUG 09, 1999 LOWEST 117.91 FEB 12, 1999

412832095033501. Local number, 77-37-13 BBBB.
LOCATION.--Lat 41°28'32", long 95°03'35", Hydrologic Unit 10240003, approximately 1 mi south of U.S. Interstate 80, and east of Highway 173. Approximately 2 mi north and 3 mi east of the Town of Marne. Owner: Geological Survey Bureau/DNR and U.S. Geological Survey.
AQUIFER.--Pennsylvanian: limestone of Pennsylvanian age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 2 in., depth 201 ft, screened 196-201 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,298 ft above sea level, from topographic map. Measuring point: Top of casing, 2.20 ft above land-surface datum.
REMARKS.--Well SW-18.
PERIOD OF RECORD.--July 1986 to October 1987, February 1990 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 113.50 ft below land-surface datum, November 4, 1993; lowest measured, 128.40 ft below land-surface datum, March 14, 1990.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	116.88	FEB 12	117.93	MAY 14	115.86	AUG 09	115.03

WATER YEAR 1999 HIGHEST 115.03 AUG 09, 1999 LOWEST 117.93 FEB 12, 1999



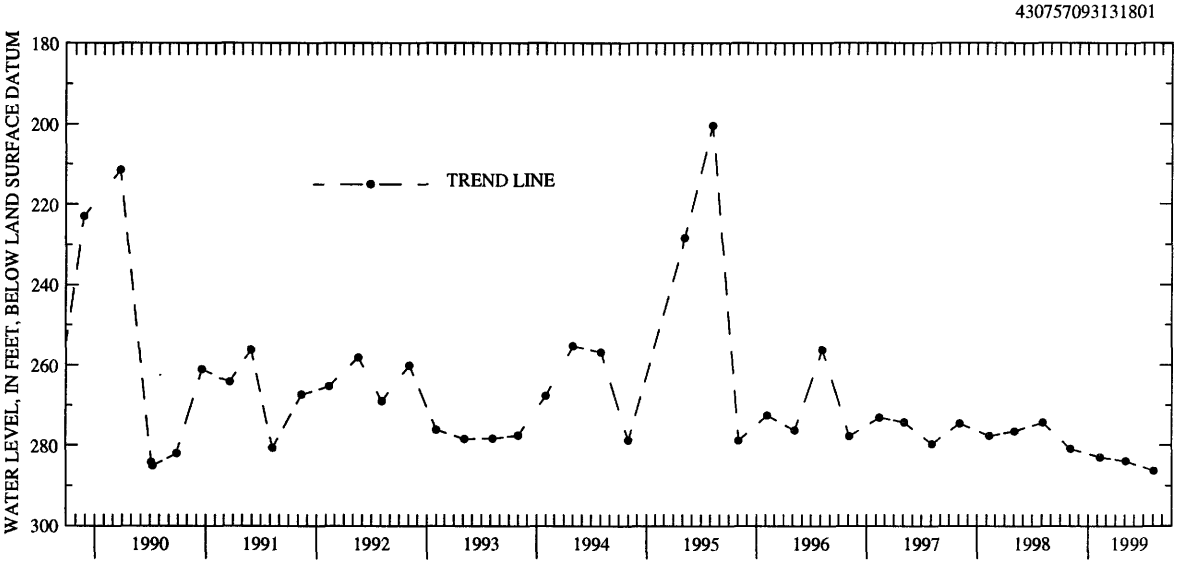
CERRO GORDO COUNTY

430757093131801. Local number, 96-20-17 DAAD.
LOCATION.--Lat 43°07'57", long 93°13'18", Hydrologic Unit 07080203, in southwest Mason City, 1 mi west of Highway 65 and south of the Iowa Terminal Rail-yard. Owner: AMPI Creamery (formerly State Brand Creameries).
AQUIFER.--Cambrian-Ordovician: sandstone of Late Cambrian age and sandy dolomite of Early Ordovician age.
WELL CHARACTERISTICS.--Unused drilled industrial artesian water well, diameter 10 to 6 in. from 0-1080 ft, depth 1,336 ft, open hole from 1,080-1,336 ft.
INSTRUMENTATION.--Quarterly measurement with electric line by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,162 ft above sea level, from topographic map. Measuring point: Top of casing, 1.50 ft above land-surface datum.
REMARKS.--State Brand Creameries Well #1. Records for 1968-1971 and 1973-1989 are unpublished and available in the files of the Iowa District Office.
PERIOD OF RECORD.--October 1968 to March 1971, and March 1973 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 170.80 ft below land-surface datum, August 4, 1977; lowest measured, 298.80 ft below land-surface datum, October 22, 1968.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	280.9	FEB 09	283.03	MAY 04	283.92	AUG 03	286.35

WATER YEAR 1999 HIGHEST 280.9 NOV 04, 1998 LOWEST 286.35 AUG 03, 1999



430806093164501. Local number, 96-21-13 BCCB.
LOCATION.--Lat 43°08'06", long 93°16'45", Hydrologic Unit 07080203, south of the County Home, just north of Iowa Highway 106, east of the City of Clear Lake. Owner: Mason City and Clear Lake Railroad.
AQUIFER.--Devonian: Cedar Valley limestone of Middle Devonian age.
WELL CHARACTERISTICS.--Drilled unused artesian water well, diameter 5 in., depth 198 ft. Casing information is not available.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,165 ft above sea level, from topographic map. Measuring point: Top of well curb, 1.30 ft above land-surface datum.
PERIOD OF RECORD.--November 1940 to August 1971, March 1973 to current year.
REMARKS:--Mason City and Clear Lake Railroad well.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 1.44 ft below land-surface datum, February 12, 1982; lowest measured, 17.26 ft below land-surface datum, November 18, 1955.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	6.57	FEB 09	6.83	MAY 04	4.73	AUG 03	4.72

WATER YEAR 1999 HIGHEST 4.72 AUG 03, 1999 LOWEST 6.83 FEB 09, 1999

CHEROKEE COUNTY

423833095365701. Local number, 90-40-06 BDCD.
LOCATION.--Lat 42°38'33", long 95°36'57", Hydrologic Unit 10230003, approximately 3.1 mi west of U.S. Highway 59 and 0.55 mi north of Iowa Highway 31 along the Illinois Central Railroad track. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Dakota: sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 1.25 in., depth 253 ft, sandpoint 252-253 ft.
INSTRUMENTATION.--Quarterly measurements with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,182 ft above sea level, from topographic map. Measuring point: Top of casing, 3.93 ft above land-surface datum.
REMARKS.--Well D-6.
PERIOD OF RECORD.--December 1978 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 28.38 ft below land-surface datum, August 27, 1983; lowest measured, 40.85 ft below land-surface datum, January 15, 1991.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	33.05	FEB 09	32.40	MAY 10	31.13	AUG 09	31.44

WATER YEAR 1999 HIGHEST 31.13 MAY 10, 1999 LOWEST 33.05 NOV 02, 1998

424132095480211. Local number, 91-42-16 DDDD11.
LOCATION.--Lat 42°41'32", long 95°48'02", Hydrologic Unit 10230004, approximately 2 mi north of the Village of Fielding at the junction of County Roads L-36 and C-44. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Dakota: sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 390 ft, screened 386-390 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,320 ft above sea level, from topographic map. Measuring point: Top of casing, 1.50 ft above land-surface datum.
REMARKS.--Well D-11.
PERIOD OF RECORD.--March 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 141.67 ft below land-surface datum, May 5, 1993; lowest measured, 156.20 ft below land-surface datum, January 10, 1990.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	155.64	MAY 11	155.22	AUG 09	155.22

WATER YEAR 1999 HIGHEST 155.22 MAY 11, 1999 AUG 09, 1999 LOWEST 155.64 NOV 02, 1998

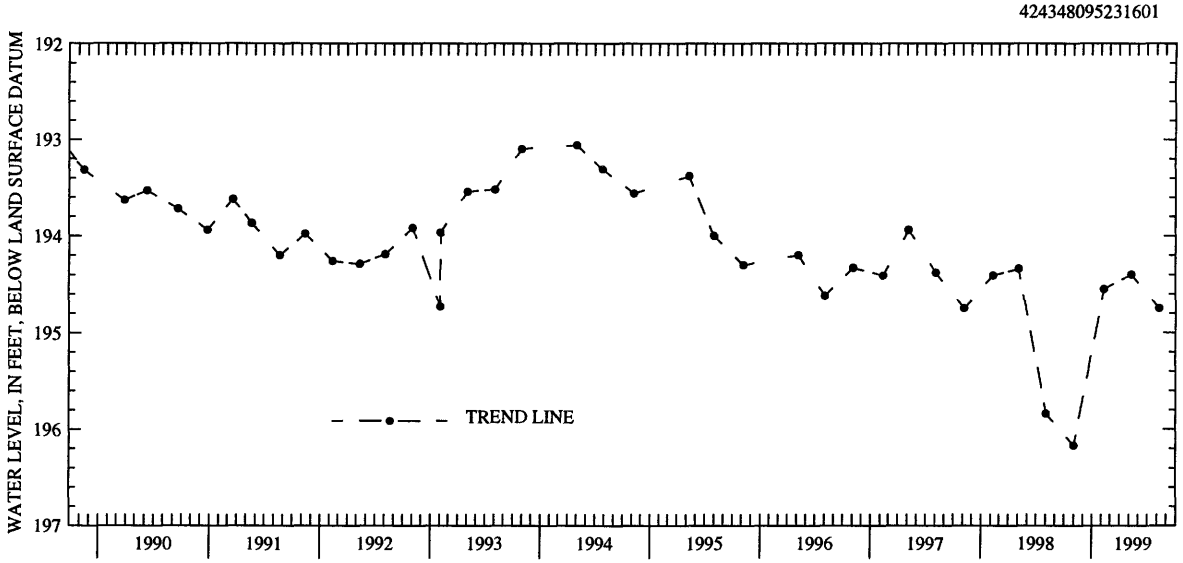
CHEROKEE COUNTY--Continued

424348095231601. Local number, 91-39-01 ADAD1.
LOCATION.--Lat 42°43'48", long 95°23'16", Hydrologic Unit 10230005, approximately 2 mi east and 0.5 mi north of the Town of Aurelia at the Larson Lake County Park. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Cambrian-Ordovician: sandstone of Cambrian age and dolomite of Ordovician age.
WELL CHARACTERISITICS.--Drilled observation artesian water well, diameter 6 in. to 236 ft, 5 in. to 486 ft, 2 in. to 1,126 ft, depth 1,545 ft, open hole 1,126 to 1,545 ft.
INSTRUMENTATION.--Quarterly measurement with electric line or chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,370 ft above sea level, from topographic map. Measuring point: Top of casing, 1.55 ft above land-surface datum.
REMARKS.--Well D-28.
PERIOD OF RECORD.--September 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 189.65 ft below land-surface datum, December 19, 1984; lowest measured, 196.17 ft below land-surface datum, November 02, 1998.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATE LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	196.17	FEB 10	194.55	MAY 10	194.40	AUG 09	194.75

WATER YEAR 1999 HIGHEST 194.40 MAY 10, 1999 LOWEST 196.17 NOV 02, 1998



424348095231602. Local number, 91-39-01 ADAD2.
LOCATION.--Lat 42°43'48", long 95°23'16", Hydrologic Unit 10230005, approximately 2 mi east and 0.5 mi north of the Town of Aurelia at the Larson Lake County Park. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Dakota: sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 4 in., depth 340 ft, screened 235-240 ft.
INSTRUMENTATION.--Quarterly measurement with electric line or chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,370 ft above sea level, from topographic map. Measuring point: Top of casing, 1.75 ft above land-surface datum.
REMARKS.--Well D-29.
PERIOD OF RECORD.--September 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 188.65 ft below land-surface datum, April 20, 1988; lowest measured, 194.15 ft below land-surface datum, August 24, 1982.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	191.87	FEB 09	191.92	MAY 10	191.62	AUG 09	191.79

WATER YEAR 1999 HIGHEST 191.62 MAY 10, 1999 LOWEST 191.92 FEB 09, 1999

CLAYTON COUNTY

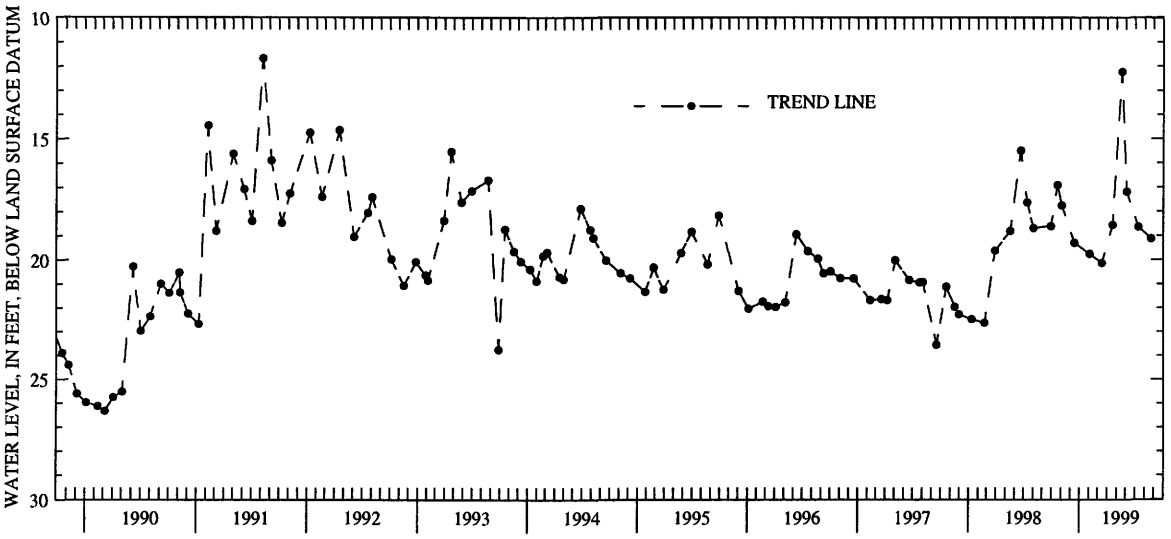
424023091291201. Local number, 91-05-30 BBBB.
LOCATION.--Lat 42°40'23", long 91°29'12", Hydrologic Unit 07060006, 5 mi northwest of the City of Edgewood, or 2 mi northwest of the junction of Iowa Highways 3 and 13, east of Strawberry Point. Owner: Harold Knight.
AQUIFER.--Glacial drift of Pleistocene age.
WELL CHARACTERISTICS.--Dug unused water-table well, diameter 36 in., depth 36 ft. Casing information not available.
INSTRUMENTATION.--Intermittent measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,233 ft above sea level, from topographic map. Measuring point: Hole in pump base at land-surface datum.
PERIOD OF RECORD.--June 1957 to current year.
REMARKS:--Harold Knight well.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 11.68 ft below land-surface datum, August 7, 1991; lowest measured, 30.68 ft below land-surface datum, January 12, 1959.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 21	16.91	FEB 03	19.75	MAY 19	12.23	AUG 23	19.13
NOV 04	17.75	MAR 15	20.14	JUN 04	17.19		
DEC 15	19.30	APR 19	18.56	JUL 12	18.65		

WATER YEAR 1999 HIGHEST 12.23 MAY 19, 1999 LOWEST 20.14 MAR 15, 1999

424023091291201



425433091285002. Local number, 94-05-31 DACC2.
LOCATION.--Lat 42°54'33", long 91°28'50", Hydrologic Unit 07060004, located at entrance to Big Spring Fish Hatchery 4.5 mi west and 1.25 mi south of the Town of St. Olaf. Owner: Geological Survey Bureau, DNR, and U.S. Geological Survey.
AQUIFER.--Cambrian-Ordovician: Galena dolomite of Middle Ordovician age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 5 in., depth 85 ft, open hole 61-85 ft.
INSTRUMENTATION.--Intermittent measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 855 ft above sea level, from topographic map. Measuring point: Top of recorder platform, 2.23 ft above land-surface datum.
REMARKS.--Well BS1-B. Historical water-level data published in OFR 91-63 and OFR 92-67.
PERIOD OF RECORD.--December 1988 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 0.62 ft above land-surface datum, August 20, 1993 (revised); lowest water level recorded 10.86 ft below land-surface datum, August 25, 1999.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	5.15	FEB 04	5.69	MAY 19	7.56	AUG 25	10.86

WATER YEAR 1999 HIGHEST 5.15 NOV 04, 1998 LOWEST 10.86 AUG 25, 1999

CLAYTON COUNTY--Continued

430156091182901. Local number, 95-04-22 BCBD.
LOCATION.--Lat 43°01'56", long 91°18'29", Hydrologic Unit 07060001, approximately 2 mi north of the junction of U.S. Highway 18 and U.S. Highway 52-Iowa Highway 13, near Spook Cave. Owner: Gerald Mielke.
AQUIFER.--Cambrian-Ordovician: St. Peter sandstone of Middle Ordovician age.
WELL CHARACTERISTICS.--Drilled unused artesian water well, diameter 6 in., depth 49 ft. Casing information not available.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 940 ft above sea level, from topographic map. Measuring point: Top of casing, 1.00 ft above land-surface datum.
PERIOD OF RECORD.--October 1957 to current year.
REMARKS.--USGS 22E1
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 13.98 ft below land-surface datum, December 7, 1983; lowest measured, 27.88 ft below land-surface datum, March 4, 1968.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	23.28	FEB 04	24.44	MAY 19	17.74	AUG 25	23.11

WATER YEAR 1999 HIGHEST 17.74 MAY 19, 1999 LOWEST 24.44 FEB 04, 1999

425736091260303. Local Number 94-05-03 A.
Location. --Lat 42°57'36", long 91°26'03", Hydrologic Unit 07060004, approximately 100 feet south of Robert's Creek on County Highway X16
Aquifer.--Cambrian-Ordovician: St. Peter Sandstone
Well Characteristics. --Drilled observation well, diameter 4 in.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
Datum. -- Elevation of land-surface datum is 1030 ft above sea level, from topographic map. Measuring point: Top of casing, 2.50 ft above land-surface datum.
PERIOD OF RECORD.--January 1989 to April 1989, May 1997 to current year.
REMARKS.--BS2-G
EXTREMES OF PERIOD OF RECORD.--Highest water level measured, 183.04 ft below land surface datum, May 18, 1998, lowest measured, 185.21 ft below land-surface datum, February 1, 1989.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	183.77	FEB 04	183.88	MAY 19	183.04	AUG 25	182.82

WATER YEAR 1999 HIGHEST 182.82 AUG 25, 1999 LOWEST 183.88 FEB 04, 1999

CLINTON COUNTY

414921090450401. Local number 81-02E-17 ACA.
LOCATION.--Lat 41°49'32", long 90°45'08", Hydrologic Unit 07080103, located below water tower near sub-station in the Town of Claims. Owner: Town of Calamus.
AQUIFER.--Silurian
WELL CHARACTERISTICS.--Drilled pumping well, diameter 12 in. to 90 ft, 10 in. to 190 ft, depth 278 ft.
INSTRUMENTATION.--Quarterly measurements with airline by USGS personnel.
DATUM.--Elevation of land-surface datum is 712 feet above sea level, by topographic map.
PERIOD OF RECORD.--August 1997 to current year.
REMARKS.--Calamus No.1
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 43 feet below land-surface datum, August 06, 1997; lowest measured, 95 ft below land-surface datum, August 07, 1998.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	47	FEB 09	47	MAY 03	47	AUG 09	47

WATER YEAR 1999 HIGHEST 47 NOV 03, 1998 FEB 09, 1999 MAY 03, 1999 AUG 09, 1999
LOWEST 47 NOV 03, 1998 FEB 09, 1999 MAY 03, 1999 AUG 09, 1999

414806090212301. Local number 81-05E-22 DDD.
LOCATION.--Lat 41°48'03", long 90°21'26", Hydrologic Unit 07080101, approximately 1 mile south of the intersection of U.S. Interstate 30 and county road 36, on the northwest corner of intersection. Owner: Town of Low Moor.
AQUIFER.--Silurian, Alexanderian Series
WELL CHARACTERISTICS.--Drilled public-use well, diameter 12 in. to 62 ft, 8 in. to 62 ft, depth 322 ft, open hole from 85-322 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 651 feet above sea level, by topographic map.
PERIOD OF RECORD.--August 1997 to current year
REMARKS.--Low Moor No.2
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 19.99 feet below land-surface datum, February 09, 1999; lowest measured, 30.50 ft below land-surface datum, May 03, 1999.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	20.40	FEB 09	19.99	MAY 03	30.50	AUG 06	27.98

WATER YEAR 1999 HIGHEST 19.99 FEB 09, 1999 LOWEST 30.50 MAY 03, 1999

CRAWFORD COUNTY

415514095312001. Local number, 82-40-17 AABB.
LOCATION.--Lat 41°55'14", long 95°31'20", Hydrologic Unit 10230007, approximately 1.5 mi west of the Town of Dow City on the south side of U.S. Highway 30. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Dakota: sandstone of Cretaceous age
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 141 ft, screened 123-141 ft, gravel-packed.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,150 ft above sea level, from topographic map. Measuring point: Top of casing, 2.50 ft above land-surface datum.
REMARKS.--Well WC-9.
PERIOD OF RECORD.--June 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 38.15 ft below land-surface datum, May 3, 1983; lowest measured, 43.86 ft below land-surface datum, June 11, 1981.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	42.24	FEB 09	41.98	MAR 12	41.00	AUG 11	41.61

WATER YEAR 1999 HIGHEST 41.00 MAR 12, 1999 LOWEST 42.24 NOV 03, 1998

420608095111701. Local number, 84-37-08 BCCB.
LOCATION.--Lat 42°06'08", long 95°11'17", Hydrologic Unit 10230007, approximately 3 mi north of the Town of Vail on the east side of County Road E-25. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Fremont buried channel: sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 541 ft, screened 527-541 ft, gravel-packed.
INSTRUMENTATION.--Quarterly measurement with chalked tape or electric line by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,380 ft above sea level, from topographic map. Measuring point: Top of casing, 1.65 ft above land-surface datum.
REMARKS.--Well WC-226.
PERIOD OF RECORD.--August 1983 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 208.35 ft below land-surface datum, July 17, 1988; lowest measured, 217.70 ft below land-surface datum, February 11, 1999.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	212.96	FEB 11	217.70	MAY 10	212.72	AUG 09	213.16

WATER YEAR 1999 HIGHEST 212.72 MAY 10, 1999 LOWEST 217.70 FEB 11, 1999

421005095342801. Local number, 85-41-13 CCCC.
LOCATION.--Lat 42°10'05", long 95°34'28", Hydrologic Unit 10230001, approximately 7 mi west of the Town of Schleswig, northeast of the junction of County Roads L-51 and E-16. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Dakota and glacial drift: sandstone of Cretaceous age and sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 361 ft, screened 307-322 ft, gravel-packed. Open to Dakota 320-361 ft.
INSTRUMENTATION.--Quarterly measurement with electric line or chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,375 ft above sea level, from topographic map. Measuring point: Top of casing, 3.49 ft above land-surface datum.
REMARKS.--Well WC-6.
PERIOD OF RECORD.--May 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 244.23 ft below land-surface datum, July 28, 1981; lowest measured, 249.05 ft below land-surface datum, February 5, 1982.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	247.19	FEB 11	245.5	MAY 10	246.98	AUG 09	247.20

WATER YEAR 1999 HIGHEST 245.5 FEB 11, 1999 LOWEST 247.20 AUG 09, 1999

CRAWFORD COUNTY--Continued

421031095225601. Local number, 85-39-16 ADDD1.
LOCATION.--Lat 42°10'31", long 95°22'56", Hydrologic Unit 10230007, approximately 2.5 mi east and 0.5 mi north of the Town of Schleswig on the west side of County Road M-27. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Dakota: sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 5 in., depth 351 ft, screened 315-330 ft, gravel-packed. Open to Pennsylvanian rock 344-351 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape or electric line by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,370 ft above sea level, from topographic map. Measuring point: Top of casing, 3.14 ft above land-surface datum.
REMARKS.--Well WC-7A.
PERIOD OF RECORD.--June 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 232.61 ft below land-surface datum, October 7, 1986; lowest measured, 239.65 ft below land-surface datum, August 2, 1995.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	235.06	FEB 11	235.25	MAY 10	235.29	AUG 09	235.32

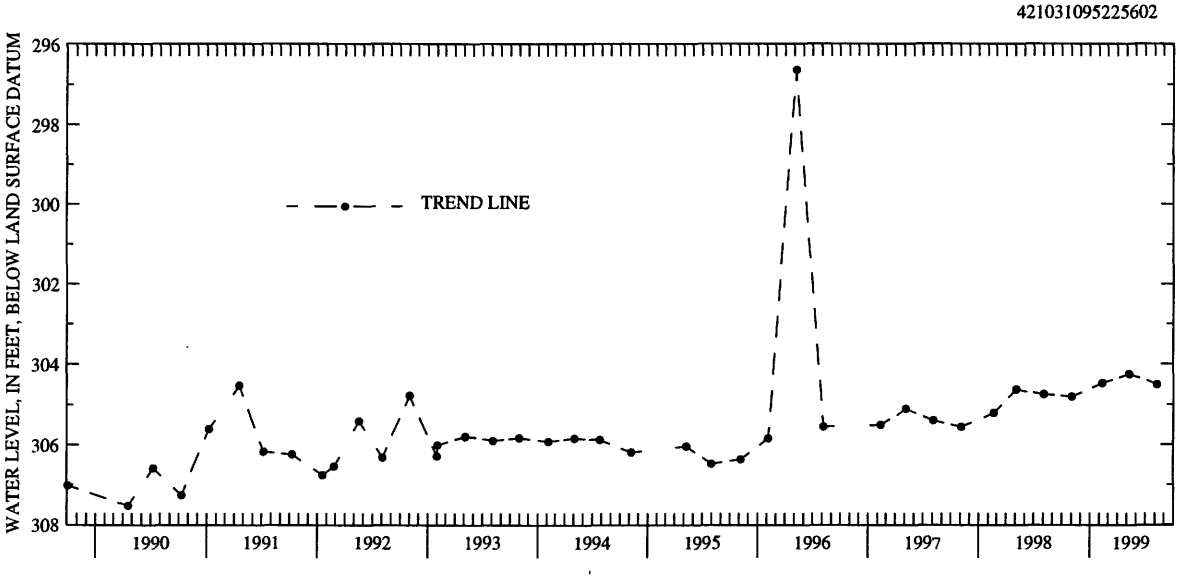
WATER YEAR 1999 HIGHEST 235.06 NOV 03, 1998 LOWEST 235.32 AUG 09, 1999

421031095225602. Local number, 85-39-16 ADDD2.
LOCATION.--Lat 42°10'31", long 95°22'56", Hydrologic Unit 10230007, approximately 2.5 mi east and 0.5 mi north of the Town of Schleswig on the west side of County Road M-27. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Mississippian: limestone of Mississippian age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 561 ft, screened 543-561 ft, gravel-packed.
INSTRUMENTATION.--Quarterly measurement with chalked tape or electric line by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,370 ft above sea level, from topographic map. Measuring point: Top of casing, 3.14 ft above land-surface datum.
REMARKS.--Well WC-7B.
PERIOD OF RECORD.--June 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 296.63 ft below land-surface datum, May 07, 1996, lowest measured, 307.64 ft below land-surface datum, October 4, 1983.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	304.81	FEB 11	304.47	MAY 10	304.25	AUG 09	304.51

WATER YEAR 1999 HIGHEST 304.25 MAY 10, 1999 LOWEST 304.81 NOV 03, 1998



CRAWFORD COUNTY--Continued

421106095125501. Local number, 85-38-12 DCBA.
LOCATION.--Lat 42°11'06", long 95°12'55", Hydrologic Unit 10230007, approximately 5.5 mi east of the Town of Kiron on the south side of County Road E-16 near the Town of Boyer. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Fremont buried channel: sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 341 ft, screened 300-310 ft, open hole from 315-341 ft., gravel packed. Open to Pennsylvanian limestone and shale 331-341 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape or electric line by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,225 ft above sea level, from topographic map. Measuring point: Top of casing, 3.70 ft above land-surface datum.
REMARKS.--Well WC-14.
PERIOD OF RECORD.--July 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.---Highest water level measured, 62.76 ft below land-surface datum, April 16, 1987; lowest measured, 66.41 ft below land-surface datum, August 09, 1999.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	66.25	FEB 11	66.04	MAY 10	65.79	AUG 09	66.41

WATER YEAR 1999 HIGHEST 65.79 MAY 10, 1999 LOWEST 66.41 AUG 09, 1999

DALLAS COUNTY

413613093530401. Local number, 79-26-33 CDBA.
LOCATION.-- Lat 40°36'13", long 93°53'04", Hydrologic Unit 07100006, approximately 0.5 miles south of the Town of Waukee on county road R-22, 100 ft east of roadway, well located inside 48 in concrete culvert. Owner: Town of Waukee.
AQUIFER.-- Cambrian/Ordovician, Jordan sandstone.
WEL CHARACTERISTICS.-- Drilled public use well, diameter 16 in., depth 2730 ft, casing interval unknown, gravel packed.
INSTRUMENTATION.-- Quarterly measurement with airline by USGS personnel.
DATUM.-- Elevation of land-surface datum is 1012 ft above sea level, from topographic map.
REMARKS.-- Waukee Well No. 2
PERIOD OF RECORD.--May 1996 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 389 ft below land-surface datum, May 9, 1997; lowest measured 428 ft below land-surface datum, February 09,1998.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	395	FEB 11	390	MAY 06	391	AUG 05	398

WATER YEAR 1999 HIGHEST 390 FEB 11, 1999 LOWEST 398 AUG 05, 1999

DECATUR COUNTY

404422093445602. Local number, 69-25-29 DDDD
LOCATION.-- Lat 40°44'22", long 93°44'56", Hydrologic Unit 10280102, approximately 7 mi east of Interstate 35 in the City of Leon, within open field between Iowa Highway 2 and NW 2nd Ave. on NW School St. Owner: City of Leon.
AQUIFER.-- Cambrian/Ordovician: Jordan sandstone.
WELL CHARCTREISTICS.--Drilled public use well, diameter 8 in, depth 2853 ft, screened 2740-2790 ft, gravel packed.
INSTRUMENTATION.-- Quarterly measurement with chalked tape by USGS personnel.
DATUM.-- Elevation of land-surface datum is 1105.60 ft above sea level, from levels. MEasuring point: Top of casing, 3.70 ft above land-surface datum.
REMARKS.-- Leon City Well No. 4
PERIOD OF RECORD.--May 1996 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 439.80 ft below land-surface datum, May 30, 1996; lowest measured, 442.66 ft below land-surface datum, August 12, 1999.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 05	441.13	FEB 12	442.30	AUG 12	442.66

WATER YEAR 1999 HIGHEST 441.13 NOV 05, 1998 LOWEST 442.66 AUG 12, 1999

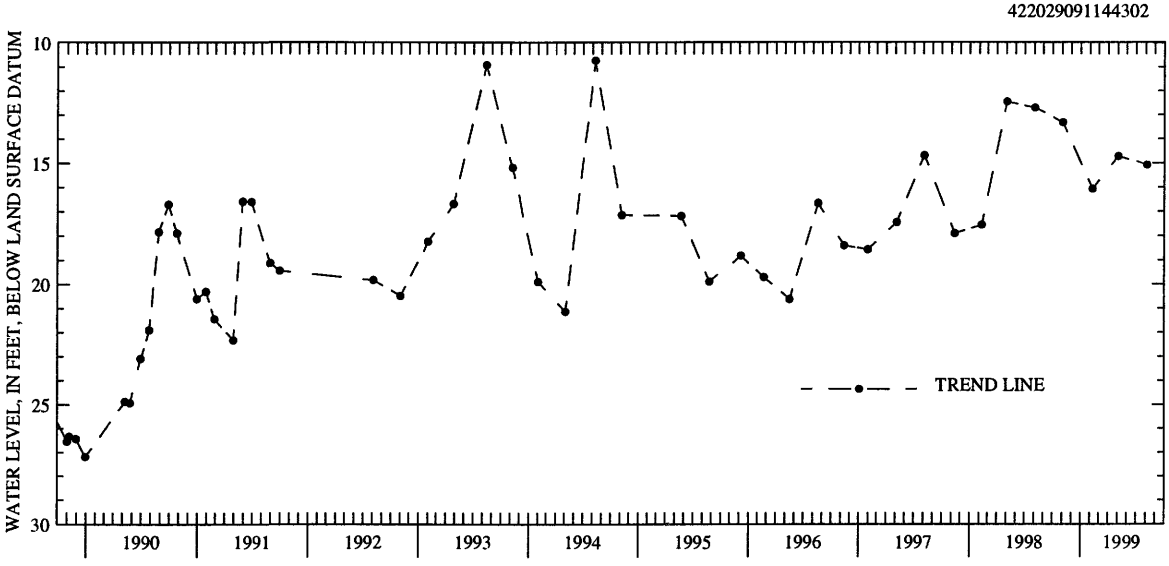
DELAWARE COUNTY

422029091144302. Local number, 87-03-18 CBCD2.
LOCATION.--Lat 42°20'37", long 91°14'47", Hydrologic Unit 07060006, behind the municipal utilities building in downtown Hopkinton. Owner: Town of Hopkinton.
AQUIFER.--Silurian: dolomite of Silurian age.
WELL CHARACTERISTICS.--Drilled unused artesian water well, diameter 8 in., depth 86 ft. Casing information not available.
INSTRUMENTATION.--Quarterly measurement with chalked tape by observer.
DATUM.--Elevation of land-surface datum is 863 ft above sea level, from topographic map. Measuring point: Nipple welded to plate on top of casing, 2.46 ft above land- surface datum.
REMARKS.--Hopkinton #1 well. Water levels affected by pumping of a nearby well.
PERIOD OF RECORD.--December 1984 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 10.74 ft below land-surface datum, August 10, 1994; lowest measured, 27.19 ft below land-surface datum, December 30, 1989.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	13.32	FEB 09	16.08	MAY 04	14.73	AUG 06	15.08

WATER YEAR 1999 HIGHEST 13.32 NOV 03, 1998 LOWEST 16.08 FEB 09, 1999



DUBUQUE COUNTY

422901090471901. Local number, 89-01-36 ABC.
LOCATION.--Lat 42°29'01", long 90°47'19", Hydrologic Unit 07060005, located within white shed northeast of Amoco plant main office on Old Fairground Road, 4 mi east of Centralia on County Highway 966. Owner: Julien Standard Oil.
AQUIFER.--Cambrian/Ordovician.
WELL CHARACTERISTICS.-- Drilled observation artesian water well, diameter 13 in., depth 1230 ft, casing open 499-1230 ft, gravel packed.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 899.00 ft above sea level, from levels. Measuring point: Top of vent cap, 2.90 above land-surface datum.
REMARKS.--Standard Oil No.2
PERIOD OF RECORD.--January 1997 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 240.38 ft below land-surface datum, January 31, 1997; lowest measured, 248.02 ft below land-surface datum, May 04, 1999.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	241.68	FEB 09	242.22	MAY 04	248.02	AUG 06	241.81

WATER YEAR 1999 HIGHEST 241.68 NOV 03, 1998 LOWEST 248.02 MAY 04, 1999

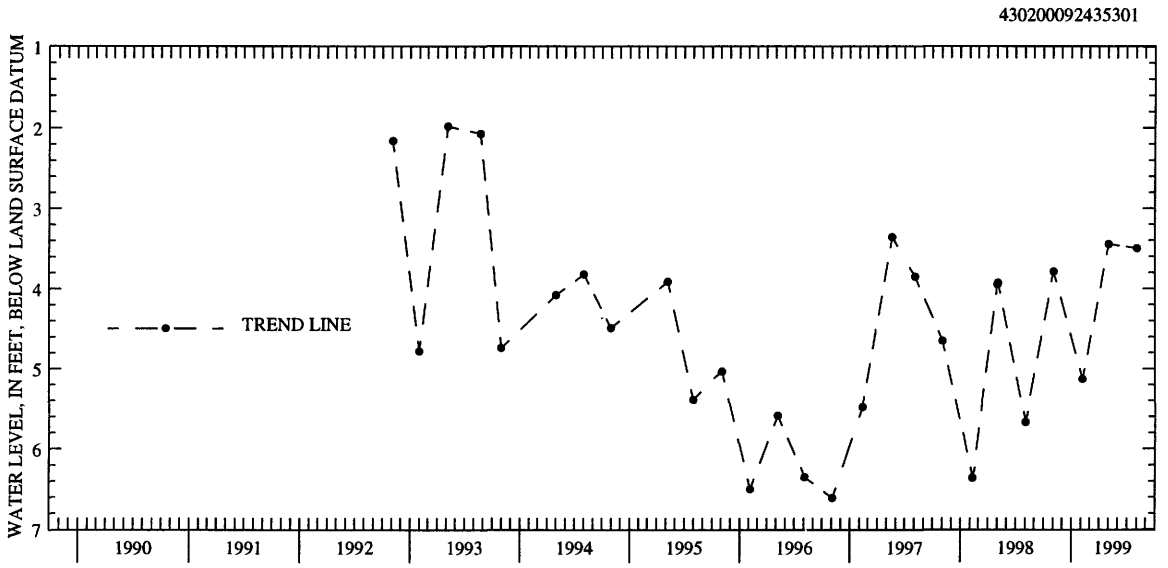
FLOYD COUNTY

430200092435301. Local number, 95-16-22 BCA1.
LOCATION.--Lat 43°02'00", long 92°43'53", Hydrologic Unit 07080201, approximately 2 mi southwest of Charles City, 1.7 mi south of Highway 14 on County Road T47. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Glacial drift of Pleistocene age.
WELL CHARACTERISTICS.--Drilled observation well, diameter 2 in., depth 29 ft, screened 10-29 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,105 ft above sea level, from topographic map. Measuring point: Top of casing, 1.92 ft above land-surface datum.
REMARKS.--Well FM-3 (T).
PERIOD OF RECORD.--August 1992 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 1.98 ft above land-surface datum, May 6, 1993; lowest measured, 6.61 ft below land-surface datum, November 4, 1996.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	3.79	FEB 08	5.13	MAY 03	3.45	AUG 03	3.50

WATER YEAR 1999 HIGHEST 3.45 MAY 03, 1999 LOWEST 5.13 FEB 08, 1999



430200092435303. Local number, 95-16-22 BCA3.
LOCATION.--Lat 43°02'00", long 92°43'53", Hydrologic Unit 07080201, approximately 2 mi southwest of Charles City, 1.7 mi south of Highway 14 on County Road T47. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Devonian: dolomite of Devonian age.
WELL CHARACTERISTICS.--Drilled observation well, diameter 1 in., depth 103 ft, screened 91-103 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,105 ft above sea level, from topographic map. Measuring point: Top of casing, 2.94 ft above land-surface datum.
REMARKS.--Well FM-3 (1).
PERIOD OF RECORD.--August 1992 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 36.01 ft above land-surface datum, November 01, 1994; lowest measured, 82.06 ft below land-surface datum, February 6, 1996.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	72.57	FEB 08	77.70	MAY 03	69.49	AUG 03	65.06

WATER YEAR 1999 HIGHEST 65.06 AUG 03, 1999 LOWEST 77.70 FEB 08, 1999

FLOYD COUNTY--Continued

430200092435304. Local number, 95-16-22 BCA4.
LOCATION.--Lat 43°02'00", long 92°43'53", Hydrologic Unit 07080201, approximately 2 mi southwest of Charles City, 1.7 mi south of Highway 14 on County Road T47. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Devonian: dolomite of Devonian age.
WELL CHARACTERISTICS.--Drilled observation well, diameter 1.5 in., depth 207 ft, screened 167-207 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,105 ft above sea level, from topographic map. Measuring point: Top of casing, 2.77 ft above land-surface datum.
REMARKS.--Well FM-3 (2).
PERIOD OF RECORD.--August 1992 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 56.05 ft above land-surface datum, August 23, 1993; lowest measured, 88.43 ft below land-surface datum, February 6, 1996.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	76.37	FEB 08	81.37	MAY 03	73.01	AUG 03	67.53

WATER YEAR 1999 HIGHEST 67.53 AUG 03, 1999 LOWEST 81.37 FEB 08, 1999

430200092435305. Local number, 95-16-22 BCA5.
LOCATION.--Lat 43°02'00", long 92°43'53", Hydrologic Unit 07080201, approximately 2 mi southwest of Charles City, 1.7 mi south of Highway 14 on County Road T47. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Devonian: dolomite of Devonian age.
WELL CHARACTERISTICS.--Drilled observation well, diameter 1.5 in., depth 297 ft, screened 257-297 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,105 ft above sea level, from topographic map. Measuring point: Top of casing, 2.73 ft above land-surface datum.
REMARKS.--Well FM-3 (3).
PERIOD OF RECORD.--August 1992 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 55.21 ft above land-surface datum, August 23, 1993; lowest measured, 82.61 ft below land-surface datum, February 6, 1996.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	76.69	FEB 08	76.75	MAY 03	69.53	AUG 03	64.88

WATER YEAR 1999 HIGHEST 64.88 AUG 03, 1999 LOWEST 76.75 FEB 08, 1999

FLOYD COUNTY-Continued

430200092435306. Local number, 95-16-22 BCA6.
LOCATION.--Lat 43°02'00", long 92°43'53", Hydrologic Unit 07080201, approximately 2 mi southwest of Charles City, 1.7 mi south of Highway 14 on County Road T47. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Devonian: dolomite of Devonian age.
WELL CHARACTERISTICS.--Drilled observation well, diameter 1.5 in., depth 360 ft, screened 340-360 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,105 ft above sea level, from topographic map. Measuring point: Top of casing, 2.53 ft above land-surface datum.
REMARKS.--Well FM-3 (4).
PERIOD OF RECORD.--August 1992 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 56.23 ft above land-surface datum, August 23, 1993; lowest measured, 88.44 ft below land-surface datum, February 6, 1996.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 21	76.37	FEB 08	82.34	MAY 03	72.96	AUG 03	67.64

WATER YEAR 1999 HIGHEST 67.64 AUG 03, 1999 LOWEST 82.34 FEB 08, 1999

430800092540301. Local number, 96-17-18 CDBA.
LOACATION.--Lat 43°07'45", long 92°54'07", Hydrologic Unit 07080202, on the north side of city street approximately 0.5 miles east of county road T-26 in the Town of Rude. Owner: Town of Rude
AQUIFER.-- Cambrian/Ordovician: Jordan sandstone and Prairie du Chien Formation dolomite.
WELL CHARACTERISTICS.--Drilled public well, diameter 8 in., depth 1290 ft, screened 846-855 ft, gravel-packed.
INSTRUMENTATION.-- Quarterly measurement by airline by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,123 ft above sea level, by altimeter.
REMARKS.--Rudd Town Well No.2
PERIOD OF RECORD.-- February 1997 to current year.
EXTREMES FOR PERIOD OF RECORD.-- Highest water level measured, 161 ft below land surface datum, August 5, 1997; lowest measured 198 ft below land-surface datum, August 03, 1999.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	188	FEB 08	187	MAY 04	192	AUG 03	198

WATER YEAR 1999 HIGHEST 187 FEB 08, 1999 LOWEST 198 AUG 03, 1999

GREENE COUNTY

420116094363001. Local number, 83-32-08 BBBC.
LOCATION.--Lat 42°01'16", long 94°36'30", Hydrologic Unit 07100006, approximately 3 mi west of the Town of Scranton, south of U.S. Highway 30. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Hardin Creek buried channel: sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 181 ft, screened 161-171 ft, gravel-packed. Open to Pennsylvanian shale and siltstone 171-181 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,135 ft above sea level, from topographic map. Measuring point: Top of casing, 2.20 ft above land-surface datum.
REMARKS.--Well WC-229.
PERIOD OF RECORD.--September 1983 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 39.44 ft below land-surface datum, August 19, 1993; lowest measured, 51.03 ft below land-surface datum, July 8, 1985.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	41.10	FEB 10	40.85	MAY 05	40.57	AUG 04	48.85

WATER YEAR 1999 HIGHEST 40.57 MAY 05, 1999 LOWEST 48.85 AUG 04, 1999

420146094272301. Local number, 83-31-04 ADDB.
LOCATION.--Lat 42°01'46", long 94°27'23", Hydrologic Unit 07100006, approximately 4 mi west of the City of Jefferson and 0.5 mi south of U.S. Highway 30, on the west side of County Road P-14. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Dakota: sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 54 ft, screened 40-51 ft, gravel-packed. Open to Pennsylvanian shale 51-54 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,000 ft above sea level, from topographic map. Measuring point: Top of casing, 2.10 ft above land-surface datum.
REMARKS.--Well WC-120.
PERIOD OF RECORD.--August 1982 to July 1987, February 1990 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 6.39 ft below land-surface datum, July 5, 1983; lowest measured, 19.57 ft below land-surface datum, November 06, 1997.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	17.76	FEB 10	17.05	MAY 05	12.07	AUG 04	16.80

WATER YEAR 1999 HIGHEST 12.07 MAY 05, 1999 LOWEST 17.76 NOV 03, 1998

415449094155601. Local number, 82-29-18 DBAA.
LOCATION.--Lat 41°54'49", long 94°15'56", Hydrologic Unit 07100006, approximately 3.25 mi west and 1.5 mi south of the Town of Rippey, south of County Road E-57. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Glacial drift of Pleistocene age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 90 ft, screened 65-75 ft, gravel-packed; open hole from 75-90 ft. Pleistocene glacial till 75-86 ft, and Pennsylvanian shale and siltstone 86-90 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,005 ft above sea level, from topographic map. Measuring point: Top of casing, 1.85 ft above land-surface datum.
REMARKS.--Well WC-117.
PERIOD OF RECORD.--August 1982 to November 1995.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 32.20 ft below land-surface datum, August 17, 1993; lowest measured, 40.13 ft below land-surface datum, February 13, 1990.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	35.41	FEB 10	35.82	MAY 05	32.66	AUG 04	34.20

WATER YEAR 1999 HIGHEST 32.66 MAY 05, 1999 LOWEST 35.82 FEB 10, 1999

GREENE COUNTY--Continued

420149094344701. Local number, 83-32-04 ACCC.
LOCATION.--Lat 42°01'49", long 94°34'47", Hydrologic Unit 07100006, 1.5 mi west of the Town of Scranton south of U.S. Highway 30, adjacent to the Scranton Cemetery. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Dakota: sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 240 ft, screened 220-240 ft, gravel-packed. Open to Pennsylvanian shale 234-240 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape or electric line by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,202 ft above sea level, from topographic map. Measuring point: Top of casing, 2.10 ft above land-surface datum.
REMARKS.--Well WC-228.
PERIOD OF RECORD.--July 1983 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 151.44 ft below land-surface datum, February 8, 1996; lowest measured, 155.48 ft below land-surface datum, April 17, 1991.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	152.70	FEB 10	152.27	MAY 05	151.88	AUG 04	152.69

WATER YEAR 1999 HIGHEST 151.88 MAY 05, 1999 LOWEST 152.70 NOV 03, 1998

420507094141901. Local number, 84-29-16 CBAB.
LOCATION.--Lat 42°05'07", long 94°14'19", Hydrologic Unit 07100006, approximately 1.5 mi south of the Town of Dana, east of Iowa Highway 144 near the Chicago and Northwestern Railroad. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Beaver buried channel: sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 181 ft, screened 161-176 ft, gravel-packed. Open to Pennsylvanian shale 177-181 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,075 ft above sea level, from topographic map. Measuring point: Top of casing, 1.80 ft above land-surface datum.
REMARKS.--Well WC-233.
PERIOD OF RECORD.--August 1983 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 38.63 ft below land-surface datum, April 2, 1985; lowest measured, 43.28 ft below land-surface datum, October 2, 1989.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	41.37	FEB 10	41.29	MAY 05	40.76	AUG 04	41.39

WATER YEAR 1999 HIGHEST 40.76 MAY 05, 1999 LOWEST 41.39 AUG 04, 1999

GRUNDY COUNTY

422611092552501. Local number, 88-18-14 BCCB.
LOCATION.--Lat 42°26'07", long 92°55'27", Hydrologic Unit 07080205, located on county road T-19 0.5 miles north of county road D-25 in the City of Wellsburg. Owner: City of Wellsburg
AQUIFER.-- Cambrian: Jordan Formation sandstone
WELL CHARACTERISTICS.-- Drilled public artesian water well, diameter 12 in., depth 2050 ft, casing open 1536-2050 ft
INSTRUMENTATION.--Quarterly measurement with airline by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,094 ft above sea level, from topographic map.
REMARKS.--Wellsburg Well No. 1
PERIOD OF RECORD.--November 1996 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 275 ft below land-surface datum, February 11, 1997; lowest measured, 296 ft below land-surface datum, August 02, 1999.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	276	FEB 08	272	MAY 03	274	AUG 02	296

WATER YEAR 1999 HIGHEST 272 FEB 08, 1999 LOWEST 296 AUG 02, 1999

GUTHRIE COUNTY

413223094150801. Local number, 78-29-24 CAAB
LOCATION.--Lat 41°32'23", long 94°15'08", Hydrologic Unit 07100007, approximately 0.5 mi west and 1.5 north of the Town of Dexter. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Dakota: sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drill observation artesian water well, diameter 2 in., depth 72 ft, screened 60-68 ft, gravel-packed. Open to Pennsylvanian shale 65-72 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,020 ft above sea level, from topographic map. Measuring point: Top of casing, 2.10 ft above land-surface datum.
REMARKS.--Well WC-238.
PERIOD OF RECORD.--August 1983 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 38.20 ft below land-surface datum, May 10, 1995; lowest measured, 48.82 ft below land-surface datum, April 10, 1986.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	40.14	FEB 10	40.16	MAY 06	39.43	AUG 05	39.87

WATER YEAR 1999 HIGHEST 39.43 MAY 06, 1999 LOWEST 40.16 FEB 10, 1999

413248094314301. Local number, 78-32-21 AAAA.
LOCATION.--Lat 41°32'48", long 94°31'43", Hydrologic Unit 07100008, approximately 2.25 mi north of the Town of Casey. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Dakota: sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 161 ft, cased to 135 ft, slotted 125-135 ft, gravel-packed. Open to Pennsylvanian shale and siltstone 158-161 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,250 ft above sea level, from topographic map. Measuring point: Top of casing, 1.90 ft above land-surface datum.
REMARKS.--Well WC-239.
PERIOD OF RECORD.--August 1983 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 70.50 ft below land-surface datum, January 12, 1988; lowest measured, 74.38 ft below land-surface datum, January 9, 1985.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	73.17	FEB 10	72.64	MAY 06	72.44	AUG 05	73.07

WATER YEAR 1999 HIGHEST 72.44 MAY 06, 1999 LOWEST 73.17 NOV 03, 1998

GUTHRIE COUNTY--Continued

414728094385301. Local number, 81-33-26 DDDD.
LOCATION.--Lat 41°47'28", long 94°38'53", Hydrologic Unit 07100007, approximately 5 mi south and 1.25 mi east of the Town of Coon Rapids on the north side of County Road F-24. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Dakota: sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 80 ft, screened 60-65 ft, gravel-packed, open hole 67-80 ft. Open to Pennsylvanian shale 67-80 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,205 ft above sea level, from topographic map. Measuring point: Top of casing, 2.20 ft above land-surface datum.
REMARKS.--Well WC-93.
PERIOD OF RECORD.--July 1982 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 36.76 ft below land-surface datum, May 4, 1994; lowest measured, 40.98 ft below land-surface datum, January 3, 1983.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	38.28	FEB 10	39.01	MAY 06	39.05	AUG 05	37.14

WATER YEAR 1999 HIGHEST 37.14 AUG 05, 1999 LOWEST 39.05 MAY 06, 1999

414821094271301. Local number, 81-31-22 CCCC.
LOCATION.--Lat 41°48'21", long 94°27'13", Hydrologic Unit 07100007, approximately 2.5 mi south and 1 mi west of the Town of Bagley, north of Spring Brook State Park. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Dakota: sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 153 ft, screened 143-153 ft, gravel-packed. Open to Pennsylvanian shale 149-153 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,190 ft above sea level, from topographic map. Measuring point: Top of casing, 1.45 ft above land-surface datum.
REMARKS.--Well WC-105.
PERIOD OF RECORD.--August 1982 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 46.84 ft below land-surface datum, August 3, 1994; lowest measured, 69.88 ft below land-surface datum, December 9, 1982.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	58.02	FEB 10	58.32	MAY 06	58.58	AUG 05	56.88

WATER YEAR 1999 HIGHEST 56.88 AUG 05, 1999 LOWEST 58.58 MAY 06, 1999

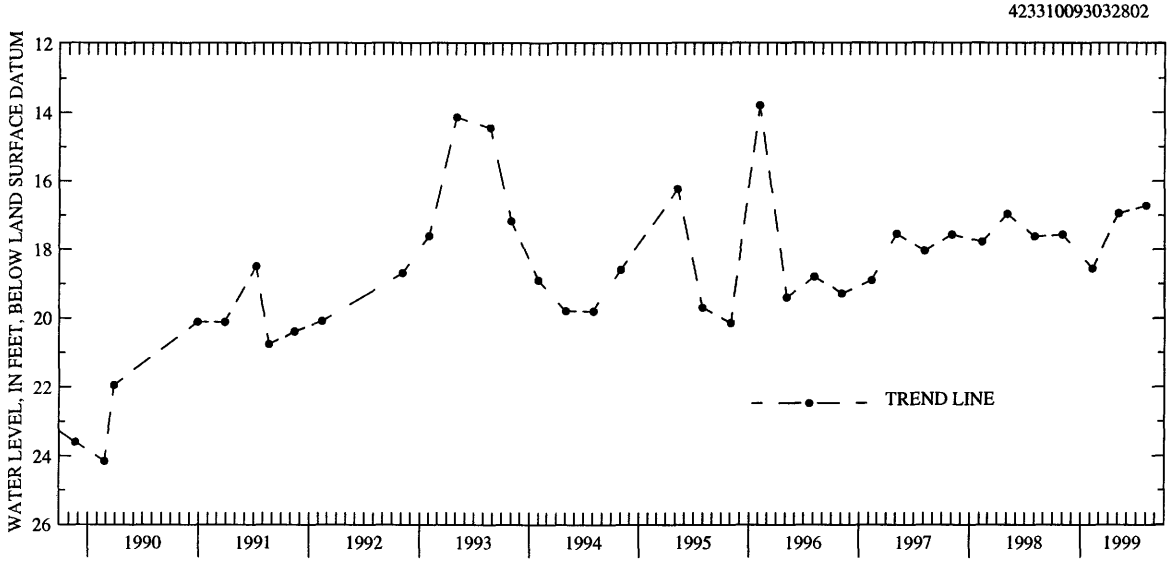
HARDIN COUNTY

423310093032802. Local number, 89-19-02 BDAC2.
LOCATION.--Lat 42°33'10", long 93°03'28", Hydrologic Unit 07080205, 0.35 south and 0.10 mi west of the intersection of U.S. Highway 20 and County Road S-56. Well is in a shed at the west end of 2nd Avenue adjacent to railroad tracks. Owner: City of Ackley.
AQUIFER.--Mississippian: limestone and dolomite of Mississippian age.
WELL CHARACTERISTICS.--Drilled unused public-supply artesian well, diameter 10 in., depth 134 ft, screened 57-60 ft, open hole 68-134 ft. Open to Devonian rock 131-134 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel. Analog digital water-level recorder, 60 minute punch, to October, 1992.
DATUM.--Elevation of land-surface datum is 1,085 ft above sea level, from topographic map. Measuring point: Top of recorder base, 0.8 ft above land-surface datum.
REMARKS.--Ackley No. 5 well.
PERIOD OF RECORD.--September 1988 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 13.79 ft below land-surface datum, February 5, 1996; lowest measured, 24.15 ft below land-surface datum, February 25, 1990.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	17.57	FEB 08	18.56	MAY 03	16.94	AUG 02	16.72

WATER YEAR 1999 HIGHEST 16.72 AUG 02, 1999 LOWEST 18.56 FEB 08, 1999



HARRISON COUNTY

413024095353901. Local number, 78-41-31 DDDD.
LOCATION.--Lat 41°30'24", long 95°35'39", Hydrologic Unit 10230006, approximately 4.5 mi south of the Town of Persia and west of Iowa Highway 191 to the north of the Tri-County High School. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Glacial drift: sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 129 ft, screened 109-119 ft, gravel-packed. Open to Pennsylvanian shale and limestone 118-129 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,158 ft above sea level, from topographic map. Measuring point: Top of casing, 2.05 ft above land-surface datum.
REMARKS.--Well WC-27.
PERIOD OF RECORD.--January 1982 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 55.26 ft below land-surface datum, July 7, 1982; lowest measured, 60.54, July 5, 1989.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	56.42	FEB 11	56.85	MAY 10	56.14	AUG 11	56.85

WATER YEAR 1999 HIGHEST 56.14 MAY 10, 1999 LOWEST 56.85 FEB 11, 1999 AUG 11, 1999

413523095483101. Local number, 78-43-05 ACDD.
LOCATION.--Lat 41°35'23", long 95°48'31", Hydrologic Unit 10230007, approximately 3.25 mi south of the Town of Logan and 1.5 mi east of U.S. Highway 30. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Dakota: sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 179 ft, screened 168-175 ft, gravel-packed. Open to Pennsylvanian shale 175-179 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,080 ft above sea level, from topographic map. Measuring point: Top of casing, 2.35 ft above land-surface datum.
REMARKS.--Well WC-33.
PERIOD OF RECORD.--May 1982 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 66.20 ft below land-surface datum, March 21, 1990; lowest measured, 74.90 ft below land-surface datum, February 16, 1988.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	71.98	FEB 09	71.84	MAY 11	70.35	AUG 11	70.71

WATER YEAR 1999 HIGHEST 70.35 MAY 11, 1999 LOWEST 71.98 NOV 04, 1998

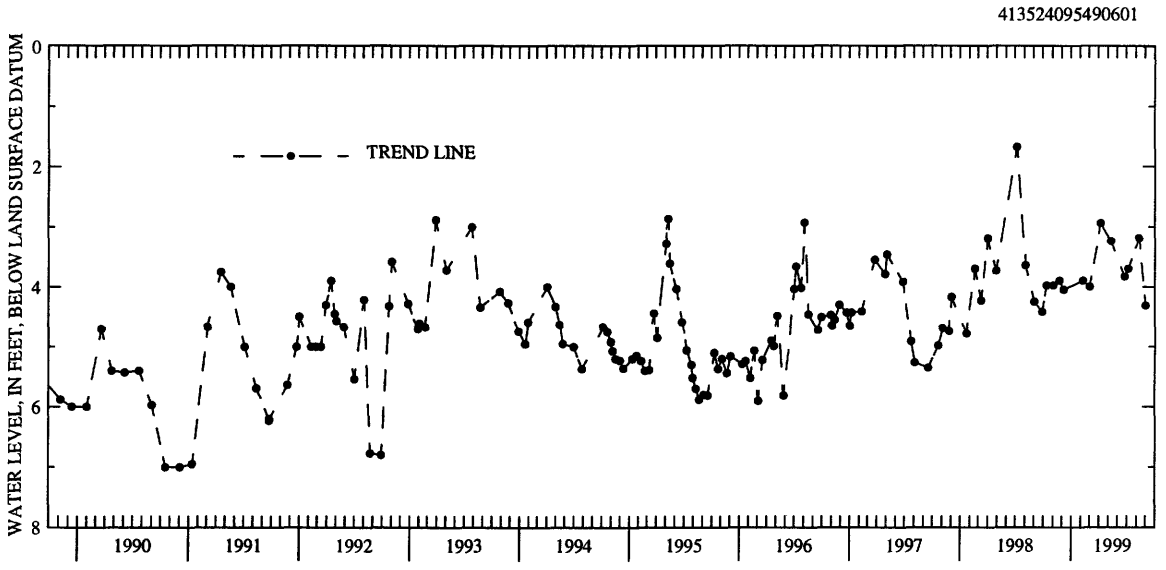
HARRISON COUNTY--Continued

413524095490601. Local number, 78-43-05 BCDD.
LOCATION.--Lat 41°35'24", long 95°49'06", Hydrologic Unit 10230007, approximately 2 mi north and 3.5 mi east of the Town of Missouri Valley and 1 mi east of U.S. Highway 30. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Alluvial: Boyer River sand and gravel of Holocene age.
WELL CHARACTERISTICS.--Drilled observation water-table well, diameter 2 in., depth 51 ft, screened 48-51 ft, gravel-packed.
INSTRUMENTATION.--Monthly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,010 ft above sea level, from topographic map. Measuring point: Top of casing, 3.40 ft above land-surface datum.
REMARKS.--Well WC-32.
PERIOD OF RECORD.--May 1982 to current year.
REVISION.--Measuring point revised September 4, 1990 to September 29, 1992.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 1.68 ft below land-surface datum, July 07, 1998; lowest measured, 7.00 ft below land-surface datum, September 9, 1988, October 18, 1990 and December 5, 1990.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 13	3.98	DEC 08	4.05	APR 08	2.94	JUL 06	3.70
NOV 04	3.98	FEB 09	3.90	MAY 11	3.24	AUG 11	3.19
24	3.90	MAR 03	4.00	JUN 25	3.83	SEP 02	4.31

WATER YEAR 1999 HIGHEST 2.94 APR 08, 1999 LOWEST 4.31 SEP 02, 1999



HARRISON COUNTY--Continued

413838095462001. Local number, 79-42-19 AADB.
LOCATION.--Lat 41°38'38", long 95°46'20", Hydrologic Unit 10230007, approximately 0.5 mi east of the Town of Logan, north of U.S. Highway 30. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Mississippian: dolomite of Mississippian age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 628 ft, screened 588-628 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,045 ft above sea level, from topographic map. Measuring point: Top of casing, 4.40 ft above land-surface datum.
REMARKS.--Well WC-22.
PERIOD OF RECORD.--November 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 0.33 ft above land-surface datum, June 19, 1987; lowest measured, 16.37 ft below land-surface datum, June 3, 1982.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	5.93	FEB 09	5.73	MAY 12	5.69	AUG 11	5.60

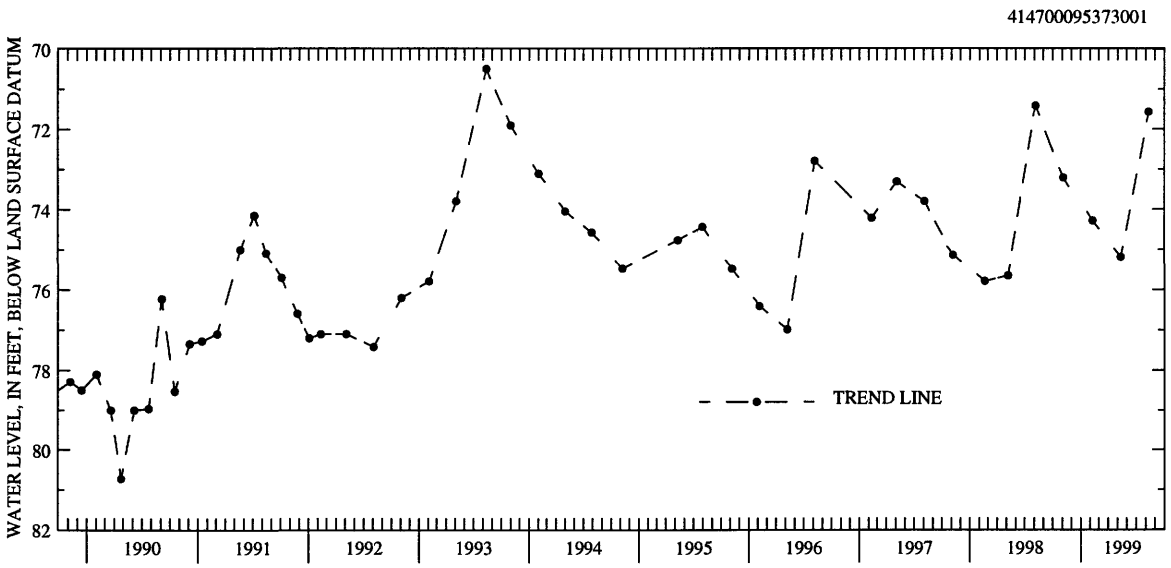
WATER YEAR 1999 HIGHEST 5.60 AUG 11, 1999 LOWEST 5.93 NOV 04, 1998

414700095373001. Local number, 81-41-33 CAAA.
LOCATION.--Lat 41°47'00", long 95°37'30", Hydrologic Unit 10230007, approximately 4.5 mi south of the Town of Dunlap, and 2 mi east of U.S. Highway 30. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Dakota: sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 169 ft, screened 145-154 ft, gravel-packed.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,182 ft above sea level, from topographic map. Measuring point: Top of casing, 2.90 ft above land-surface datum.
REMARKS.--Well WC-52.
PERIOD OF RECORD.--June 1982 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 70.50 ft below land-surface datum, August 12, 1993; lowest measured, 85.03 ft below land-surface datum, June 4, 1982.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	73.21	FEB 09	74.28	MAY 12	75.19	AUG 11	71.57

WATER YEAR 1999 HIGHEST 71.57 AUG 11, 1999 LOWEST 75.19 MAY 12, 1999



HENRY COUNTY

405010091424901. Local number, 70-07-30 BCDD.
LOCATION.--Lat 40°50'10", long 91°42'49", Hydrologic Unit 07080107, in the Hillsboro City Park adjacent to water tower. Owner: City of Hillsboro.
AQUIFER.--Mississippian: limestone of Mississippian age.
WELL CHARACTERISTICS.--Drilled unused test hole, diameter 6 in., depth 365 ft, cased to 74.8 ft, open hole 74.8-365 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 733 ft above sea level, from topographic map. Measuring point: Hole in top of casing, 1.15 ft above land-surface datum.
REMARKS.--Hillsboro Test 1.
PERIOD OF RECORD.--August 1989 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 70.12 ft below land-surface datum, February 23, 1996, May 6, 1994; lowest measured, 77.21 ft below land-surface datum, October 27, 1989.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 05	76.57	FEB 08	71.56	MAY 03	71.57	AUG 05	76.46

WATER YEAR 1999 HIGHEST 71.56 FEB 08, 1999 LOWEST 76.57 NOV 05, 1998

410852091394301. Local number, 73-07-09 AABD.
LOCATION.--Lat 41°08'52", long 91°39'43", Hydrologic Unit 07080107, north of Main Street near the water tower, Wayland. Owner: Town of Wayland.
AQUIFER.--Glacial drift of Pleistocene age.
WELL CHARACTERISTICS.--Dug unused water-table well, diameter 4 ft, depth 52 ft. Casing information not available.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 735 ft above sea level, from topographic map. Measuring point: Hole in top of casing, 0.21 ft above land-surface datum.
REMARKS.--Wayland Town Well
PERIOD OF RECORD.--August 1960 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 2.30 ft below land-surface datum, September 1, 1965; lowest measured, 14.69 ft below land-surface datum, February 15, 1977.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 05	9.67	FEB 09	9.78	MAY 03	9.73	AUG 05	11.05

WATER YEAR 1999 HIGHEST 9.67 NOV 05, 1998 LOWEST 11.05 AUG 05, 1999

HOWARD COUNTY

432158092065801. Local number, 99-11-26 BCA.
LOCATION.--Lat 43°21'58", long 92°06'58", Hydrologic Unit 07060004, located approximately 1 mi west of the town of Cresco, 0.5 mi south from state highway 9 on county road V-58. Owner: Town of Cresco.
AQUIFER.-- Cambrian/Ordovician.
WELL CHARACTERISTICS.--Drilled public use artesian well, diameter 16 in, depth 1120 ft., Casing information not available.
INSTRUMENTATION.--Quarterly measurement using an airline by USGS personnel.
DATUM.--Elevation of land-surface datum is 1288 ft above sea level, from topographic map.
REMARKS.--Cresco Well No. 4.
PERIOD OF RECORD.--February 1997 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 318 ft below land surface datum, May 20, 1997; lowest measured, 340 ft below land-surface datum, August 02, 1999.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL
MAY 04	320	AUG 02	340

WATER YEAR 1999 HIGHEST 320 MAY 04, 1999 LOWEST 340 AUG 02, 1999

HUMBOLDT COUNTY

424039094103601. Local number, 91-28-20 CAAA.
LOCATION.--Lat 42°40'39", long 94°10'36", Hydrologic Unit 07100004, approximately 3 mi south of the Town of Dakota City, on the west side of County Road P-56. Owner: Elmer Gravdlund.
AQUIFER.--Glacial drift of Pleistocene age.
WELL CHARACTERISTICS.--Unused water-table well, diameter 3 ft, cribbed with field stone, depth 24.5 ft, casing information unavailable.
INSTRUMENTATION.--Monthly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,135 ft above sea level, from topographic map. Measuring point: Top of casing, 0.30 ft above land-surface datum.
REMARKS: Gravdlund/G-1 well.
PERIOD OF RECORD.--July 1988 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 4.40 ft below land-surface datum, April 26, 1991; lowest measured, 19.29 ft below land-surface datum, March 12, 1990.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 07	9.80	JAN 12	11.80	APR 06	9.27	JUL 01	5.99
NOV 18	10.79	FEB 11	11.83	MAY 05	5.74	AUG 02	7.19
DEC 17	11.35	MAR 11	10.48	JUN 01	5.77	SEP 09	8.25

WATER YEAR 1999 HIGHEST 5.74 MAY 05, 1999 LOWEST 11.83 FEB 11, 1999

IDA COUNTY

422215095390811. Local number, 87-41-05 CCCC11.
LOCATION.--Lat 42°22'15", long 95°39'08", Hydrologic Unit 10230005, approximately 0.75 mi east and 6.5 mi south of the Village of Cushing. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Dakota: sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 490 ft, screened 301-305 ft. Original depth 510 ft, cemented back to 490 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,344 ft above sea level, from topographic map. Measuring point: Top of casing, 2.18 ft above land-surface datum.
REMARKS.--Well D-10.
PERIOD OF RECORD.--June 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 202.55 ft below land-surface datum, June 4, 1980; lowest measured, 206.69 ft below land-surface datum, November 03, 1998.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	206.69	FEB 09	206.52	MAY 10	206.29	AUG 09	206.04

WATER YEAR 1999 HIGHEST 206.04 AUG 09, 1999 LOWEST 206.69 NOV 03, 1998

423107095383201. Local number, 89-41-13 CCCC.
LOCATION.--Lat 42°31'07", long 95°38'32", Hydrologic Unit 10230003, at a roadside park on County Road D-15, approximately 1.5 mi east and 3.5 mi north of the Village of Cushing. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Mississippian: limestone of Mississippian age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 469 ft, sand point 465-468 ft, open hole 468-469 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,320 ft above sea level, from topographic map. Measuring point: Top of casing, 2.11 ft above land-surface datum.
REMARKS.--Well D-9.
PERIOD OF RECORD.--December 1978 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 180.25 ft below land-surface datum, August 09, 1999; lowest measured, 244.55 ft below land-surface datum, July 9, 1980.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	182.72	FEB 09	181.83	MAY 10	181.69	AUG 09	180.25

WATER YEAR 1999 HIGHEST 180.25 AUG 09, 1999 LOWEST 182.72 NOV 02, 1998

JACKSON COUNTY

420842090165701. Local number, 85-6E-29 ACAD1.
LOCATION.--Lat 42°08'42", long 90°16'57", Hydrologic Unit 07060005, 1 mi east of U.S. Highway 52, 2 mi southeast of the Village of Green Island beside the Chicago, Milwaukee, St. Paul and Pacific Railroad tracks in the Upper Mississippi River Wildlife and Fish Refuge. Owner: U.S. Geological Survey.
AQUIFER.--Dresbach: Mt. Simon sandstone of Early Cambrian age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 1,804 ft, screened 1,705-1,725 ft, open hole 1,725-1,804 ft.
INSTRUMENTATION.--Quarterly measurement with engineers rule by USGS personnel.
DATUM.--Elevation of land-surface datum is 610 ft above sea level, from topographic map. Measuring point: Mark on angle iron attached to well house, 6.05 ft above land- surface datum.
REMARKS.--Flowing well. Green Island #1.
PERIOD OF RECORD.--May 1983 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 11.81 ft above land-surface datum, May 16, 1988; lowest measured, 9.23 ft above land-surface datum, September 02, 1998.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	8.72	FEB 09	9.13	MAY 04	8.62	AUG 06	9.00

WATER YEAR 1999 HIGHEST 8.62 MAY 04, 1999 LOWEST 9.13 FEB 09, 1999

420842090165702. Local number, 85-06E-29 ACAD2.
LOCATION.--Lat 42°08'42", long 90°16'57", Hydrologic Unit 07060005, 1 mi east of U.S. Highway 52, 2 mi southeast of the Village of Green Island beside the Chicago, Milwaukee, St. Paul and Pacific Railroad tracks in the Upper Mississippi River Wildlife and Fish Refuge. Owner: U.S. Geological Survey.
AQUIFER.-- Cambrian-Ordovician, Wonewoc sandstone of Late Cambrian age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 1,275 ft, screened 1,204.4-1,224.4 ft, open hole 1,224.4-1,275 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 610 ft above sea level, from topographic map. Measuring point: Top of casing, 2.0 ft above land-surface datum
REMARKS.--Green Island No. 2 well. Well pumped during winter to supply water to goose pond. Water levels for water years 1986 to 1989 affected by oil in the well.
PERIOD OF RECORD.--July 1982 to November 1983, September 1986 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 0.73 ft above land-surface datum, May 23, 1995; lowest measured, 3.88 below land-surface datum, November 4, 1982.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
(MEASUREMENTS ABOVE LAND SURFACE INDICATED BY "+")

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	.70	FEB 09	.48	MAY 04	+.01	AUG 06	.41

WATER YEAR 1999 HIGHEST +.01 MAY 04, 1999 LOWEST .70 NOV 03, 1998

420842090165703. Local number, 85-6E-29 ACAD3
LOCATION.--Lat 42°08'42", long 90°16'57", Hydrologic Unit 07060005, 1 mi east of U.S. Highway 52, 2 mi southeast of the Village of Green Island beside the Chicago, Milwaukee, St. Paul and Pacific Railroad tracks in the Upper Mississippi River Wildlife and Fish Refuge. Owner: U.S. Geological Survey.
AQUIFER.--Cambrian-Ordovician: Prairie du Chien dolomite of Early Ordovician age and St. Peter sandstone of Middle Ordovician age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 910 ft, screened 604.2-624.2 ft, open hole 624.2-910 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 610 ft above sea level, from topographic map. Measuring point: Top of casing, 2.00 ft above land-surface datum.
REMARKS.--Green Island No. 3.
PERIOD OF RECORD.--May 1982 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 5.19 ft below land-surface datum, January 8, 1986; lowest measured 9.90 ft below land-surface datum, August 31, 1983.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	7.43	FEB 09	7.07	MAY 04	6.81	AUG 06	6.70

WATER YEAR 1999 HIGHEST 6.70 AUG 06, 1999 LOWEST 7.43 NOV 03, 1998

JACKSON COUNTY--Continued

420433090502401. Local number, 84-01E 22
LOCATION.--Lat 42°04'33", long 90°50'24", Hydrologic Unit 07060006, located just east of the water-tower in the Town of Baldwin. Owner: Town of Baldwin.
AQUIFER.--Devonian/Silurian
WELL CHARACTERISTICS.--Drilled public-use well, diameter 14 in., depth 190 ft, open hole from 80-190 ft.
INSTRUMENTATION.--Quarterly measurement using airline by USGS personnel.
DATUM.--Elevation of land-surface is 760 feet above sea level, by topographic map.
REMARKS.--Baldwin No. 2
PERIOD OF RECORD.--August 1997 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 59.74 feet below land-surface datum, May 03, 1999; lowest measured, 64.22 feet below land-surface datum, February 09, 1999.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	59.81	FEB 09	64.22	MAY 03	59.74	AUG 06	61.35

WATER YEAR 1999 HIGHEST 59.74 MAY 03, 1999 LOWEST 64.22 FEB 09, 1999

420842090165704. Local number, 85-6E-29 ACAD4.
LOCATION.--Lat 42°08'42", long 90°16'57", Hydrologic Unit 07060005, 1 mi east of U.S. Highway 52, 2 mi southeast of the Village of Green Island beside the Chicago, Milwaukee, St. Paul and Pacific Rail- road tracks in the Upper Mississippi River Wildlife and Fish Refuge. Owner: U.S. Geological Survey.
AQUIFER.--Cambrian-Ordovician: Galena dolomite of Middle Ordovician age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 400 ft, screened 300-320 ft, open hole 320-400 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 610 ft above sea level, from topographic map. Measuring point: Top of casing, 2.00 ft above land-surface datum.
REMARKS.--Green Island No. 4.
PERIOD OF RECORD.--May 1982 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 11.39 ft below land-surface datum April 27, 1993; lowest measured, 19.46 ft below land-surface datum, September 20, 1988.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	15.86	FEB 09	16.38	MAY 04	14.14	AUG 06	15.43

WATER YEAR 1999 HIGHEST 14.14 MAY 04, 1999 LOWEST 16.38 FEB 09, 1999

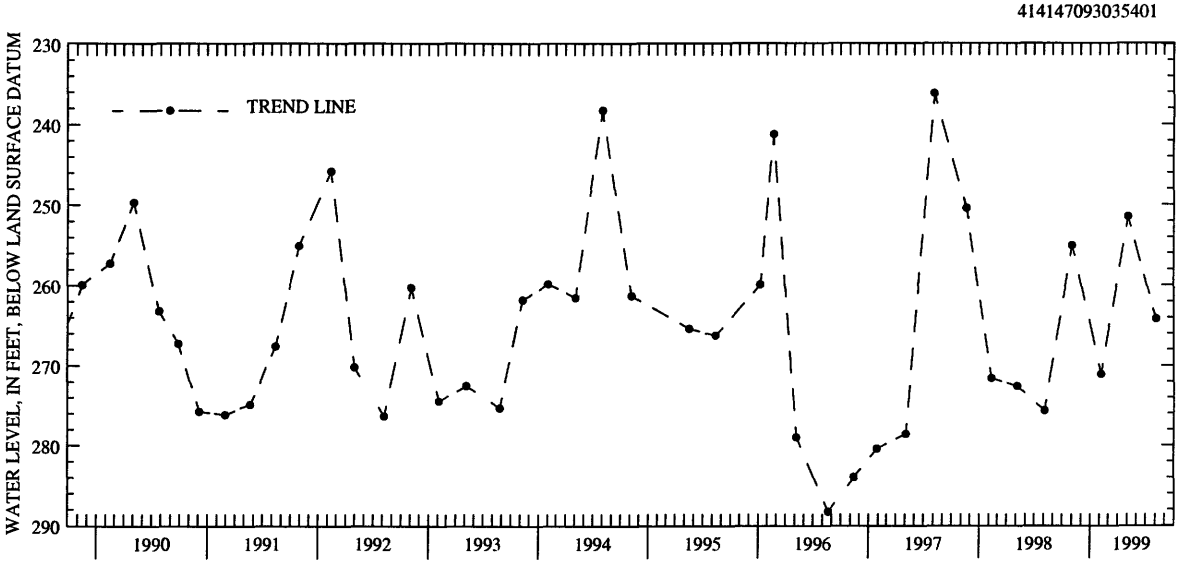
JASPER COUNTY

414147093035401. Local number, 80-19-33 ACAC.
LOCATION.--Lat 41°41'50", long 93°03'53", Hydrologic Unit 07080105, 231 West 10th Street, Newton. Owner: John Coppess.
AQUIFER.--Cambrian-Ordovician: sandstone and sandy dolomite of Late Cambrian and Early Ordovician age.
WELL CHARACTERISTICS.--Drilled unused private artesian water well, diameter 12 to 6 in., depth 2,567 ft, cased to 1,750 ft, open hole 1,750-2,567 ft. Open to 461 ft of Early Ordovician Prairie du Chien formation, 262 ft of Late Cambrian St. Lawrence formation, and 94 ft of Middle Cambrian Franconia formation.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 915 ft above sea level, from topographic map. Measuring point: Plug in cement well cover, 0.50 ft above land-surface datum.
REMARKS.--John Coppess well
PERIOD OF RECORD.--September 1963 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 98.43 ft below land-surface datum, June 14, 1966; lowest measured, 288.3 ft below land-surface datum, August 21, 1996.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	255.03	FEB 08	271.09	MAY 05	251.47	AUG 05	264.19

WATER YEAR 1999 HIGHEST 251.47 MAY 05, 1999 LOWEST 271.09 FEB 08, 1999



414210092592001. Local number, 80-18-31 ABBB.
LOCATION.--Lat 41°42'10", long 92°59'20", Hydrologic Unit 07080105, approximately 3 mi east of the City of Newton just south of U.S. Highway 6. Owner: P.W. Beukema.
AQUIFER.--Glacial drift of Pleistocene age.
WELL CHARACTERISTICS.--Dug stock water-table well, diameter 36 in., depth 37 ft, cribbed with brick.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 940 ft above sea level, from topographic map. Measuring point: Top of cement platform, 0.70 ft above land-surface datum.
REMARKS.--Beukema well
PERIOD OF RECORD.--February 1940 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 2.67 ft below land-surface datum, June 10, 1947; lowest measured, 27.15 ft below land-surface datum, December 18, 1948.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	5.31	FEB 08	7.89	MAY 05	4.52	AUG 05	6.26

WATER YEAR 1999 HIGHEST 4.52 MAY 05, 1999 LOWEST 7.89 FEB 08, 1999

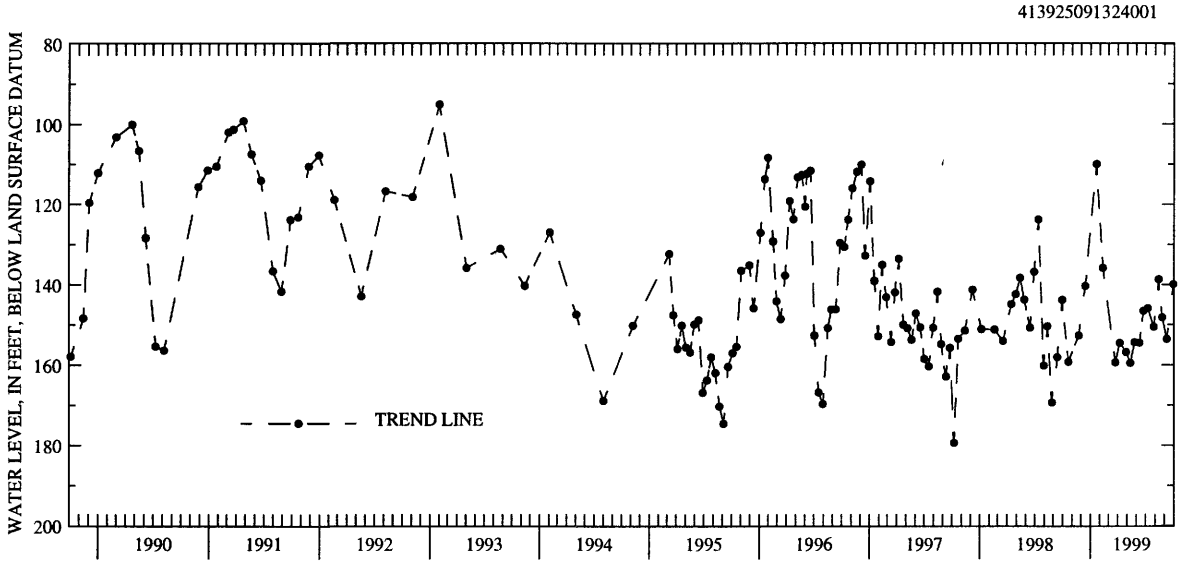
JOHNSON COUNTY

413925091324001. Local number, 79-06-09 DDBC.
LOCATION.--Lat 41°39'35", long 91°32'37", Hydrologic Unit 07080209, at the Quadrangle Dormitory, University of Iowa, Iowa City. Owner: University of Iowa.
AQUIFER.--Silurian: dolomite of Silurian age.
WELL CHARACTERISTICS.--Drilled unused artesian water well, diameter 12 in., depth 430.5 ft, cased to 225 ft, open hole 225-430.5 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel, measured twice per month as part of project 461908100.
DATUM.--Elevation of land-surface datum is 714 ft above sea level, from topographic map. Measuring point: Nipple welded to plate on top of casing, 1.81 ft above land- surface datum.
REMARKS.--University of Iowa Quadrangle Dormitory. Water levels affected by nearby wells pumping in late spring, summer, and early fall.
PERIOD OF RECORD.--April 1975 to current year.
REVISED RECORDS.--WDR IA-84-1, WDR IA-88-1.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 74.63 ft below land-surface datum, March 21, 1979; lowest measured, 174.62 ft below land-surface datum, September 5, 1995.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 21	159.26	MAR 24	159.38	JUN 11	157.55	AUG 25	148.20
NOV 24	152.65	APR 08	154.53	24	146.56	SEP 09	153.60
DEC 15	140.17	28	156.85	JUL 08	145.89	30	139.89
JAN 20	110.00	MAY 12	159.56	28	150.58		
FEB 11	135.87	26	154.39	AUG 12	138.77		

WATER YEAR 1999 HIGHEST 110.00 JAN 20, 1999 LOWEST 159.56 MAY 12, 1999



JOHNSON COUNTY--Continued

414132091345501. Local number, 80-06-31 ADAC1
LOCATION.--Lat 41°41'47", long 91°35'00", Hydrologic Unit 07080209, located in the City of Coralville, north of U.S. Interstate 80. Owner: City of Coralville.
AQUIFER.--Silurian: dolomite of Silurian age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 5 in. to 130 ft, 2 in. to 300 ft, depth 500 ft, open hole 300-500 ft.
INSTRUMENTATION.--Monthly measurement with chalked tape by USGS personnel, measured twice per month March 1995 to October 1995.
DATUM.--Elevation of land-surface datum is 795 ft above sea level, from topographic map. Measuring point: top of casing, 0.70 ft above land-surface datum.
REMARKS.--Coralville Observation No. 2, East.
PERIOD OF RECORD.--June 1988 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 192.75 ft below land-surface datum, March 20, 1990; lowest water level measured, 323.24 ft below land-surface datum, December 18, 1996.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 21	253.01	MAR 24	248.75	JUN 10	252.89	AUG 25	253.23
NOV 24	245.76	APR 08	236.36	24	252.70	SEP 09	258.25
DEC 15	231.58	28	249.40	JUL 08	254.94	30	256.50
JAN 20	206.07	MAY 12	240.85	28	260.25		
FEB 11	234.79	26	254.95	AUG 12	251.41		

WATER YEAR 1999 HIGHEST 206.07 JAN 20, 1999 LOWEST 260.25 JUL 28, 1999

414132091345502. Local number, 80-06-31 ADBC1.
LOCATION.--Lat 41°41'47", long 91°35'00", Hydrologic Unit 07080209, located in the City of Coralville, north of U.S. Interstate 80. Owner: City of Coralville.
AQUIFER.--Silurian: dolomite of Silurian age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 5 in. to 130 ft, 2 in. to 300 ft, depth 500 ft, open hole 300-500 ft.
INSTRUMENTATION.--Monthly measurement with chalked tape by USGS personnel, measured twice per month March 1995 to September 1997.
DATUM.--Elevation of land-surface datum is 795 ft above sea level, from topographic map. Measuring point: top of casing, 1.03 ft above land-surface datum.
REMARKS.--Coralville Observation No. 3, North.
PERIOD OF RECORD.--June 1988 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest level measured, 169.04 ft below land-surface datum, June 21, 1988; lowest water level measured, 252.30 ft. below land-surface datum, July 30, 1998.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 21	245.31	MAR 24	236.17	JUN 10	246.45	AUG 25	246.12
NOV 24	240.15	APR 08	237.05	24	245.08	SEP 09	250.07
DEC 15	228.78	28	242.54	JUL 08	246.13	30	248.64
JAN 20	202.14	MAY 12	239.54	28	240.97		
FEB 11	225.13	26	247.19	AUG 12	243.45		

WATER YEAR 1999 HIGHEST 202.14 JAN 20, 1999 LOWEST 250.07 SEP 09, 1999

JOHNSON COUNTY--Continued

414107091322901. Local number, 79-06-04 AAAA.
LOCATION.--Lat 41°41'07", long 91°32'30", Hydrologic Unit 07080209, at Forest View Trailer Court, northern edge of Iowa City. Owner: Forest View Trailer Court.
AQUIFER.--Silurian: limestone of Silurian age.
WELL CHARACTERISTICS.--Drilled unused artesian water well, diameter 6 in., depth 280 ft, cased to 96 ft, open hole 96-280 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel, measured twice per month March 1995 to October 1995. Graphic water-level recorder May 1971 to October 1986.
DATUM.--Elevation of land-surface datum is 735 ft above sea level, from topographic map. Measuring point: Nipple on plate welded to top of casing, 1.62 ft above land- surface datum.
REMARKS.--Forest View Trailer Court. Water levels affected by wells in the area pumping in late spring, summer, and early fall. The large number of water-level measurements in June 1996 are a result of the well being used as an observation well for a nearby pump test.
PERIOD OF RECORD.--May 1971 to current year.
REVISED RECORDS.--WDR IA-84-1.
EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 96.93 ft below land-surface datum, March 23, 1979; lowest measured, 153.24 ft below land-surface datum, July 30, 1998.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 21	145.04	MAR 24	144.50	JUN 10	145.65	AUG 25	143.68
NOV 24	143.16	APR 08	143.26	24	142.52	SEP 09	144.81
DEC 15	140.64	28	143.56	JUL 08	140.49	30	141.64
JAN 20	128.01	MAY 12	144.86	28	142.96		
FEB 11	137.67	26	144.09	AUG 12	139.71		

WATER YEAR 1999 HIGHEST 128.01 JAN 20, 1999 LOWEST 145.65 JUN 10, 1999

JOHNSON COUNTY--Continued

414132091345503. Local number, 80-06-31 ADBD1.
LOCATION.--Lat 41°41'44", long 91°34'58", Hydrologic Unit 07080209, located in the City of Coralville, north of U.S. Interstate 80. Owner: City of Coralville.
AQUIFER.--Silurian: dolomite of Silurian age.
WELL CHARACTERISTICS.--Drilled public-supply water well, 12 in. diameter, depth 500 ft, cased 0-200 ft, open hole 200-500 ft.
INSTRUMENTATION.--Monthly airline measurement by USGS personnel, measured twice per month March 1995 to October 1995.
DATUM.--Elevation of land-surface datum is 795 ft above sea level, from topographic map. Measuring point: airline gauge, 2.88 ft above land-surface datum.
REMARKS.--Coralville Production No. 9.
PERIOD OF RECORD.--June 1988 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 204 ft below land-surface datum, July 25, 1988; lowest water level measured, 309 ft below land-surface datum, July 28, 1999.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 21	289	APR 08	295	JUN 24	302	SEP 09	306
NOV 24	285	28	296	JUL 08	302	30	304
DEC 15	241	MAY 12	244	28	309		
FEB 11	235	26	303	AUG 12	297		
MAR 24	301	JUN 10	302	25	300		

WATER YEAR 1999 HIGHEST 235 FEB 11, 1999 LOWEST 309 JUL 28, 1999

414145091350101. Local number, 80-06-31 ADC.
LOCATION.--Lat 41°41'45", long 91°35'01". Hydrologic unit 07080209, located in the city of Coralville., north of U.S. Interstate 80. Owner: City of Coralville.
AQUIFER.--Cambrian- Jordan sandstone.
WELL CHARACTERISTICS.--Drilled public-supply water well, diameter 16 in, depth 1710 ft., casing information not available.
INSTRUMENTATION.--Bi-monthly measurements using airline by USGS personnel.
DATUM.--Elevation of land-surface datum is 740 ft above sea level, from unknown method.
REMARKS.--Coralville No. 10.
PERIOD OF RECORD.--June 1996 to current year.
EXTREMES FOR PERIOD OF RECORD.--highest water level measured, 318 ft below land-surface datum, May 07, 1997; lowest water level measured, 411 ft. below land surface datum, July 08, 1999, August 12, 1999, September 09, 1999.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 21	382	MAR 24	396	JUN 10	407	AUG 25	405
NOV 24	398	APR 08	392	24	408	SEP 09	411
DEC 15	334	28	397	JUL 08	411	30	405
JAN 20	339	MAY 12	397	28	410		
FEB 11	382	26	405	AUG 12	411		

WATER YEAR 1999 HIGHEST 334 DEC 15, 1998 LOWEST 411 JUL 08, 1999 AUG 12, 1999 SEP 09, 1999

414315091252001. Local number, 80-05-22 CBCB1.
LOCATION.--Lat 41°43'16", long 91°25'20", Hydrologic Unit 07080209, along the Chicago, Rock Island and Pacific Railroad track, southeast of the overpass on Rapid Creek Road over the track, approximately 5.5 mi northeast of the junction of Interstate 80 and Iowa Highway 1. Owner: Chicago, Rock Island and Pacific Railroad Co.
AQUIFER.--Glacial drift of Pleistocene age.
WELL CHARACTERISTICS.--Drilled unused water-table well, diameter 2.25 in., depth 18.43 ft, screened 16.43-18.43 ft. Depth originally 20 ft, depth of 18.43 ft measured June 23, 1989.
INSTRUMENTATION.--Monthly measurement with chalked tape by USGS personnel. Graphic water-level recorder February 1942 to October 1965, measured twice per month March 1995 to October 1995.
DATUM.--Elevation of land-surface datum is 753 ft above sea level, from topographic map. Measuring point: Nipple welded to casing, 4.47 ft above land-surface datum.
REMARKS.--At the site of the former Elmira depot.
PERIOD OF RECORD.--May 1941 to September 1956, January 1958 to current year.
REVISED RECORDS.--WDR IA-88-1.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 4.84 ft below land-surface datum, April 29, 1947 (revised); lowest measured, dry, November 10, 15, 20, 25, and 30, 1964, December 5, 10, 15, 20, 25 and 31, 1964, December 1 and 10, 1975, October 21, November 23, and December 17, 1976, and January 20 and February 18, 1977.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 21	10.81	MAR 24	10.43	JUN 11	9.85	AUG 26	10.60
NOV 24	10.42	APR 09	10.34	25	9.71	SEP 09	11.16
DEC 15	10.23	29	10.12	JUL 09	9.55		
JAN 20	10.60	MAY 13	9.97	29	9.73		
FEB 11	10.57	27	9.89	AUG 13	10.14		

WATER YEAR 1999 HIGHEST 9.55 JUL 09, 1999 LOWEST 11.16 SEP 09, 1999

JOHNSON COUNTY--Continued

414221091361101. Local number, 80-07-25 DBAC1.
LOCATION.--Lat 41°42'24", long 91°36'21", Hydrologic Unit 07080209, located at the Iowa Department of Natural Resources/ Geological Survey Bureau's Oakdale core repository. Owner: Geological Survey Bureau/DNR.
AQUIFER.--Silurian: dolomite of Silurian age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 6 in. to 164 ft, 5 in. to 319 ft, 4 in. 319-361.5 ft, liner set 310-361.5 ft, depth 532 ft, open hole 361.5-532 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel, measured twice per month March 1995 to October 1995.
DATUM.--Elevation of land-surface datum is 790 ft above sea level, from topographic map. Measuring point: top of recorder platform, 2.65 ft above land-surface datum.
REMARKS.--Oakdale No. 1 (ODW-1).
PERIOD OF RECORD.--April 1990 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 126.23 ft below land-surface datum, July, 31 1997; lowest water level measured, 245.93 ft below land-surface datum, July 26, 1991.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 21	234.17	MAR 24	224.89	JUN 10	233.09	AUG 25	232.80
NOV 24	232.05	APR 08	223.34	24	225.05	SEP 09	236.79
DEC 15	229.24	28	222.18	JUL 08	230.74	30	234.45
JAN 20	207.84	MAY 12	224.37	28	238.66		
FEB 11	215.21	26	227.71	AUG 12	229.63		

WATER YEAR 1999 HIGHEST 207.84 JAN 20, 1999 LOWEST 238.66 JUL 28, 1999

414221091361102. Local number, 80-07-25 DBAC2.
LOCATION.--Lat 41°42'24", long 91°36'21", Hydrologic Unit 07080209, located at the Iowa Department of Natural Resources/ Geological Survey Bureau's Oakdale core repository. Owner: Geological Survey Bureau/DNR.
AQUIFER.--Devonian: limestone and dolomite of Devonian age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 5 in., depth 301 ft, cased 0-175 ft, open hole 175-301 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel, measured twice per month March 1995 to October 1995.
DATUM.--Elevation of land-surface datum is 790 ft above sea level, from topographic map. Measuring point: top of recorder platform, 2.55 ft above land-surface datum.
REMARKS.--Oakdale No. 2, (ODW-2).
PERIOD OF RECORD.--April 1990 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 198.65 ft below land-surface datum, June 2 and 7, 1996; lowest water level measured, 227.09 ft below land-surface datum, August 28, 1991.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1997 TO SEPTEMBER 1998

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 21	218.23	MAR 24	210.87	JUN 10	214.35	AUG 25	215.68
NOV 24	216.95	APR 08	209.62	24	209.48	SEP 09	218.84
DEC 15	215.51	28	206.67	JUL 08	213.38	30	218.24
JAN 20	206.01	MAY 12	208.15	28	218.60		
FEB 11	202.49	26	210.46	AUG 12	213.74		

WATER YEAR 1999 HIGHEST 202.49 FEB 11, 1999 LOWEST 218.84 SEP 09, 1999

JOHNSON COUNTY--Continued

413950091322402. Local number, 79-06-10 BCCD.
LOCATION.--Lat 41°39'57", long 91°32'14", Hydrologic Unit 07080209, located on the northeast corner of the terminal end of North Madison Street just north of the Iowa City water treatment plant, approximately 0.5 miles north of Burlington St. Owner: The city of Iowa City.
AQUIFER.--Cambrian/Ordovician. Dolomite from the Prairie Du Chien Formation
WELL CHARACTERISTICS.--Drilled public use well, diameter 26 in, depth 1570 ft, open interval from 1000-1570 ft.
INSTRUMENTATION.--Bi-weekly measurements using an airline by USGS personnel.
DATUM.--Elevation of land-surface datum is 650 ft above sea level, from topographic map.
REMARKS.--Iowa City Well No. 1
PERIOD OF RECORD.--April 1996 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 154 ft below land-surface datum, September 25, 1996, May 07, 1997, June 18, 1997, July 02,1997; lowest water level measured, 360 ft below land-surface datum, May 12, 1999.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 21	172	MAR 24	296	MAY 26	313	AUG 12	309
NOV 24	281	APR 08	200	JUN 10	309	25	196
DEC 15	198	28	298	24	310	SEP 09	186
JAN 20	297	MAY 12	360	JUL 08	307	30	182
FEB 11	327	17	316	28	316		

WATER YEAR 1999 HIGHEST 172 OCT 21, 1998 LOWEST 360 MAY 12, 1999

413929091322401. Local number 79-06-10 CCCB.
LOCATION.--Lat 41°39'30", long 91°32'25". Hydrologic Unit 07080209, located at University of Iowa water treatment plant. Owner: University of Iowa.
AQUIFER.--Cambrian-Jordan sandstone.
WELL CHARACTERISTICS.--Drilled artesian well used for withdrawal and testing, diameter 20 in, depth 1550 ft, casing open from 1063-1550 ft.
INSTRUMENTATION.--Bi-weekly measurements using airline by USGS personnel
DATUM.--Elevation of land-surface datum is 654.51 ft. above sea level, by levels run to accuracy of 0.01 ft. Measuring point is airline connection, 0.85 ft. above land surface datum.
REMARKS.--SUI water treatment plant
PERIOD OF RECORD.--May 17, 1995 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 160 ft below land-surface datum, June 04, 1997; lowest water level measured, 216 ft. below land-surface datum, April 30, 1998.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 21	148	MAR 24	178	JUN 10	191	AUG 25	171
NOV 24	159	APR 08	173	24	187	SEP 09	162
DEC 15	172	28	187	JUL 08	187	30	157
JAN 20	167	MAY 12	210	28	187		
FEB 11	177	26	203	AUG 12	187		

WATER YEAR 1999 HIGHEST 148 OCT 21, 1998 LOWEST 210 MAY 12, 1999

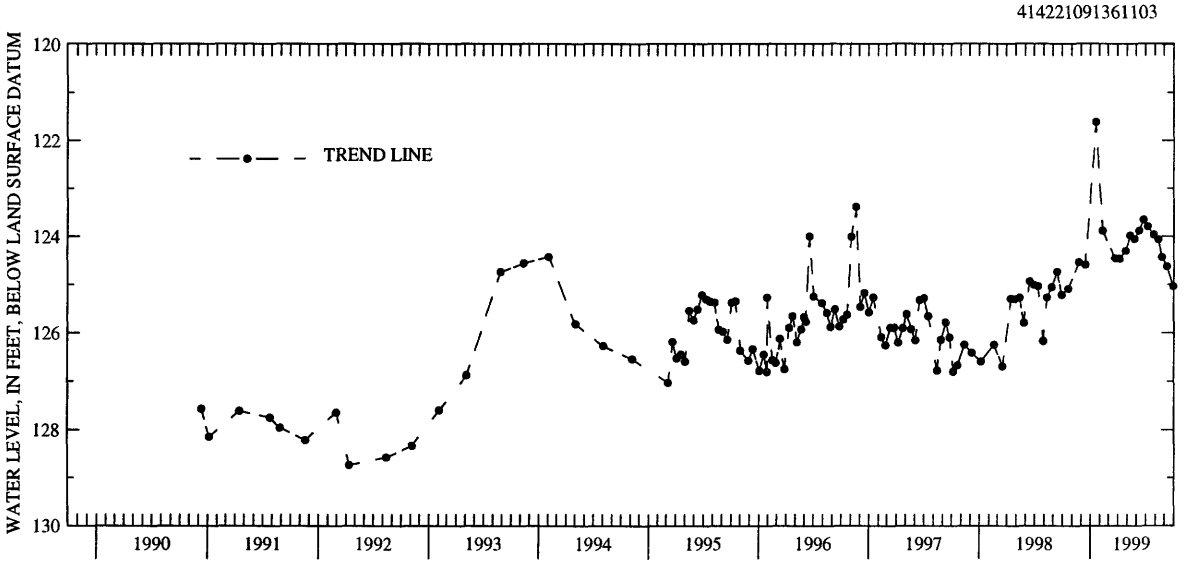
JOHNSON COUNTY--Continued

414221091361103. Local number, 80-07-25 DBAD1.
LOCATION.--Lat 41°42'24", long 91°36'21", Hydrologic Unit 07080209, located at the Iowa Department of Natural Resources/ Geological Survey Bureau's Oakdale core repository. Owner: Geological Survey Bureau/DNR.
AQUIFER.--Buried channel: sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 4 in., depth 171 ft, screened 153-171. ft.
INSTRUMENTATION.-- Quarterly measurement with chalked tape by USGS personnel, measured twice per month March 1995 to October 1995.
DATUM.--Elevation of land-surface datum is 790 ft above sea level, from topographic map. Measuring point: top of recorder platform, 2.55 ft above land-surface datum.
REMARKS.--Oakdale No. 3 (ODW-3).
PERIOD OF RECORD.--April 1990 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 121.61 ft below land-surface datum, January 20, 1999; lowest water level measured, 128.74 ft below land-surface datum, April 12, 1992.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 21	125.09	MAR 24	124.46	JUN 10	123.89	AUG 25	124.44
NOV 24	124.54	APR 08	124.47	24	123.66	SEP 09	124.63
DEC 15	124.59	28	124.31	JUL 08	123.80	30	125.04
JAN 20	121.61	MAY 12	123.99	28	123.97		
FEB 11	123.89	26	124.06	AUG 12	124.07		

WATER YEAR 1999 HIGHEST 121.61 JAN 20, 1999 LOWEST 125.09 OCT 21, 1998



JOHNSON COUNTY--Continued

414315091252002. Local number, 80-05-22 CBCB2.
LOCATION.--Lat 41°43'16", long 91°25'20", Hydrologic Unit 07080209, along the Chicago, Rock Island and Pacific Railroad track, southeast of the overpass on Rapid Creek Road over the track, approximately 5.5 mi northeast of the junction of Interstate 80 and Iowa Highway 1. Owner: Chicago, Rock Island and Pacific Railroad Co.
AQUIFER.--Devonian: Cedar Valley limestone of Middle Devonian age.
WELL CHARACTERISTICS.--Drilled unused artesian water well, diameter 5 in., depth 82.5 ft. Casing information not available.
INSTRUMENTATION.--Intermittant measurement with chalked tape by USGS personnel. Shaft encoder and data collection platform (dcp) installed July, 1998.
DATUM.--Elevation of land-surface datum is 753 ft above sea level, from topographic map. Measuring point: Nipple welded to plate on top of casing, 4.01 ft above land- surface datum.
REMARKS.--At the site of the former Elmira depot.
PERIOD OF RECORD.--December 1941 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 5.58 ft below land-surface datum, November 27, 1992; lowest measured, 21.65 ft below land-surface datum, August 21, 1989.

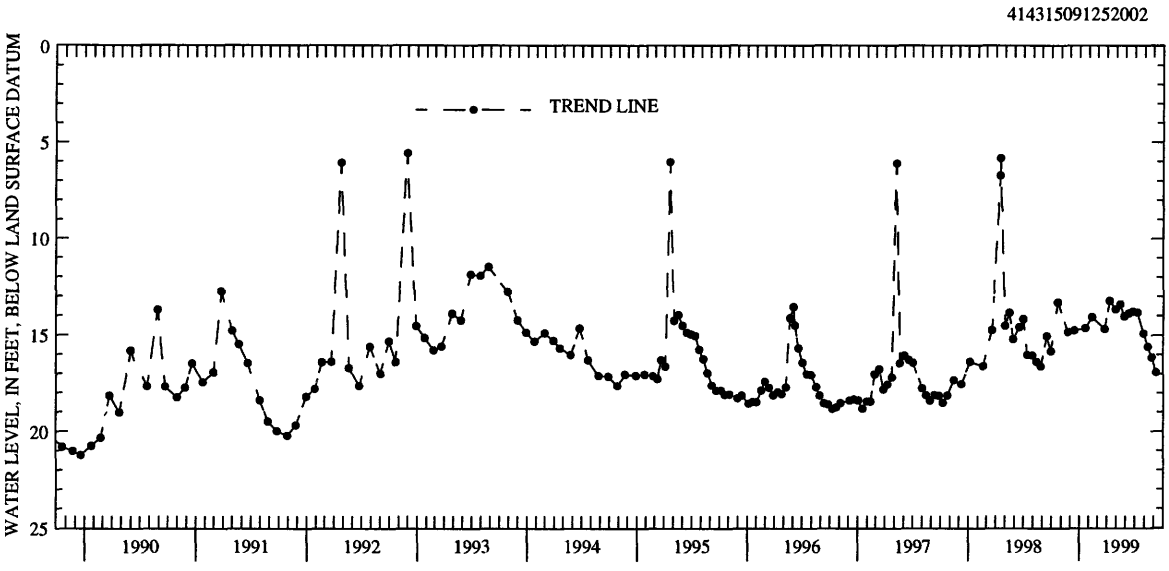
MEASURED WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 21	13.31	MAR 24	14.68	JUN 11	13.88	AUG 26	16.15
NOV 24	14.83	APR 09	13.23	25	13.78	SEP 09	16.92
DEC 15	14.75	29	13.67	JUL 09	13.83		
JAN 20	14.63	MAY 13	13.41	29	14.91		
FEB 11	14.07	27	14.03	AUG 13	15.59		

WATER YEAR 1999 HIGHEST 13.23 APR 09, 1999 LOWEST 16.92 SEP 09, 1999

DEPTH BELOW LAND SURFACE (WATER LEVEL) (FEET), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16.04	14.12	14.94	14.82	14.30	14.81	14.81	13.69	14.16	12.88	15.21	16.45
2	15.97	14.15	14.83	14.62	14.04	14.81	---	13.66	14.29	13.10	15.32	16.49
3	15.47	14.23	14.77	14.64	13.76	14.89	14.79	13.61	14.34	13.21	15.34	16.58
4	15.28	14.36	14.79	14.80	13.87	14.89	14.81	13.58	14.30	13.39	15.32	16.62
5	14.14	14.40	14.77	14.76	13.86	14.88	14.74	13.53	14.25	13.49	15.36	16.67
6	13.46	14.51	14.76	14.71	13.97	15.05	14.66	13.51	14.33	13.65	15.37	16.76
7	13.83	14.60	14.87	14.75	13.96	15.13	14.69	13.58	14.39	13.75	15.37	16.79
8	14.22	14.61	14.86	14.74	13.98	14.98	14.59	13.68	14.46	13.77	15.49	16.84
9	14.44	14.50	14.84	14.74	14.06	14.89	13.23	13.73	14.47	13.83	15.52	16.92
10	14.63	13.72	14.85	14.72	14.13	15.03	12.37	13.70	14.28	14.01	15.53	16.93
11	14.76	13.85	14.84	14.61	14.07	15.09	12.74	13.66	13.88	14.07	15.62	17.00
12	14.88	13.93	14.79	14.58	13.98	15.09	13.24	13.65	13.61	14.09	15.54	17.03
13	14.95	13.95	14.76	14.71	14.13	15.06	13.43	13.42	12.34	14.11	15.59	17.10
14	15.01	13.97	14.77	14.72	14.10	15.04	13.57	13.39	11.98	14.16	15.75	17.14
15	15.05	14.14	14.75	14.65	14.08	15.03	13.59	13.42	12.57	14.24	15.81	17.20
16	15.08	14.18	14.71	14.61	14.24	14.69	13.19	13.35	13.01	14.32	15.84	17.26
17	14.46	14.39	14.68	14.57	14.35	14.24	13.02	13.19	13.27	14.42	15.92	17.29
18	11.80	14.37	14.55	14.58	14.42	14.28	13.10	13.22	13.37	14.45	15.88	17.29
19	12.29	14.52	14.76	14.65	14.52	14.41	13.28	13.28	13.44	14.51	15.79	17.30
20	12.84	14.63	14.81	14.64	14.64	14.43	13.46	13.35	13.56	14.56	15.88	17.39
21	13.31	14.68	14.79	---	14.75	14.49	13.55	13.41	13.63	14.62	15.93	17.45
22	13.80	14.65	14.86	---	14.76	14.57	13.63	13.54	13.71	14.68	15.95	17.46
23	14.04	14.76	14.84	---	14.71	14.60	13.12	13.59	13.68	14.70	15.95	17.43
24	14.18	14.83	14.82	---	14.74	14.68	12.86	13.64	13.70	14.78	15.99	17.46
25	14.30	14.73	14.74	---	14.80	14.78	12.84	13.72	13.78	14.84	16.08	17.49
26	14.40	14.79	14.68	---	14.78	14.79	13.07	13.88	13.80	14.89	16.15	17.52
27	14.31	14.78	14.65	---	14.68	14.78	13.25	14.02	13.62	14.91	16.21	17.64
28	14.03	14.76	14.67	14.41	14.75	14.79	13.49	14.08	12.02	14.91	16.27	17.64
29	13.86	14.71	14.69	14.45	---	14.92	13.67	14.11	12.18	14.91	16.37	17.64
30	13.92	14.81	14.79	14.47	---	14.92	13.71	14.16	12.59	14.92	16.42	17.61
31	14.05	---	14.77	14.45	---	14.82	---	14.17	---	15.05	16.43	---
MEAN	14.28	14.42	14.77	---	14.30	14.80	---	13.63	13.57	14.23	15.78	17.15
MAX	16.04	14.83	14.94	---	14.80	15.13	---	14.17	14.47	15.05	16.43	17.64
MIN	11.80	13.72	14.55	---	13.76	14.24	---	13.19	11.98	12.88	15.21	16.45


414315091252002
WATER LEVEL, IN FEET, BELOW LAND SURFACE DATUM
0
5
10
15
20
25
TREND LINE
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999

JONES COUNTY

415808091160501. Local number, 83-04-25 CBBB.
LOCATION.--Lat 41°58'08", long 91°16'05", Hydrologic Unit 07080103, 4 mi north of the Town of Mechanicsville and 1 mi west of County Road X-40. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Silurian: dolomite of Silurian age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 6 in. to 41 ft, 5 in. 41-517 ft, depth 517 ft, open hole 41-517 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 811 ft above sea level, from topographic map. Measuring point: Nipple welded to plate on top of casing, 2.16 ft above land- surface datum.
REMARKS.--White Oak Creek well.
PERIOD OF RECORD.--July 1976 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 0.78 ft below land-surface datum, May 3, 1993; lowest measured, 6.21 ft below land-surface datum, September 11, 1989.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	1.51	FEB 09	2.76	MAY 03	2.17	AUG 06	5.46

WATER YEAR 1999 HIGHEST 1.51 NOV 03, 1998 LOWEST 5.46 AUG 06, 1999

KEOKUK COUNTY

412030092121601. Local number, 76-12-35 DBDC
LOCATION.--Lat 41°20'30", long 92°12'16", Hydrologic Unit 07080106, approximately 0.25 mi north of the town of Sigourney, 0.25 mi north of Highway 92. Owner: City of Sigourney.
AQUIFER.--Mississippian: limestone and dolomite of Mississippian age.
WELL CHARACTERISTICS.--Drilled unused public-supply artesian well, diameter 14 in., depth 300 ft, cased to 128 ft, open hole 128-300 ft.
INSTRUMENTATION.-- Quarterly measurement with chalked tape by USGS personnel. Analog digital water-level recorder January 1989 to September 1992.
DATUM.--Elevation of land-surface datum is 769 ft above sea level, from topographic map. Measuring point: Top of recorder base, 1.56 ft above land-surface datum.
REMARKS.--Sigourney South Rock Island No. 1 well. Water levels affected by nearby pumping.
PERIOD OF RECORD.--July 1988 to present.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 80.99 ft below land-surface datum, May 17, 1995; lowest measured, 118.29 ft below land-surface datum, August 31, 1991.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	88.96	MAY 04	83.33	AUG 05	85.26

WATER YEAR 1999 HIGHEST 83.33 MAY 04, 1999 LOWEST 88.96 NOV 04, 1998

LEE COUNTY

404306091270201. Local number, 68-05-05 DAAC.
LOCATION.--Lat 40°43'06", long 91°27'02", Hydrologic Unit 07080104, located on the south side of State Highway 2 approximately 7 mi east of Donnellson and 6 mi south of West Point.
AQUIFER.--Cambrian-Jordan sandstone
WELL CHARACTERISTICS.--Drilled public-use well, diameter 20 to 10 in., depth 1910 ft, open hole from 1290-1910 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 763 ft., from topographic map. Measuring point: Top of casing 3.00 ft above land-surface datum.
REMARKS.--West Point No. 3
PERIOD OF RECORD.--November 15, 1996 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 262.04 ft below land-surface datum, January 28, 1997; lowest measured, 266.61 ft. below land-surface datum, August 06, 1999.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	264.31	FEB 08	263.21	MAY 04	264.57	AUG 06	266.61

WATER YEAR 1999 HIGHEST 263.21 FEB 08, 1999 LOWEST 266.61 AUG 06, 1999

LINN COUNTY

415343091360101. Local number, 82-07-25 AAAB.
LOCATION.--Lat 41°53'43", long 91°36'01", Hydrologic Unit 07080208, 0.5 mi northwest of the Town of Ely at the southwest corner of the junction of County Roads E-70 and W-6E. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Silurian: limestone and dolomite of Silurian age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 6 in., depth 401 ft, cased to 121.5 ft, open hole 121.5-401 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel. Graphic water-level recorder April 1978 to October 1979. Intermittent measurement with chalked tape by USGS personnel May 1976 to April 1978.
DATUM.--Elevation of land-surface datum is 772 ft above sea level, from topographic map. Measuring point: Top of casing, 1.76 ft above land-surface datum.
REMARKS.--Ely (Northwest) Railroad well. Records for May 1976 to September 1988 are unpublished and available in the files of the Iowa District Office.
PERIOD OF RECORD.--May 1976 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 3.03 ft below land-surface datum, August 26, 1993; lowest measured, 19.96 ft below land-surface datum, June 14, 1977.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	7.89	MAY 03	6.93	AUG 09	9.95
FEB 10	8.79	AUG 09	6.92		

WATER YEAR 1999 HIGHEST 6.92 AUG 09, 1999 LOWEST 9.95 AUG 09, 1999

420200091363001. Local number 83-07-01 BADC.
LOCATION.--Lat 42°02'00", long 91°36'36", Hydrologic Unit 07080206, located in the town of Marion. Owner: Town of Marion
AQUIFER.--Cambrian-Trempealeau Group
WEL CHARACTERISTCS.--Drilled public-use well, depth 1570, casing information not available.
INSTRUMENTATION.--Quarterly measurements using airline by an observer.
DATUM.--Elevation of land-surface datum is 793 ft above sea level, from topographic map.
REMARKS.--Marion No.4
PERIOD OF RECORD.--August 1997 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 260 ft below land-surface datum, April 21, 1998; lowest measured 325 ft below land-surface datum, August 325, 1999

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL
AUG 19	325

420219091344101. Local number 84-06-32 BCBC.
LOCATION.--Lat 42°02'45", long 91°34'43", Hydrologic Unit 07080206, located in the town of Marion near Tauber park on the corner of 31st St. and 23rd Ave. Owner: Town of Marion.
AQUIFER.--Cambrian/Ordovician- Jordan sandstone.
WELL CHARACTERISTICS.--Drilled public-use well, diameter 24 to 12.5 in., depth 1660 ft, open hole from 1150-1660 ft.
INSTRUMENTATION.--Quarterly measurements using airline by an observer.
DATUM.--Elevation of land-surface datum is 863 ft above sea level, from topographic map.
REMARKS.--Marion No. 5.
PERIOD OF RECORDS.--January 1997 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 330 ft. below land surface datum, January 28, 1997 and April 21, 1997; lowest measured, 384 ft. below land-surface datum, August 18, 1999.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	348	FEB 18	373	APR 23	348	AUG 18	384

WATER YEAR 1999 HIGHEST 348 NOV 20, 1998 APR 23, 1999 LOWEST 384 AUG 18, 1999

LINN COUNTY--Continued

415422091422601. Local number, 82-07-18 CDCD.
LOCATION.--Lat 41°54'22", long 91°42'26", Hydrologic Unit 07080205, on 76th Avenue SW, approximately 1.5 mi west of U.S. Highway 218, Cedar Rapids. Owner: Edwin J. Hynek.
AQUIFER.--Glacial drift of Pleistocene age.
WELL CHARACTERISTICS.--Dug unused water-table well, diameter 4 ft, depth 13.5 ft, cribbed with brick.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel. Graphic water-level recorder July 1959 to September 1987.
DATUM.--Elevation of land-surface datum is 835 ft above sea level, from topographic map. Measuring point: Base of recorder shelter, 0.37 ft above land-surface datum.
REMARKS.--Well previously owned by Lester Petrak.
PERIOD OF RECORD.--July 1959 to current year.
REVISED RECORDS.--WDR IA-84-1.
EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 1.09 ft below land-surface datum, August 4, 1968; lowest recorded, 11.75 ft below land-surface datum, February 8, 1977.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	4.33	FEB 10	4.64	MAY 03	4.86

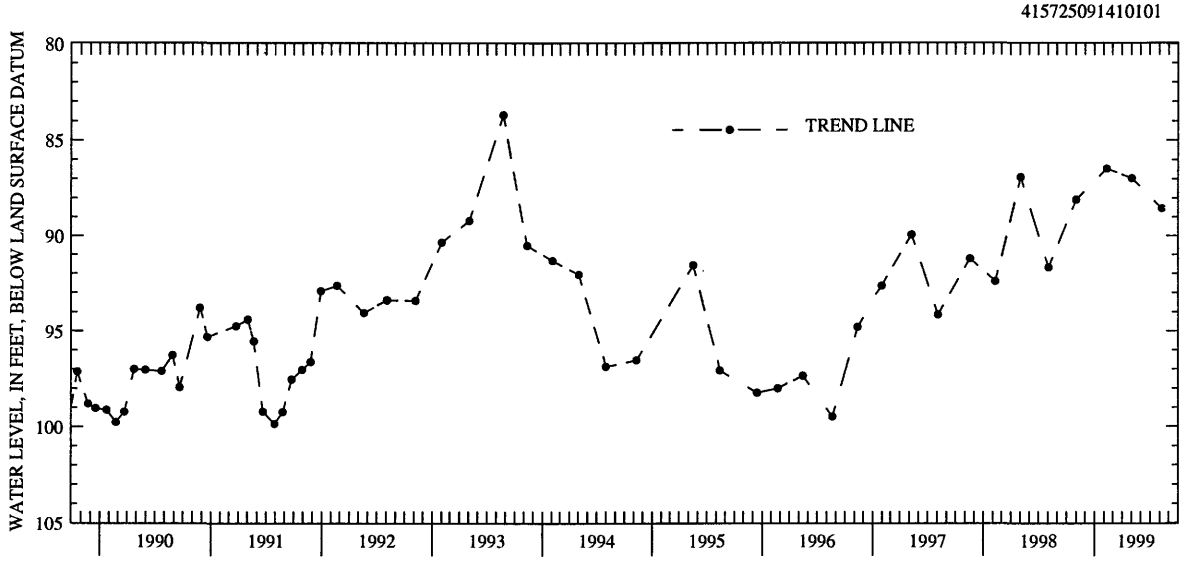
WATER YEAR 1999 HIGHEST 4.33 NOV 02, 1998 LOWEST 4.86 MAY 03, 1999

415725091410101. Local number, 83-07-32 ACDC.
LOCATION.--Lat 41°57'25", long 91°41'01", Hydrologic Unit 07080205, northwest corner of 22nd Avenue SW and 11th Street SW, Cedar Rapids. Owner: Floyd Fetter.
AQUIFER.--Silurian: limestone of Silurian age.
WELL CHARACTERISTICS.--Drilled unused artesian water well, diameter 5 in., depth 282 ft. Casing information not available.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 805 ft above sea level, from topographic map. Measuring point: Plug in well cover at land-surface datum.
REMARKS.--Water levels may be affected by pumping of near by wells.
PERIOD OF RECORD.--July 1940 to current year.
REVISED RECORDS.--WDR IA-88-1.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 75.88 ft below land-surface datum, January 26, 1942; lowest measured, 107.00 ft below land-surface datum, September 16, 1976.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	88.08	FEB 10	86.47	MAY 03	86.97	AUG 09	88.54

WATER YEAR 1999 HIGHEST 86.47 FEB 10, 1999 LOWEST 88.54 AUG 09, 1999



LINN COUNTY--Continued

415834091351601. Local number, 83-06-30 ABBA.
LOCATION.--Lat 41°58'34", long 91°35'16", Hydrologic Unit 07080206, approximately 200 ft west of 5201 Mount Vernon Road SE, Cedar Rapids. Owner: Vulcan Auto Yard. Formerly owned by B.L. Anderson.
AQUIFER.--Silurian-Devonian: dolomite of Silurian and limestone and dolomite of Devonian age.
WELL CHARACTERISTICS.--Drilled unused artesian water well, diameter 6 in., depth 76.5 ft. Casing information not available.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 755 ft above sea level, from topographic map. Measuring point: Hole in pump base, 0.50 ft above land-surface datum.
REMARKS.--Katz well.
PERIOD OF RECORD.--May 1940 to current year.
EXTREMES OF PERIOD OF RECORD.--Highest water level measured, 37.68 ft below land-surface datum, August 24, 1993; lowest measured, 53.90 ft below land-surface datum, December 21, 1970.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	47.64	FEB 10	48.78	MAY 03	46.67	AUG 09	46.45

WATER YEAR 1999 HIGHEST 46.45 AUG 09, 1999 LOWEST 48.78 FEB 10, 1999

420300091325801. Local number, 84-06-33 ABBB.
LOCATION.--Lat 42°03'00", long 91°32'58", Hydrologic Unit 07080206, near the City of Marion on the east side of Iowa Highway 13, approximately 1 mi north of U.S. Highway 151. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Silurian: dolomite of Silurian age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 6 in. to 142 ft, 5 in. 142-161 ft, depth 481 ft, open hole 161-481 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 838 ft above sea level, from topographic map. Measuring point: Top of casing, 0.90 ft above land-surface datum.
REMARKS.--Marion well.
PERIOD OF RECORD.--June 1976 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 42.15 ft below land-surface datum, June 18, 1986; lowest measured, 50.26 ft below land-surface datum, December 1, 1989.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	44.03	FEB 10	44.07	MAY 03	44.89	AUG 09	45.02

WATER YEAR 1999 HIGHEST 44.03 NOV 02, 1998 LOWEST 45.02 AUG 09, 1999

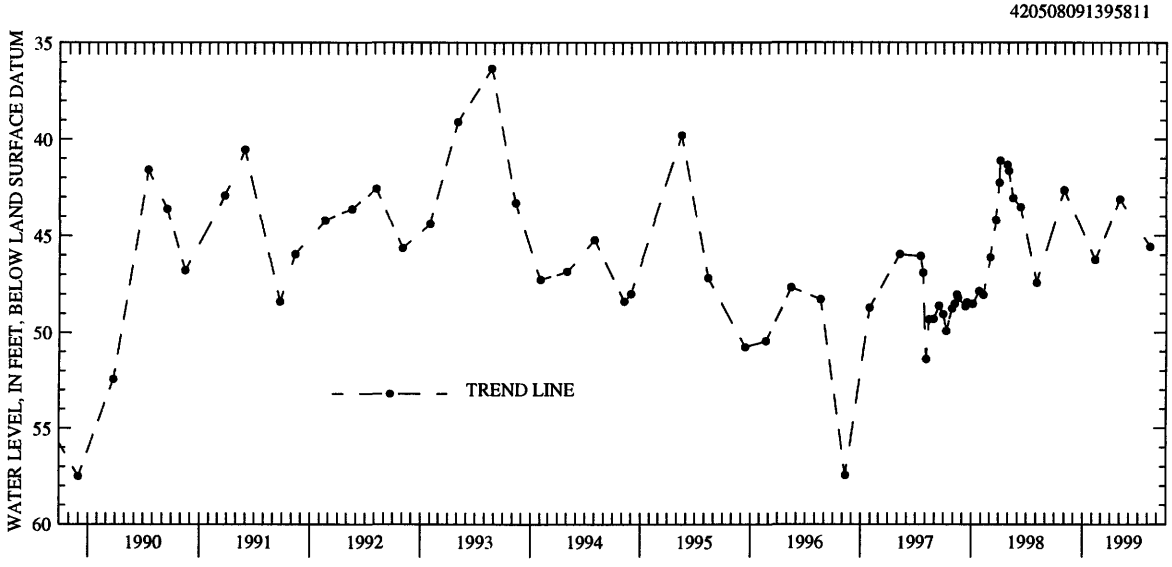
LINN COUNTY--Continued

420508091395811. Local number, 84-07-16 DBBB.
LOCATION.--Lat 42°05'16", long 91°40'02", Hydrologic Unit 07080205, approximately 0.5 mi south of County Road E-34, north of the Town of Robins. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Silurian: dolomite of Silurian age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 6 in. to 60.6 ft, 5 in. to 173 ft, depth 520 ft, open hole 173-520 ft. Open to Devonian rock 173-197, Silurian 196.5-510 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel. Graphic water-level recorder November 1975 to September 1979. Intermittent measurement with chalked tape by USGS personnel April 1975 to November 1975.
DATUM.--Elevation of land-surface datum is 873 ft above sea level, from topographic map. Measuring point: Top of casing, 1.20 ft above land-surface datum.
REMARKS.--Robins well. Records for April 1975 to September 1988 are unpublished and available in the files of the Iowa District Office.
PERIOD OF RECORD.--April 1975 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 36.33 ft below land-surface datum, August 24, 1993; lowest measured, 57.50 ft below land-surface datum, December 1, 1989.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	42.65	FEB 10	46.25	MAY 03	43.13	AUG 09	45.58

WATER YEAR 1999 HIGHEST 42.65 NOV 02, 1998 LOWEST 46.25 FEB 10, 1999



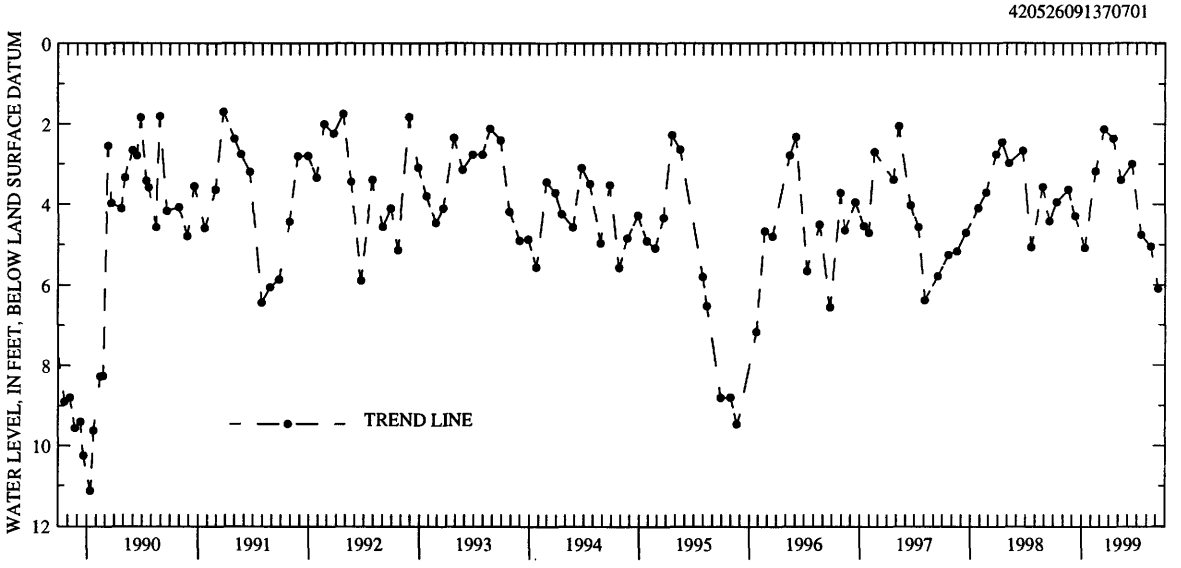
LINN COUNTY--Continued

420526091370701. Local number, 84-07-13 BCBB.
LOCATION.--Lat 42°05'26", long 91°37'07", Hydrologic Unit 07080206, approximately 0.25 mi south of the junction of County Roads W-58 and E-34, on the east side of the road, or approximately 3.75 mi north of the City of Marion. Owner: U.S. Geological Survey.
AQUIFER.--Glacial drift of Pleistocene age.
WELL CHARACTERISTICS.--Drilled observation water-table well, diameter 1.25 in., depth 17 ft, screened 15-17 ft.
INSTRUMENTATION.--Monthly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 882 ft above sea level, from topographic map. Measuring point: Nipple welded to casing, 1.24 ft above land-surface datum.
REMARKS.--USGS13E2 well.
PERIOD OF RECORD.--September 1948 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 0.93 ft below land-surface datum, May 18, 1982; lowest measured, 15.19 ft below land-surface datum, January 20, 1977.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 13	3.95	JAN 12	5.08	APR 16	2.36	JUL 15	4.76
NOV 20	3.64	FEB 17	3.18	MAY 11	3.40	AUG 16	5.05
DEC 11	4.29	MAR 16	2.12	JUN 16	3.00	SEP 09	6.10

WATER YEAR 1999 HIGHEST 2.12 MAR 16, 1999 LOWEST 6.10 SEP 09, 1999



420730091490401. Local number, 85-08-31 DDCD1.
LOCATION.--Lat 42°07'30", long 91°49'04", Hydrologic Unit 07080205, at the fenced north end of Pleasant Creek Reservoir near the beach house in the beach area. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Silurian: dolomite of Silurian age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 6 in. to 53.5 ft, 5 in. to 214 ft, depth 481 ft, open hole 214-481 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel. Graphic water-level recorder May 1975 to December 1979.
DATUM.--Elevation of land-surface datum is 833 ft above sea level, from topographic map. Measuring point: Top of casing, 1.17 ft above land-surface datum.
REMARKS.--Pleasant Creek Reservoir/Silurian well. Records for May 1975 to September 1988 are unpublished and available in the files of the Iowa District Office.
PERIOD OF RECORD.--May 1975 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 20.73 ft below land-surface datum, May 03, 1999; lowest measured, 108.49 ft below land-surface datum, August 4, 1997.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	47.47	FEB 10	20.85	MAY 03	20.73	AUG 09	23.81

WATER YEAR 1999 HIGHEST 20.73 MAY 03, 1999 LOWEST 47.47 NOV 02, 1998

LINN COUNTY--Continued

420730091490402. Local number, 85-08-31 DDCD2.
LOCATION.--Lat 42°07'29", long 91°49'01", Hydrologic Unit 07080205, at the fenced north end of Pleasant Creek Reservoir near the beach house in the beach area. Owner: Geological Survey Bureau, DNR, and U.S. Geological Survey.
AQUIFER.--Devonian: limestone and dolomite of Devonian age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 5 in., depth 205 ft, cased to 52 ft, open hole 52-205 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel. Graphic water-level recorder May 1975 to December 1979.
DATUM.--Elevation of land-surface datum is 841 ft above sea level, from topographic map. Measuring point: Top of casing, 2.38 ft above land-surface datum.
REMARKS.--Pleasant Creek Reservoir/Devonian well. Records for May 1975 to September 1989 are unpublished and available in the Iowa District Office.
PERIOD OF RECORD.--May 1975 to May 1980, April 1984 to present.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 14.60 ft below land-surface datum, May 31, 1991; lowest measured, 48.55 ft below land-surface datum, November 12, 1976.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	28.67	FEB 10	18.39	MAY 03	17.96	AUG 09	18.33

WATER YEAR 1999 HIGHEST 17.96 MAY 03, 1999 LOWEST 28.67 NOV 02, 1998

421149091403301. Local number, 85-07-04 CCCC.
LOCATION.--Lat 42°11'49", long 91°40'33", Hydrologic Unit 07080205, approximately 5 mi east of the Town of Center Point, north side of County Road E-16. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Silurian-Devonian: dolomite of Silurian age and limestone and dolomite of Devonian age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 6 in. to 41 ft, 5 in 129-147 ft, depth 435 ft, open hole 41-129 ft and 147-435 ft. Devonian rock 23-139 ft, Silurian rock 139-431 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel. Graphic water-level recorder March 1974 to December 1979. Intermittent measurement with chalked tape by USGS personnel July 1973 to March 1974.
DATUM.--Elevation of land-surface datum is 912 ft above sea level, from topographic map. Measuring point: Nipple welded to plate on top of casing, 1.21 ft above land- surface datum.
REMARKS.--Alice well.
PERIOD OF RECORD.--July 1973 to current year.
REVISED RECORDS.--WDR IA-84-1.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 17.06 ft below land-surface datum, June 10, 1974; lowest measured, 34.27 ft below land-surface datum, December 1, 1989.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	25.63	FEB 10	26.74	MAY 03	25.15	AUG 09	26.87

WATER YEAR 1999 HIGHEST 25.15 MAY 03, 1999 LOWEST 26.87 AUG 09, 1999

421207091312201. Local number, 85-06-03 DABB.
LOCATION.--Lat 42°12'07", long 91°31'24", Hydrologic Unit 07080102, located east of State Highway 13 in the Town of Central City. Owner: Town of Central City.
AQUIFER.--Silurian
WELL CHARCTERISTICS.--Drilled pumping well, diameter 6 in., depth 106 ft., casing information not available.
INSTRUMENTATION.--Quarterly measurements with airline by USGS personnel.
DATUM.--Elevation of land-surface datum is 825 ft, by topographic map.
REMARKS.--Central City Well
PERIOD OF RECORD.--August 1997 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 10 feet below land-surface datum, August 09, 1999 and Aug. 03, 1998; lowest measured, 22 ft below land-surface datum, February 23, 1998.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	14	FEB 10	14	MAY 03	11	AUG 09	10

WATER YEAR 1999 HIGHEST 10 AUG 09, 1999 LOWEST 14 NOV 02, 1998 FEB 10, 1999

LYON COUNTY

431812096302701. Local number, 98-48-16 DDAD.
LOCATION.--Lat 43°18'12", long 96°30'27", Hydrologic Unit 10170203, approximately 3.5 mi east of the City of Canton, S.D., south of U.S. Highway 18. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Dakota: sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 358 ft, screened 335-355 ft. Open to Late Precambrian Sioux quartzite 353-358 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,268 ft above sea level, from topographic map. Measuring point: Top of casing, 2.00 ft above land-surface datum.
REMARKS.--Well D-20.
PERIOD OF RECORD.--December 1978 to December 1980, May 1982 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 91.89 ft below land-surface datum, July 8, 1986; lowest measured, 107.60 ft below land-surface datum, November 7, 1991.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	106.03	FEB 10	105.20	MAY 11	104.26	AUG 10	104.54

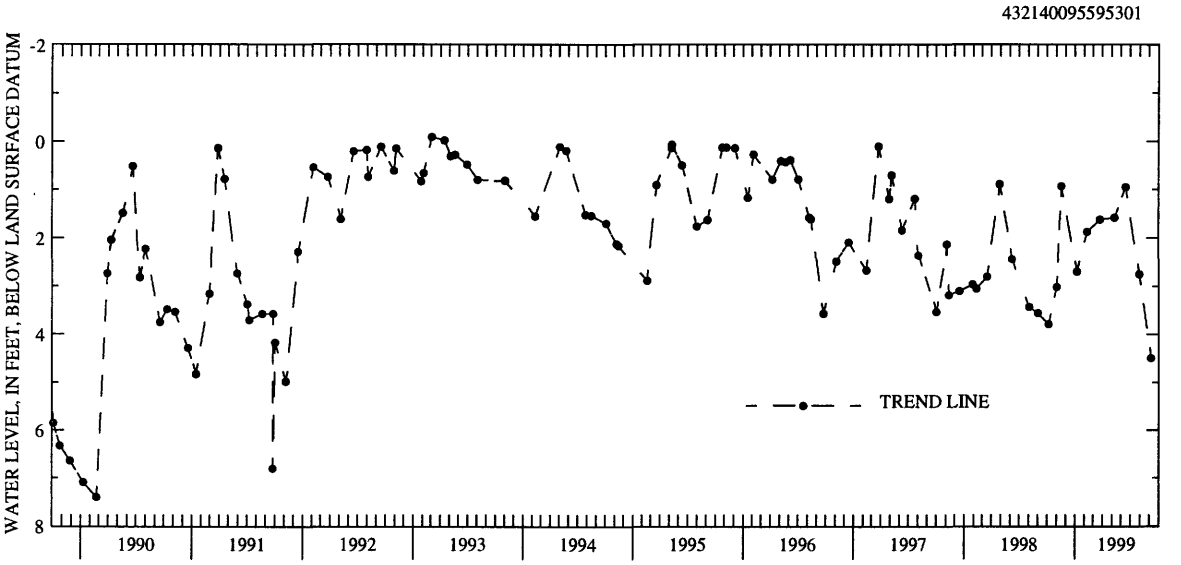
WATER YEAR 1999 HIGHEST 104.26 MAY 11, 1999 LOWEST 106.03 NOV 02, 1998

432140095595301. Local number, 99-44-26 DDDD.
LOCATION.--Lat 43°21'40", long 95°59'53", Hydrologic Unit 10170204, 1 mi north of the City of George, west of Iowa Highway 339. Owner: State of Iowa.
AQUIFER.--Glacial drift of Pleistocene age.
WELL CHARACTERISTICS.--Drilled unused water-table well, diameter 20 in., depth 38 ft, lined with tile.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,400 ft above sea level, from topographic map. Measuring point: Plug in well cover, 2.01 ft above land-surface datum.
REMARKS.--Well No. 26R1.
PERIOD OF RECORD.--October 1940 to June 1943, May 1947 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 0.07 ft above land-surface datum, May 10, 1995; lowest measured, 9.74 ft below land-surface datum, October 24, 1940.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 06	3.79	JAN 07	2.69	MAY 11	1.58	SEP 08	4.49
NOV 02	3.01	FEB 10	1.87	JUN 16	.95		
18	.93	MAR 24	1.62	JUL 29	2.75		

WATER YEAR 1999 HIGHEST .93 NOV 18, 1998 LOWEST 4.49 SEP 08, 1999



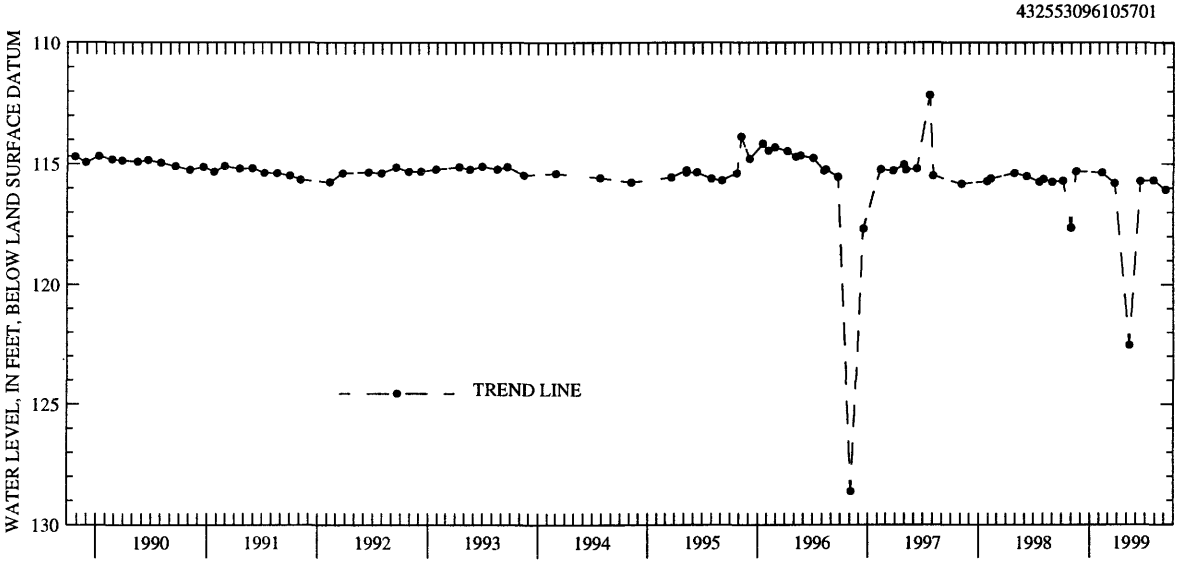
LYON COUNTY--Continued

432553096105701. Local number, 99-45-05 ABAC.
LOCATION.--Lat 43°25'53", long 96°10'57", Hydrologic Unit 10170204, 0.05 mi south of Iowa Highway 9 on 2nd Street, Rock Rapids. Owner: City of Rock Rapids.
AQUIFER.--Dakota: sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled unused artesian water well, diameter 10 in., depth 375 ft, cased to 296 ft, open hole 296-375 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,368 ft above sea level, from topographic map. Measuring point: Plug in cover over casing, 1.00 ft above land-surface datum.
REMARKS.--City test well No. 3.
PERIOD OF RECORD.--August 1960 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 100.08 ft below land-surface datum, July 27, 1964; lowest measured, 128.62 ft below land-surface datum, November 5, 1996.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 06	115.70	JAN 07	114.56	MAY 11	122.53	SEP 08	116.08
NOV 02	117.65	FEB 10	115.36	JUN 16	115.72		
18	115.31	MAR 24	115.80	JUL 29	115.69		

WATER YEAR 1999 HIGHEST 114.56 JAN 07, 1999 LOWEST 122.53 MAY 11, 1999



432601096335511. Local number, 100-48-31 CCCC11.
LOCATION.--Lat 43°26'01", long 96°33'55", Hydrologic Unit 10170203, 0.5 mi west and 2.5 mi south of the Village of Granite. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Dakota: sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 657 ft, screened 450-455 ft and 630-650 ft. Dakota 437-653 ft, Sioux Quartzite 653-657 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,417 ft above sea level, from topographic map. Measuring point: Top of casing at land-surface datum.
REMARKS.--Well D-19.
PERIOD OF RECORD.--December 1978 to December 1980, May 1982 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 151.57 ft below land-surface datum, February 11, 1994; lowest measured, 158.25 ft below land-surface datum, April 11, 1990.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	155.43	FEB 10	154.68	MAY 11	154.03	AUG 10	154.54

WATER YEAR 1999 HIGHEST 154.03 MAY 11, 1999 LOWEST 155.43 NOV 02, 1998

MADISON COUNTY

411727093483001. Local number, 75-26-23 AAAC.
LOCATION.--Lat 41°17'27", long 93°48'30", Hydrologic Unit 07100008, near the shelter house in the city park, St. Charles. Owner: City of St. Charles.
AQUIFER.--Mississippian: limestone of Mississippian age.
WELL CHARACTERISTICS.--Drilled unused artesian water well, diameter 8 in., depth 867 ft, cased to 657 ft, open hole 657-867 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,067 ft above sea level, from topographic map. Measuring point: Plug in well cover, 1.20 ft above land-surface datum.
REMARKS.--City well No. 1.
PERIOD OF RECORD.--November 1962 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 261.76 ft below land-surface datum, November 20, 1962; lowest measured, 280.26 ft below land-surface datum, August 19, 1999.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 05	279.91	MAR 04	279.71	AUG 19	280.26
FEB 12	279.84	APR 14	279.72		

WATER YEAR 1999 HIGHEST 279.71 MAR 04, 1999 LOWEST 280.26 AUG 19, 1999

MAHASKA COUNTY

411912092273601. Local number, 75-14-10 BAAC.
LOCATION.--Lat 41°19'12", long 92°27'36", Hydrologic Unit 07080106, approximately 0.5 mi south of Iowa Highway 92 in the town of Rose Hill. Owner: City of Rose Hill.
AQUIFER.--Mississippian: limestone and dolomite of Mississippian age.
WELL CHARACTERISTICS.--Drilled unused public-supply artesian well, diameter 6 in., depth 370 ft, casing information not available.
INSTRUMENTATION.-- Quarterly measurement with chalked tape by USGS personnel. Analog digital water-level recorder July 1990 to October 1992. Intermittent measurement with chalked tape by USGS personnel May 1989 to June 1989.
DATUM.--Elevation of land-surface datum is 815 ft above sea level, from topographic map. Measuring point: Top of recorder platform, 1.63 ft above land-surface datum.
REMARKS.--Rose Hill No. 2 well.
PERIOD OF RECORD.--May 1989 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 100.69 ft below land-surface datum, July 30, 1992; lowest measured, 107.51 ft below land-surface datum, February 08, 1999.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	101.35	FEB 08	107.51	MAY 05	100.03	AUG 05	102.59

WATER YEAR 1999 HIGHEST 100.03 MAY 05, 1999 LOWEST 107.51 FEB 08, 1999

MAHASKA COUNTY--Continued

411914092274701. Local number, 75-14-10 BABC.
LOCATION.--Lat 41°19'14", long 92°27'47", Hydrologic Unit 07080106, approximately 0.45 mi south of Iowa Highway 92, behind City Hall in the Town of Rose Hill. Owner: City of Rose Hill.
AQUIFER.--Mississippian: limestone and dolomite of Mississippian age.
WELL CHARACTERISTICS.--Drilled unused public-supply artesian well, diameter 5 in., depth 273 ft, cased to 106 ft, open hole 106-273 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 817 ft above sea level, from topographic map. Measuring point: Top of casing, 1.56 ft above land-surface datum.
REMARKS.--Rose Hill No. 4 well.
PERIOD OF RECORD.--September 1988 to current year.
REVISION.--Site identification number. Previously published as 411914092273001.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 99.56 ft below land-surface datum, May 17, 1995; lowest measured, 106.03 ft below land-surface datum, May 05, 1999.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	100.92	FEB 08	100.26	MAY 05	106.03	AUG 05	99.76

WATER YEAR 1999 HIGHEST 99.76 AUG 05, 1999 LOWEST 106.03 MAY 05, 1999

412020092471002. Local number, 76-17-35 CADB.
LOCATION.--Lat 41°20'25", long 92°47'09", Hydrologic Unit 07100009, 150 ft east of the old treatment plant near a retirement village on the north end of the Town of Leighton. Owner: Town of Leighton.
AQUIFER.--Cambrian-Ordovician: sandstone of Late Cambrian and sandstone and sandy dolomite of Early Ordovician age.
WELL CHARACTERISTICS.--Drilled unused public-supply artesian well, diameter 8 in. to 383 ft, 5 in. 383-1778 ft, depth 2200 ft, open 1778-2200 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 820 ft above sea level, from topographic map. Measuring point: Top of casing, 5.43 ft above land-surface datum.
REMARKS.--Leighton No. 4 well.
PERIOD OF RECORD.--May 1989 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 215.38 ft below land-surface datum, May 11, 1989; lowest measured, 282.96 ft below land-surface datum, August 20, 1996.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	258.19	MAY 05	223.03	AUG 05	232.10

WATER YEAR 1999 HIGHEST 223.03 MAY 05, 1999 LOWEST 258.19 NOV 04, 1998

MARION COUNTY

411323093142601. Local number, 74-21-11 DBCB1.
LOCATION.--Lat 41°13'23", long 93°14'26", Hydrologic Unit 07100008, north of the water tower in the town square. Owner: Town of Melcher.
AQUIFER.--Glacial drift of Pleistocene age.
WELL CHARACTERISTICS.--Drilled unused water-table well, diameter 18 in., depth 9.7 ft, lined with tile. Depth originally 25 ft, depth measured in 1981 and 1991 at 12.2 ft.
INSTRUMENTATION.--Monthly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 948 ft above sea level, from topographic map. Measuring point: Top of tile casing at land-surface datum.
REMARKS.--Town well No. 2.
PERIOD OF RECORD.--March 1950 to current year.
REVISION.--Highest water level measured, 0.20 ft below land-surface datum, October 10, 1973; lowest measured, 15.27 ft below land-surface datum, October 22, 1953.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 0.20 ft below land-surface datum, October 10, 1973; lowest measured, 15.27 ft below land-surface datum, October 22, 1953.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 16	5.59	JAN 13	5.89	MAY 05	3.39	AUG 05	7.01
NOV 04	4.77	FEB 08	4.36	JUN 09	5.89	31	6.72
DEC 15	7.28	MAR 16	1.19	JUL 20	6.78		

WATER YEAR 1999 HIGHEST 1.19 MAR 16, 1999 LOWEST 7.28 DEC 15, 1998

411328093143503. Local number, 74-21-11 CAAD3.
LOCATION.--Lat 41°13'28", long 93°14'35", Hydrologic Unit 07100008, northeast corner of the junction of West 1st Street and North A Street, Melcher. Owner: Town of Melcher.
AQUIFER.--Glacial drift of Pleistocene age.
WELL CHARACTERISTICS.--Drilled unused artesian water well, diameter 1.25 in., depth 96.5 ft, screened 78-80 ft, open hole 80-96.5 ft.
INSTRUMENTATION.--Monthly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 944 ft above sea level, from topographic map. Measuring point: Nipple welded to casing, 0.51 ft above land-surface datum.
REMARKS.--Town well No. 5, well 11L1.
PERIOD OF RECORD.--August 1953 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 8.29 ft below land-surface datum, May 7, 1996; lowest measured (nearby well pumping), 55.16 ft, revised, below land-surface datum, March 4, 1954.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	12.10	FEB 08	12.13	MAY 05	11.32	AUG 05	12.58

WATER YEAR 1999 HIGHEST 11.32 MAY 05, 1999 LOWEST 12.58 AUG 05, 1999

411329093142902. Local number, 74-21-11 DBBB2.
LOCATION.--Lat 41°13'29", long 93°14'29", Hydrologic Unit 07100008, southeast corner of the T junction of North B Street and Main Street, Melcher. Owner: Town of Melcher.
AQUIFER.--Glacial drift of Pleistocene age.
WELL CHARACTERISTICS.--Drilled unused artesian water well, diameter 6 in., depth 119 ft, cased to 76 ft, open hole 76-119 ft.
INSTRUMENTATION.--Monthly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 943 ft above sea level, from topographic map. Measuring point: Nipple welded to plate on top of casing, 1.82 ft above land- surface datum.
REMARKS.--Town well No. 3, well 11K1.
PERIOD OF RECORD.--July 1945 to December 1955, October 1976 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 11.16 ft below land-surface datum, May 07, 1996; lowest measured (nearby well pumping), 108.85 ft below land-surface datum, December 4, 6-7, 1949.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	21.12	FEB 08	22.43	MAY 05	21.89	AUG 05	21.66

WATER YEAR 1999 HIGHEST 21.12 NOV 04, 1998 LOWEST 22.43 FEB 08, 1999

MARSHALL COUNTY

420355092534701. Local number, 84-18-24 CDCA.
LOCATION.--Lat 42°03'55", long 92°53'47", Hydrologic Unit 07080208, east of Riverview Park and south of the sewage treatment plant, Marshalltown. Owner: City of Marshalltown.
AQUIFER.--Glacial drift of Pleistocene age.
WELL CHARACTERISTICS.--Drilled unused artesian water well, diameter 8 in., depth 200 ft, screened 190-200 ft.
INSTRUMENTATION.--Quarterly measurement with electric line or chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 871 ft above sea level, from topographic map. Measuring point: Top of casing, 0.22 ft above land-surface datum.
REMARKS.--Marshalltown city well.
PERIOD OF RECORD.--May 1949 to August 1971, March 1973 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 4.92 ft below land-surface datum, July 13, 1951; lowest measured, 61.04 ft below land-surface datum, November 2, 1995.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	39.14	FEB 08	50.27	MAY 03	44.97	AUG 02	54.34

WATER YEAR 1999 HIGHEST 39.14 NOV 02, 1998 LOWEST 54.34 AUG 02, 1999

MILLS COUNTY

405641095365101. Local number, 71-42-24 AAAA.
LOCATION.--Lat 40°56'41", long 95°36'51", Hydrologic Unit 10240002, at the intersection of County Roads M-16 and H-46, approximately 5 mi southeast of the City of Malvern. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Buried channel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled observation water-table well, diameter 2 in., depth 255 ft, screened 240-250 ft, gravel packed.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,102 ft above sea level, from topographic map. Measuring point: Top of casing, 2.20 ft above land-surface datum.
REMARKS.--Well SW-41.
PERIOD OF RECORD.--June 1990 and August 1992 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 135.50 feet below land-surface datum, August 5, 1993; lowest measured, 144.30 ft below land-surface datum, June 13, 1990.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 05	137.77	FEB 12	138.63	MAY 14	137.14	AUG 12	137.56

WATER YEAR 1999 HIGHEST 137.14 MAY 14, 1999 LOWEST 138.63 FEB 12, 1999

405813095433201. Local number, 71-42-07 BBCD.
LOCATION.--Lat 40°58'13", long 95°43'32", Hydrologic Unit 10240001, on the west side of the T-intersection of county roads, approximately 5.5 mi south of the City of Glenwood. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Buried channel: sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled observation water-table well, diameter 2 in., depth 351 ft, screened 332-342 ft, gravel packed.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,122 ft above sea level, from topographic map. Measuring point: Top of casing, 1.80 ft above land-surface datum.
REMARKS.--Well SW-40.
PERIOD OF RECORD.--August 1992 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 165.70 feet below land-surface datum, August 5, 1993; lowest measured, 171.94 ft below land-surface datum, November 10, 1994.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 05	168.02	FEB 12	169.13	MAY 14	166.99	AUG 12	168.41

WATER YEAR 1999 HIGHEST 166.99 MAY 14, 1999 LOWEST 169.13 FEB 12, 1999

MITCHELL COUNTY

432156092484101. Local number, 95-17-23 DAA1.
LOCATION.--Lat 43°21'56", long 92°48'41", Hydrologic Unit 07080201, approximately 4 mi southwest of Staceyville, at the intersection of Highway 218 and County Road T40. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.-- Glacial drift of Pleistocene age.
WELL CHARACTERISTICS.--Drilled observation well, diameter 2 in., depth 27 ft, screened 10-27 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,210 ft above sea level, from topographic map. Measuring point: Top of casing, 2.41 ft above land-surface datum.
REMARKS.--Well FM-2T.
PERIOD OF RECORD.--August 1992 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 1.46 ft above land-surface datum, May 6, 1993; lowest measured, 12.69 ft below land-surface datum, February 11, 1998.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	3.18	FEB 09	2.64	MAY 04	2.81	AUG 02	2.63

WATER YEAR 1999 HIGHEST 2.63 AUG 02, 1999 LOWEST 3.18 NOV 04, 1998

432156092484102. Local number, 95-17-23 DAA2.
LOCATION.--Lat 43°21'56", long 92°48'41", Hydrologic Unit 07080201, approximately 4 mi southwest of Staceyville, at the intersection of Highway 218 and County Road T40. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.-- Devonian: dolomite of Devonian age.
WELL CHARACTERISTICS.--Drilled observation well, diameter 1 in., depth 70 ft, screened 55-70 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,210 ft above sea level, from topographic map. Measuring point: Top of casing, 2.58 ft above land-surface datum.
REMARKS.--Well FM-2 (1).
PERIOD OF RECORD.--August 1992 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 6.89 ft above land-surface datum, August 23, 1993; lowest measured, 11.92 ft below land-surface datum, January 31, 1994.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	10.79	FEB 09	11.21	MAY 04	8.24	AUG 02	7.63

WATER YEAR 1999 HIGHEST 7.63 AUG 02, 1999 LOWEST 11.21 FEB 09, 1999

432156092484103. Local number, 95-17-23 DAA3.
LOCATION.--Lat 43°21'56", long 92°48'41", Hydrologic Unit 07080201, approximately 4 mi southwest of Staceyville, at the intersection of Highway 218 and County Road T40. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.-- Devonian: dolomite of Devonian age.
WELL CHARACTERISTICS.--Drilled observation well, diameter 1.5 in., depth 150 ft, screened 110-150 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,210 ft above sea level, from topographic map. Measuring point: Top of casing, 2.55 ft above land-surface datum.
REMARKS.--Well FM-2 (2).
PERIOD OF RECORD.--August 1992 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 6.78 ft above land-surface datum, August 23, 1993; lowest measured, 12.65 ft below land-surface datum, May 07, 1996.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	11.51	FEB 09	12.23	MAY 04	8.54	AUG 02	7.73

WATER YEAR 1999 HIGHEST 7.73 AUG 02, 1999 LOWEST 12.23 FEB 09, 1999

MITCHELL COUNTY--Continued

432156092484104. Local number, 95-17-23 DAA4.
LOCATION.--Lat 43°21'56", long 92°48'41", Hydrologic Unit 07080201, approximately 4 mi southwest of Staceyville, at the intersection of Highway 218 and County Road T40. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.-- Devonian: dolomite of Devonian age.
WELL CHARACTERISTICS.--Drilled observation well, diameter 1.5 in., depth 250 ft, screened 188-250 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,210 ft above sea level, from topographic map. Measuring point: Top of casing, 2.44 ft above land-surface datum.
REMARKS.--Well FM-2 (3).
PERIOD OF RECORD.--August 1992 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 5.54 ft above land-surface datum, May 6, 1993; lowest measured, 15.92 ft below land-surface datum, May 7, 1996.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	13.14	FEB 09	15.08	MAY 04	9.88	AUG 02	8.78

WATER YEAR 1999 HIGHEST 8.78 AUG 02, 1999 LOWEST 15.08 FEB 09, 1999

432156092484105. Local number, 95-17-23 DAA5.
LOCATION.--Lat 43°21'56", long 92°48'41", Hydrologic Unit 07080201, approximately 4 mi southwest of Staceyville, at the intersection of Highway 218 and County Road T40. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.-- Devonian: dolomite of Devonian age.
WELL CHARACTERISTICS.--Drilled observation well, diameter 1.5 in., depth 348 ft, screened 278-348 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,210 ft above sea level, from topographic map. Measuring point: Top of casing, 2.37 ft above land-surface datum.
REMARKS.--Well FM-2 (4).
PERIOD OF RECORD.--August 1992 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 10.04 ft above land-surface datum, August 23, 1993; lowest measured, 21.81 ft below land-surface datum, Nov. 4, 1996.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	19.35	FEB 09	17.73	MAY 04	14.03	AUG 02	12.51

WATER YEAR 1999 HIGHEST 12.51 AUG 02, 1999 LOWEST 19.35 NOV 04, 1998

MONONA COUNTY

415456095414101. Local number, 82-42-14 ADCA.
LOCATION.--Lat 41°54'56", long 95°41'41", Hydrologic Unit 10230007, approximately 6 mi southeast of the Town of Soldier, on the north side of Iowa Highway 37. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Dakota: sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 341 ft, slotted 311-336 ft, gravel-packed, open 336-341 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape or electric line by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,340 ft above sea level, from topographic map. Measuring point: Top of casing, 2.02 ft above land-surface datum.
REMARKS.--Well WC-4.
PERIOD OF RECORD.--May 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 240.25 ft below land-surface datum, January 10, 1984; lowest measured, 246.69 ft below land-surface datum, July 28, 1981.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	243.82	FEB 09	243.81	MAY 12	243.65	AUG 11	243.91

WATER YEAR 1999 HIGHEST 243.65 MAY 12, 1999 LOWEST 243.91 AUG 11, 1999

420004095451501. Local number, 83-42-17 ACDD.
LOCATION.--Lat 42°00'04", long 95°45'15", Hydrologic Unit 10230001, approximately 1.75 mi northeast of the Town of Soldier, 0.25 mi west of Iowa Highway 183. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Glacial drift of Pleistocene age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 161 ft, screened 149-154 ft. Open to Pennsylvanian shale and limestone 153-161 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,160 ft above sea level, from topographic map. Measuring point: Top of casing, 2.20 ft above land-surface datum.
REMARKS.--Well WC-176.
PERIOD OF RECORD.--May 1983 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 54.50 ft below land-surface datum, November 6, 1991; lowest measured, 64.09 ft below land-surface datum, September 7, 1983.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	59.18	FEB 09	59.16	MAY 12	58.98	AUG 11	59.71

WATER YEAR 1999 HIGHEST 58.98 MAY 12, 1999 LOWEST 59.71 AUG 11, 1999

420139095155701. Local number, 83-43-04 CBCB.
LOCATION.--Lat 41°01'39", long 95°51'57", Hydrologic Unit 10230005, approximately 5.5 mi northwest of the Town of Soldier and 1.5 mi north of Iowa Highway 37. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Dakota: sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 321 ft, screened 297-315 ft, gravel-packed, open hole 315-321 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,235 ft above sea level, from topographic map. Measuring point: Top of casing, 2.53 ft above land-surface datum.
REMARKS.--Well WC-5.
PERIOD OF RECORD.--May 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 183.60 ft below land-surface datum, November 3, 1993; lowest measured, 189.96 ft below land-surface datum, February 2, 1982.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	186.09	FEB 09	184.52	MAY 12	184.41	AUG 11	184.43

WATER YEAR 1999 HIGHEST 184.41 MAY 12, 1999 LOWEST 186.09 NOV 03, 1998

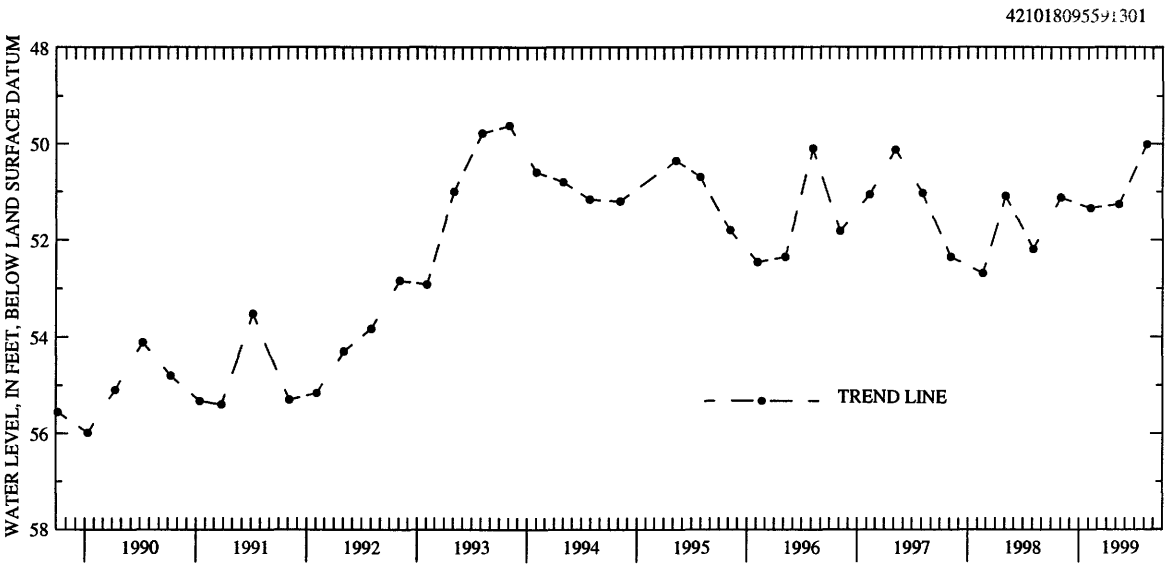
MONONA COUNTY--Continued

421018095591301. Local number, 85-44-17 DCAA.
LOCATION.--Lat 42°10'18", long 95°59'13", Hydrologic Unit 10230003, approximately 2.5 mi southwest of the Town of Rodney on the north side of County Road L-12. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Dakota: sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 135 ft, screened 115-125 ft, gravel-packed.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,110 ft above sea level, from topographic map. Measuring point: Top of casing, 2.70 ft above land-surface datum.
REMARKS.--Well WC-158.
PERIOD OF RECORD.--October 1982 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 49.62 ft below land-surface datum, November 3, 1993; lowest measured, 55.99 ft below land-surface datum, January 11, 1990.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	51.12	FEB 09	51.34	MAY 12	51.26	AUG 10	50.01

WATER YEAR 1999 HIGHEST 50.01 AUG 10, 1999 LOWEST 51.34 FEB 09, 1999



MONTGOMERY COUNTY

405841095012702. Local number, 71-36-06 DADA2.
LOCATION.--Lat 40°58'42", long 95°01'25", Hydrologic Unit 10240009, located east of dam at Viking Lake State Park, approximately 0.3 mi south of Iowa Highway 34 on the west side of road. Owner: Geological Survey Bureau, DNR, and U.S. Geological Survey.
AQUIFER.--Glacial drift of Pleistocene age.
WELL CHARACTERISTICS.--Drilled observation water-table well, diameter 2 in., depth 36 ft, screened 33-36 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by observer and U.S.G.S. personnel.
DATUM.--Elevation of land-surface datum is 1,080 ft above sea level, from topographic map. Measuring point: Top of casing, 2.28 ft above land-surface datum.
REMARKS.--Viking Lake No. 2 (6J2) well.
PERIOD OF RECORD.--June 1989 to present.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 11.51 ft below land-surface datum, September 9, 1989; lowest measured, 17.15 ft below land-surface datum, August 15, 1989.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 05	16.41	FEB 12	16.40	MAY 14	14.16

WATER YEAR 1999 HIGHEST 14.16 MAY 14, 1999 LOWEST 16.41 NOV 05, 1998

MONTGOMERY COUNTY--continued

410057095075101. Local number, 72-37-29 BABA.
LOCATION.--Lat 41°00'57", long 95°07'49", Hydrologic Unit 10240005, approximately 4.35 mi east of the City of Red Oak, just south of County Road H-34. Owner: John Ogden.
AQUIFER.--Glacial drift of Pleistocene age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 3 in., depth 40 ft, screened interval unavailable.
INSTRUMENTATION.--Intermittent measurement with chalked tape by USGS personnel. Shaft encoder and transmitting data collection platform (dcp) installed July, 1998.
DATUM.--Elevation of land-surface datum is 1,275 ft above sea level, from topographic map. Measuring point: Top of casing, 1.20 ft above land-surface datum.
PERIOD OF RECORD.--June 1937 to current year.
REVISION.--Measuring point revised May 10, 1990 to September 10, 1992.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 1.14 ft below land-surface datum, July 22, 1993; lowest measured, dry, July 8, 1963 and February 3, 1964.

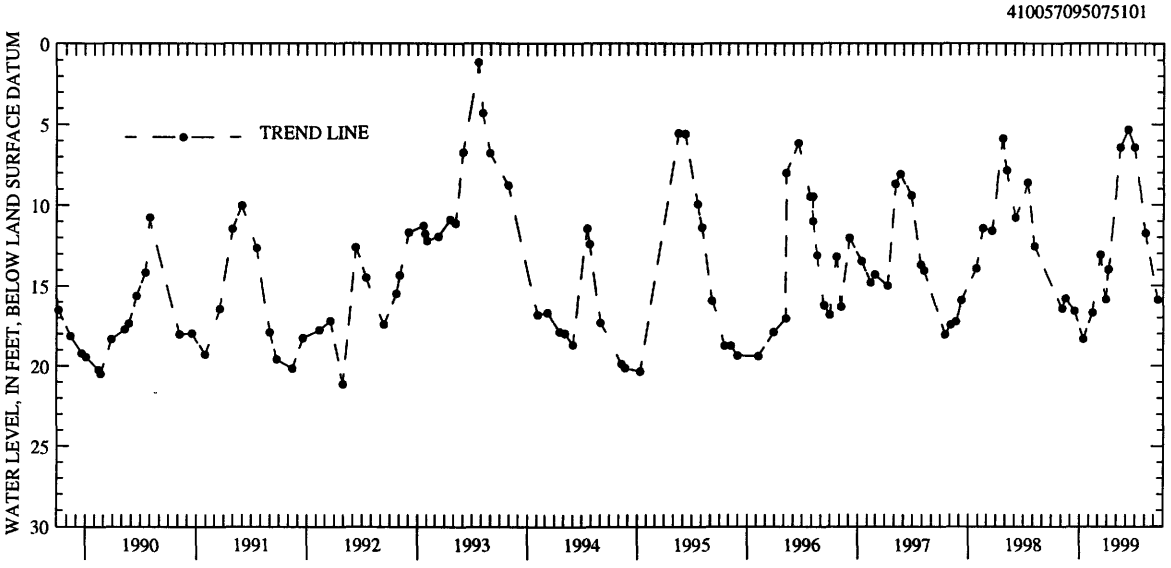
MEASURED WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 05	16.44	FEB 12	16.70	MAY 14	6.43	SEP 15	15.89
17	15.81	MAR 11	13.11	JUN 08	5.33		
DEC 15	16.60	29	15.86	29	6.43		
JAN 13	18.33	APR 06	13.99	AUG 04	11.73		

WATER YEAR 1999 HIGHEST 5.33 JUN 08, 1999 LOWEST 18.33 JAN 13, 1999

DEPTH BELOW LAND SURFACE (WATER LEVEL) (FEET), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	18.27	17.90	16.05	17.71	17.83	15.00	15.94	7.10	4.53	5.80	11.08	14.55
2	18.31	17.30	16.07	17.76	17.74	14.92	15.97	7.07	4.67	5.82	11.29	14.72
3	18.32	16.62	16.09	17.68	17.63	14.82	16.01	7.04	4.79	5.83	11.47	14.91
4	18.31	16.37	16.13	17.77	17.52	14.73	16.07	7.02	4.88	5.85	11.73	15.08
5	18.27	16.44	16.16	17.82	17.35	14.23	14.65	6.93	4.98	5.86	12.07	15.23
6	18.23	16.58	16.21	17.86	17.19	13.66	13.99	6.91	5.08	5.88	12.26	15.35
7	18.23	16.59	16.27	17.95	17.05	13.57	14.45	6.87	5.20	5.89	9.18	15.45
8	18.24	16.58	16.33	18.01	16.94	13.44	14.11	6.86	5.33	5.90	9.58	14.91
9	18.27	16.48	16.38	18.09	16.88	13.30	14.21	6.86	5.45	5.92	9.89	14.98
10	18.31	16.20	16.44	18.14	16.81	13.20	14.27	6.85	5.53	5.93	10.15	15.13
11	18.35	16.05	16.47	18.19	16.73	13.14	14.31	6.85	5.52	5.94	10.38	15.29
12	18.40	16.03	16.48	18.22	16.70	13.28	14.30	6.24	5.64	5.96	10.48	15.44
13	18.45	16.00	16.51	18.32	16.65	13.45	14.11	6.37	5.74	5.97	10.74	15.59
14	18.49	15.94	16.56	18.35	16.56	13.61	12.52	6.43	5.83	6.89	10.94	15.75
15	18.52	15.91	16.61	18.32	16.47	13.78	8.42	6.36	5.94	7.69	11.15	15.89
16	18.55	15.87	16.66	18.30	16.40	13.91	9.13	6.30	6.03	7.88	11.42	16.02
17	18.56	15.85	16.72	18.28	16.34	14.04	9.26	5.55	6.14	8.03	11.70	16.14
18	18.45	15.82	16.75	18.21	16.28	14.20	9.17	5.52	6.26	8.16	11.92	16.27
19	18.41	15.82	16.83	18.18	16.23	14.37	8.99	5.61	6.37	8.34	12.13	16.38
20	18.40	15.83	16.91	18.18	16.19	14.49	8.83	5.55	6.48	8.53	12.32	16.45
21	18.40	15.83	16.97	18.12	16.17	14.62	8.69	3.88	6.62	8.75	12.54	16.53
22	18.40	15.83	17.06	17.23	16.13	14.75	8.07	4.43	6.73	8.97	12.77	16.62
23	18.41	15.84	---	17.60	16.04	14.89	8.20	4.35	6.26	9.18	12.98	16.71
24	18.41	15.88	---	17.78	16.00	15.03	8.17	4.45	6.46	9.37	13.17	16.80
25	18.41	15.88	---	17.94	15.95	15.20	8.04	4.50	6.66	9.58	13.36	16.90
26	18.42	15.91	---	18.03	15.86	15.37	7.95	4.58	6.81	9.80	13.53	16.99
27	18.43	15.94	---	18.01	15.50	15.52	6.98	4.64	6.36	9.98	13.74	17.05
28	18.44	15.95	---	17.97	15.15	15.67	7.08	4.72	6.25	10.16	13.96	17.03
29	18.13	15.95	---	17.97	---	15.84	7.11	4.81	6.43	10.36	14.14	17.04
30	17.99	15.99	---	17.94	---	15.91	7.11	4.75	6.39	10.59	14.25	17.07
31	17.95	---	17.66	17.90	---	15.92	---	4.47	---	10.85	14.37	---
MEAN	18.35	16.17	---	17.99	16.58	14.45	11.20	5.80	5.85	7.73	11.96	15.94
MAX	18.56	17.90	---	18.35	17.83	15.92	16.07	7.10	6.81	10.85	14.37	17.00
MIN	17.95	15.82	---	17.23	15.15	13.14	6.98	3.88	4.53	5.80	9.18	14.55


410057095075101
WATER LEVEL, IN FEET, BELOW LAND SURFACE DATUM
0
5
10
15
20
25
30
TREND LINE
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999

MUSCATINE COUNTY

412120091080401. Local number, 76-02-30 CBAA1.
LOCATION.--Lat 41°21'20", long 91°08'04", Hydrologic Unit 07080101, west of the Town of Fruitland on an Iowa State University Agricultural Experiment Farm. Owner: U.S. Geological Survey.
AQUIFER.--Alluvial: Mississippi River sand and gravel of Holocene age.
WELL CHARACTERISTICS.--Drilled observation water-table well, diameter 6 in., depth 27 ft, screened 24-27 ft.
INSTRUMENTATION.--Intermittent measurement with chalked tape by USGS personnel. Graphic water-level recorder May 1966 to October 1987.
DATUM.--Elevation of land-surface datum is 546 ft above sea level, from topographic map. Measuring point: Top of casing, 3.40 ft above land-surface datum.
REMARKS.--Fruitland/30M4 well.
PERIOD OF RECORD.--May 1966 to current year.
REVISED RECORDS.--WDR IA-84-1.
EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 7.15 ft below land-surface datum, September 7, 1993; lowest measured, 17.86 ft below land-surface datum, August 2, 1989.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	14.59	FEB 09	15.16	MAY 04	14.59	AUG 06	15.5

WATER YEAR 1999 HIGHEST 14.59 NOV 03, 1998 MAY 04, 1999 LOWEST 15.5 AUG 06, 1999

412120091080402. Local number, 76-02-30 CBAA.
LOCATION.--Lat 41°21'20", long 91°08'04", Hydrologic Unit 07080101, west of the Town of Fruitland on an Iowa State University Agricultural Experiment Farm. Owner: U.S. Geological Survey.
AQUIFER.--Silurian-Devonian: limestone of Silurian and Devonian age.
WELL CHARACTERISTICS.--Drilled observation water-table well, diameter 2 in., depth 189 ft, screened 169-189 ft.
INSTRUMENTATION.--Intermittent measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 546 ft above sea level, from topographic map. Measuring point: Top of casing, 3.01 ft above land-surface datum.
REMARKS.--Fruitland 13B well.
PERIOD OF RECORD.--October 1992 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 7.12 ft below land-surface datum, August 24, 1993; lowest measured, 16.73 ft below land-surface datum, February 22, 1996.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	14.56	FEB 09	15.15	MAY 04	14.62	AUG 06	15.41

WATER YEAR 1999 HIGHEST 14.56 NOV 03, 1998 LOWEST 15.41 AUG 06, 1999

MUSCATINE COUNTY--Continued

412120091080403. Local number, 76-02-30 CBAA.
LOCATION.--Lat 41°21'20", long 91°08'04", Hydrologic Unit 07080101, west of the Town of Fruitland on an Iowa State University Agricultural Experiment Farm. Owner: U.S. Geological Survey.
AQUIFER.--Alluvial: Mississippi River sand and gravel of Quarternary age.
WELL CHARACTERISTICS.--Drilled observation water-table well, diameter 2 in., depth 100 ft, screened 90-100 ft.
INSTRUMENTATION.--Intermittent measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 546 ft above sea level, from topographic map. Measuring point: Top of casing, 3.13 ft above land-surface datum.
REMARKS.--Fruitland 13C well.
PERIOD OF RECORD.--October 1992 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 7.20 ft below land-surface datum, September 10, 1993; lowest measured, 16.84 ft below land-surface datum, February 22, 1996.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	13.97	FEB 09	15.22	MAY 04	14.64	AUG 06	15.57

WATER YEAR 1999 HIGHEST 13.97 NOV 03, 1998 LOWEST 15.57 AUG 06, 1999

412740090503201. Local number, 77-01-22 BCBC.
LOCATION.--Lat 41°27'40", long 90°50'53", Hydrologic Unit 07080101, located in basement of house along State Highway 22. Owner: Ed Albers.
AQUIFER.--Silurian-Niagran Series
WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in., depth 412 ft, cased to 194.6 ft, open 194.6-412 ft.
INSTRUMENTATION.--Monthly measurements using airline by USGS personnel.
DATUM.--Elevation of land-surface is 645 ft above sea level, by topographic map. Measuring Point: 5.79 ft below land surface datum.
REMARKS.--Albers Farm well.
PERIOD OF RECORD.--May 1997 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 104.79 ft. below land-surface datum, January 06, 1998; lowest measured, 160.79 ft below land-surface datum, September 01, 1998

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 06	116.79	FEB 02	112.79	MAY 04	114.79	AUG 03	125.79
NOV 03	114.79	MAR 02	115.79	JUN 15	114.79	SEP 09	111.79
DEC 01	115.79	APR 06	114.79	JUL 06	115.79		

WATER YEAR 1999 HIGHEST 111.79 SEP 09, 1999 LOWEST 125.79 AUG 03, 1999

412833090482001, Local number, 77-01-14 ADAD.
LOCATION.--Lat 41°28'33". long 90°48'20", Hydrologic Unit 07080101, located I mile north of State Highway 22 on County Road Y36, between driveways at 1824 Zachary Ave. Owner: Everett Nitzel.
AQUIFER.--Devonian/Silurian
WELL CHARACTERISTICS.--Drilled public-use well, depth 400 ft., casing information not available.
INSTRUMENTATION.--Quarterly measurements using airline by USGS personnel.
DATUM.--Elevation of land-surface datum is 700 feet above sea level, from topographic map.
REMARKS.--E. Nitzel Well.
PERIOD OF RECORD.--May 1997 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 235 ft. below land-surface datum, July 01, 1997; lowest measured, 269 ft below land-surface datum, July 06, 1999, August 03, 1999.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 06	259	JAN 12	253	APR 06	255	JUL 06	269
NOV 03	256	FEB 02	256	MAY 04	257	AUG 03	269
DEC 01	254	MAR 02	257	JUN 15	265	SEP 09	265

WATER YEAR 1999 HIGHEST 253 JAN 12, 1999 LOWEST 269 JUL 06, 1999 AUG 03, 1999

MUSCATINE COUNTY--Continued

412952090501101. Local number, 77-01-03 CDBD.
LOCATION.--Lat 41°29'52", long 90°05'11", Hydrologic Unit 07080101, located in side yard of house at 3714 165th Street in the town of Blue Grass. Owner: Don Massey.
AQUIFER.--Devonian/Silurian
WELL CHARACTERISTICS.--Drilled public-use well, diameter 5 in., depth 372 ft., casing information not available.
INSTRUMENTATION.--Monthly measurements with airline by USGS personnel.
DATUM.--Elevation of land-surface datum is 720 ft above sea level, from topographic map.
REMARKS.--Massey Well
PERIOD OF RECORD.--June 1997 to current year.
EXTREMES FOR PERIOD OF RECORD. --Highest water level measured, 134 ft below land-surface datum, June 10, 1997; lowest measured 161, August 03, 1999.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 06	159	JAN 12	158	APR 06	153	JUL 06	157
NOV 03	159	FEB 02	151	MAY 04	152	AUG 03	161
DEC 01	151	MAR 02	152	JUN 15	158	SEP 09	152

WATER YEAR 1999 HIGHEST 151 DEC 01, 1998 FEB 02, 1999 LOWEST 161 AUG 03, 1999

413520091013701. Local number, 78-02-01 ACCD.
LOCATION.--Lat 41°35'18", long 91°01'37", Hydrologic Unit 07080206, located approximately one block east of water treatment plant. Owner: City of Wilton Junction.
AQUIFER.--Silurian
WELL CHARACTERISTICS.--Drilled public-supply well, diameter 8 in., depth 450 ft., steel casing to 315 ft., open hole from 315-450 ft.
INSTRUMENTATION.--Quarterly measurements with airline by USGS personnel.
DATUM.--Elevation of land-surface datum is 692 ft above sea level, from topographic map.
REMARKS.--Wilton No.1
PERIOD OF RECORD.--March 1968 to current year.
EXTREMES FOR PERIOD OF RECORD. --Highest water level measured, 33 ft below land-surface datum, March 14, 1968; lowest measured 63, August 19, 1998.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 17	50	FEB 18	41	AUG 10	47

WATER YEAR 1999 HIGHEST 41 FEB 18, 1999 LOWEST 50 NOV 17, 1998

O'BRIEN COUNTY

425610095250611. Local number, 94-39-26 BADB11.
LOCATION.--Lat 42°56'10", long 95°25'06", Hydrologic Unit 10230003, near a dead-end road just south of the Little Sioux River, 0.9 mi north of Iowa Highway 10, approximately 5 mi southeast of the Town of Sutherland. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Dakota: sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2.5 in, depth 352 ft, screened 291-295 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,212 ft above sea level, from topographic map. Measuring point: Top of casing, 2.30 ft above land-surface datum.
REMARKS.--Well D-3.
PERIOD OF RECORD.--April 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 34.94 ft below land-surface datum, May 09, 1995; lowest measured, 36.85 ft below land-surface datum, December 15, 1980.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	36.66	FEB 09	36.39	MAY 05	35.71	AUG 04	36.42

WATER YEAR 1999 HIGHEST 35.71 MAY 05, 1999 LOWEST 36.66 NOV 04, 1998

430930095350401. Local number, 96-40-05 DDDA1.
LOCATION.--Lat 43°09'30", long 95°35'04", Hydrologic Unit 10230003, approximately 3 mi east of the Town of Sanborn and 2 mi south of U.S. Highway 18. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Ordovician and Dakota: sandy shale of Ordovician age and sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 701 ft, screened 661-701 ft. Dakota 487-688 ft, Ordovician 688-701 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,560 ft above sea level, from topographic map. Measuring point: Top of casing, 4.00 ft above land-surface datum.
REMARKS.--Well D-41.
PERIOD OF RECORD.--June 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 358.39 ft below land-surface datum, July 8, 1986; lowest measured, 364.74 ft below land-surface datum, November 7, 1991.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	361.59	FEB 10	361.10	MAY 11	361	AUG 10	361.43

WATER YEAR 1999 HIGHEST 361 MAY 11, 1999 LOWEST 361.59 NOV 02, 1998

OSCEOLA COUNTY

431613095251801. Local number, 98-39-26 CDCC.
LOCATION.--Lat 43°16'13", long 95°25'18", Hydrologic Unit 10230003, 3.5 mi south and 2.5 mi east of the Village of May City. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Dakota: sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 500 ft, screened 490-500 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape or electric line by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,398 ft above sea level, from topographic map. Measuring point: Top of casing, 2.70 ft above land-surface datum.
REMARKS.--Well D-39.
PERIOD OF RECORD.--June 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 189.99 ft below land-surface datum, June 17, 1980; lowest measured, 196.85 ft (nearby well pumping) below land-surface datum, September 6, 1984.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	192.92	FEB 09	192.56	MAY 05	192.19	AUG 03	196.54

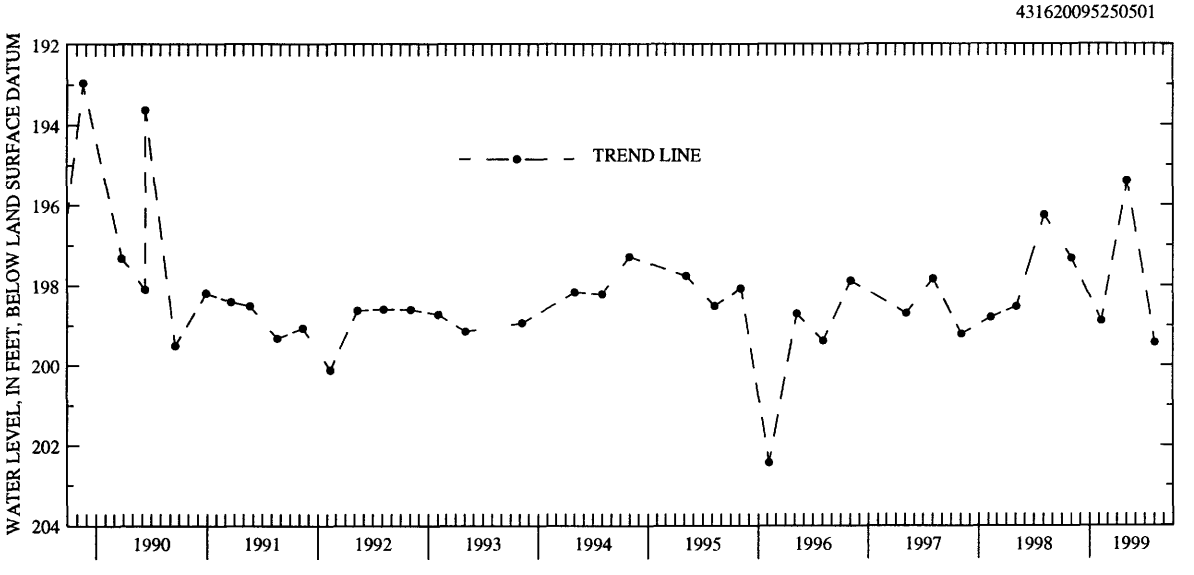
WATER YEAR 1999 HIGHEST 192.19 MAY 05, 1999 LOWEST 196.54 AUG 03, 1999

431620095250501. Local number, 98-39-26 CDAD1.
LOCATION.--Lat 43°16'20", long 95°25'05", Hydrologic Unit 10230003, 3.5 mi south and 2.5 mi east of the Village of May City. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Cambrian-Ordovician: St. Peter sandstone of Middle Ordovician age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 662 ft, screened 622-662 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape or electric line by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,402 ft above sea level, from topographic map. Measuring point: Top of low pipe, 1.47 ft above land-surface datum.
REMARKS.--Well D-38, Deep Hibbing; in same borehole as well D-38 Shallow Hibbing.
PERIOD OF RECORD.--June 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 192.96 ft below land-surface datum, November 20, 1989; lowest measured, 202.43 ft below land-surface datum, February 07, 1996.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	197.32	FEB 09	198.88	MAY 05	195.40	AUG 03	199.43

WATER YEAR 1999 HIGHEST 195.40 MAY 05, 1999 LOWEST 199.43 AUG 03, 1999



OSCEOLA COUNTY--Continued

431620095250511. Local number, 98-39-26 CDAD11.
LOCATION.--Lat 43°16'20", long 95°25'05", Hydrologic Unit 10230003, 3.5 mi south and 2.5 mi east of the Village of May City. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Dakota: sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 345 ft, screened 335-345 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape or electric line by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,402 ft above sea level, from topographic map. Measuring point: Top of high pipe, 2.60 ft above land-surface datum.
REMARKS.--Well D-38, Shallow Hibbing; in same borehole as well D-38 Deep Hibbing.
PERIOD OF RECORD.--June 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 192.20 ft below land-surface datum, September 10, 1981; lowest measured, 197.03 ft below land-surface datum, May 05, 1999.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	195.38	FEB 09	195.14	MAY 05	197.03	AUG 03	195.30

WATER YEAR 1999 HIGHEST 195.14 FEB 09, 1999 LOWEST 197.03 MAY 05, 1999

432828095283611. Local number, 100-39-17 DCCB11.
LOCATION.--Lat 43°28'28", long 95°28'36", Hydrologic Unit 10230003, approximately 2 mi west and 2 mi north of the Town of Harris, east of County Road M-12. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Dakota: sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 5 in. to 461 ft, 4 in. 440-760 ft, depth 760 ft, screened 680-700 ft.
INSTRUMENTATION.--Quarterly measurement with electric line or chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,560 ft above sea level, from topographic map. Measuring point: Top of casing, 3.00 ft above land-surface datum.
REMARKS.--Well D-13.
PERIOD OF RECORD.--July 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 341.80 ft below land-surface datum, August 5, 1980; lowest measured, 350.68 ft below land-surface datum, November 05, 1997.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	345.39	FEB 09	345.14	MAY 05	344.64	AUG 03	345.37

WATER YEAR 1999 HIGHEST 344.64 MAY 05, 1999 LOWEST 345.39 NOV 04, 1998

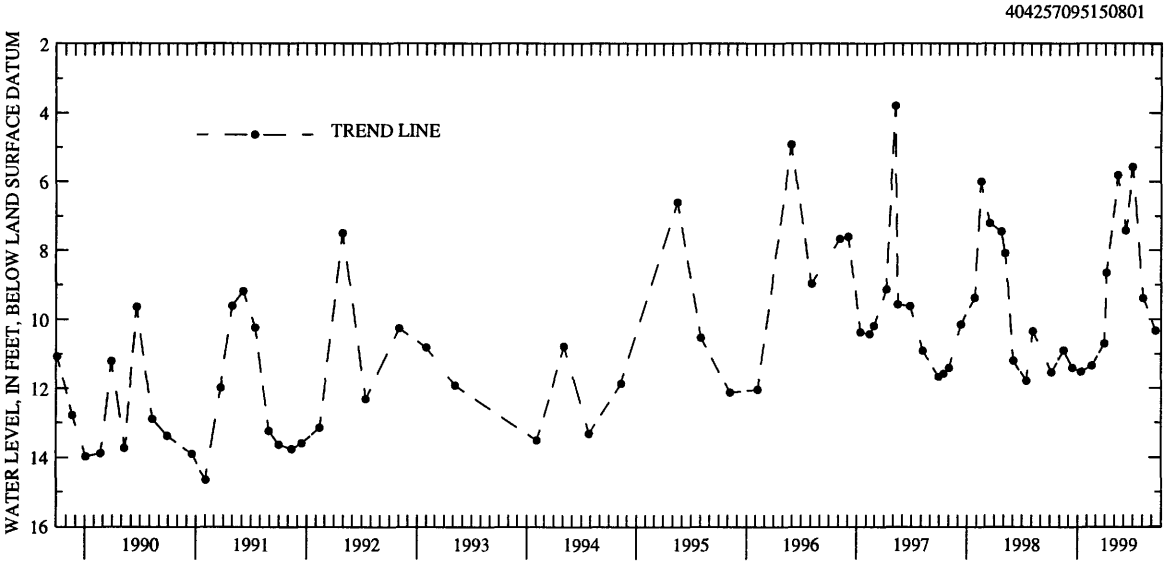
PAGE COUNTY

404257095150801. Local number, 68-38-07 CCAA.
LOCATION.--Lat 40°42'57", long 95°15'08", Hydrologic Unit 10240005, approximately 2 mi south of the Village of Norwich and 1.5 mi west of County Road M-48. Owner: William Brayman.
AQUIFER.--Glacial drift of Pleistocene age.
WELL CHARACTERISTICS.--Drilled unused water-table well, diameter 12 in., depth 44 ft, lined with tile.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,087 ft above sea level, from topographic map. Measuring point: Top of well, 1.20 ft below original land-surface datum.
REMARKS.--Braymen Farm Well. Terracing of the farm land surrounding well has lowered the land surface below the original measuring point.
PERIOD OF RECORD.--January 1938 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 2.09 ft below land-surface datum, March 26, 1946; lowest measured, 22.76 ft below land-surface datum, June 23, 1947.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 07	11.54	JAN 13	11.52	APR 06	8.66	JUL 01	5.58
NOV 16	10.90	FEB 17	11.34	MAY 14	5.81	AUG 04	9.39
DEC 15	11.41	MAR 30	10.70	JUN 08	7.42	SEP 14	10.33

WATER YEAR 1999 HIGHEST 5.58 JUL 01, 1999 LOWEST 11.54 OCT 07, 1998



PLYMOUTH COUNTY

424833096324701. Local number, 92-48-06 DDDA.
LOCATION.--Lat 42°48'33", long 96°32'47", Hydrologic Unit 10170203, just south of the curve on Iowa Highway 3, 1 mi south of the Town of Akron. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Dakota: in sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 4 in. to 184 ft, 2 in. to 581 ft, depth 581 ft, screened 430-434 ft and 510-515 ft. Paleozoic rock 576-581 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel,.
DATUM.--Elevation of land-surface datum is 1,282 ft above sea level, from topographic map. Measuring point: Top of casing, 4.50 ft above land-surface datum.
REMARKS.--Well D-35.
PERIOD OF RECORD.--December 1979 to December 1980, May 1982 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 135.73 ft below land-surface datum, February 10, 1999; lowest measured, 159.82 ft below land-surface datum, August 6, 1980.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	137.17	FEB 10	135.73	MAY 11	136.52	AUG 10	136.42

WATER YEAR 1999 HIGHEST 135.73 FEB 10, 1999 LOWEST 137.17 NOV 02, 1998

PLYMOUTH COUNTY--Continued

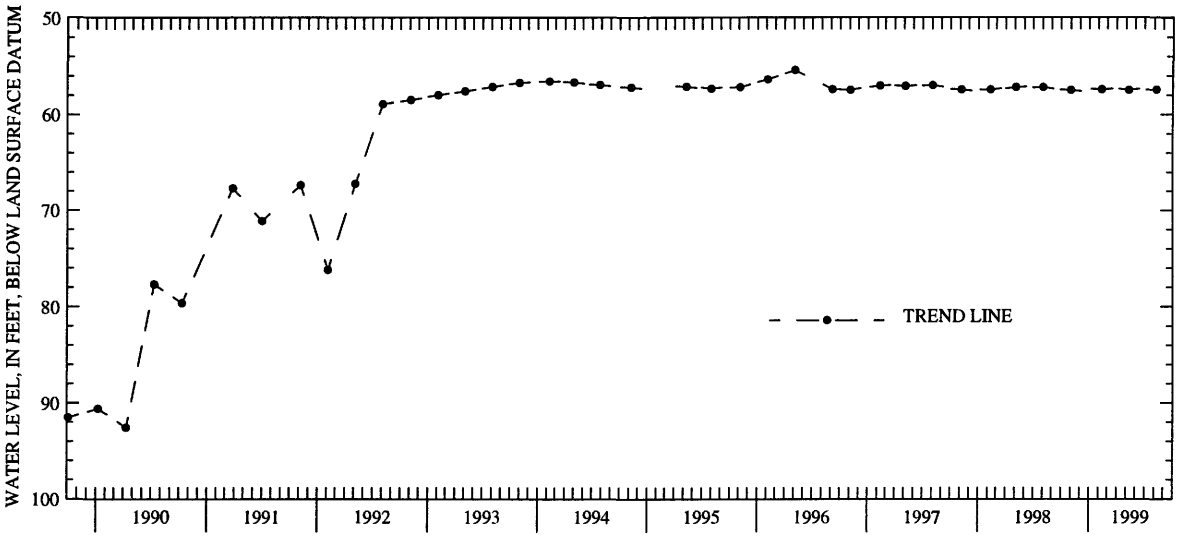
424850096074801. Local number, 92-45-02 CBCB.
LOCATION.--Lat 42°48'50", long 96°07'48", Hydrologic Unit 10230002, approximately 3.8 mi west and 0.6 mi south of the Village of Oyens. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Cambrian-Ordovician: dolomite of Cambrian and Ordovician age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 5 in. to 161 ft, 4 in. to 598 ft, 2 in. to 1,340 ft, depth 1,340 ft, cased to 598 ft, open hole 598-1,340 ft. Well deepened from 1,089 ft to 1,340 ft in May, 1984. Ordovician rock 568-782 ft, Cambrian rock 782-1062 ft, Precambrian 1062-1340 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,245 ft above sea level, from topographic map. Measuring point: Top of casing, 2.80 ft above land-surface datum.
REMARKS.--Well D-21.
PERIOD OF RECORD.--May 1979 to January 1981, May 1982 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 55.40 ft below land-surface datum, May 06, 1996; Lowest measured, 102.10 ft below land-surface datum, August 6, 1980.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	57.48	FEB 10	57.37	MAY 11	57.46	AUG 09	57.43

WATER YEAR 1999 HIGHEST 57.37 FEB 10, 1999 LOWEST 57.48 NOV 02, 1998

424850096074801



425249096125001. Local number, 93-46-12 DDDD.
LOCATION.--Lat 42°52'49", long 96°12'50", Hydrologic Unit 10230002, 1 mi west and 1 mi south of the Village of Struble. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Dakota: sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2.5 in., depth 570 ft, screened 356-360 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,280 ft above sea level, from topographic map. Measuring point: Top of coupling, 2.25 ft above land-surface datum.
REMARKS.--Well D-2.
PERIOD OF RECORD.--March 1980 to December 1980, May 1982 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 117.78 ft below land-surface datum, April 9, 1980; lowest measured, 124.71 ft below land-surface datum, November 02, 1998.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	124.71	FEB 10	122.12	MAY 11	121.67	AUG 10	124.67

WATER YEAR 1999 HIGHEST 121.67 MAY 11, 1999 LOWEST 124.71 NOV 02, 1998

POTTAWATTAMIE COUNTY

411359095171901. Local number, 74-39-01 CCCC.
LOCATION.--Lat 41°13'59", long 95°17'19", Hydrologic Unit 10240002, approximately 6.5 mi east of the Town of Carson, on the northeast corner of the junction of Iowa Highway 92 and County Road M-41. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Buried channel: sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled observation well, diameter 2 in., depth 216 ft, screened 189-206 ft, gravel-packed, open to Pennsylvanian shale 207-216 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,245 ft above sea level, from topographic map. Measuring point: Top of casing, 2.50 ft above land-surface datum.
REMARKS.--Well SW-21.
PERIOD OF RECORD.--July 1986 to current year.
REVISION.--Lowest water level measured, 129.38 ft below land-surface datum, August 20, 1986.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 123.19 ft below land-surface datum, August 11, 1999; lowest measured, 129.38 ft below land-surface datum, August 20, 1986.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 05	123.68	FEB 12	123.71	MAY 14	123.69	AUG 11	123.19

WATER YEAR 1999 HIGHEST 123.19 AUG 11, 1999 LOWEST 123.71 FEB 12, 1999

412407095391201. Local number, 76-42-10 ADBC.
LOCATION.--Lat 41°24'01", long 95°39'17", Hydrologic Unit 10230006, approximately 1 mi east of the Town of Underwood, behind structure at reststop on eastbound Interstate 80. Owner: Iowa Highway Commission
AQUIFER.-- Cambrian: sandstone and dolomite. from the Jordan and Prairie du Chen formations.
WELL CHARACTERISTICS.-- Drilled public use well, diameter 16 in., depth 2520 ft, screened 2420-2460 ft, gravel packed.
INSTRUMENTATION.-- Quarterly measurement with chalked tape by USGS personnel.
DATUM.-- Elevation of land-surface datum is 1,093 ft above sea level, from topographic map. Measuring point: Top of casing, 1.72 ft above land-surface datum.
REMARKS.-- Underwood Well
PERIOD OF RECORD.-- October 1996 to current year.
EXTREMES FOR PERIOD OF RECORD.-- Highest water level measured, 72.86 ft below land surface datum, August 06, 1998; lowest measured, 74.18 ft below land surface datum, October 28, 1996.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 06	73.08	MAR 25	73.14	AUG 13	72.25

WATER YEAR 1999 HIGHEST 72.25 AUG 13, 1999 LOWEST 73.14 MAR 25, 1999

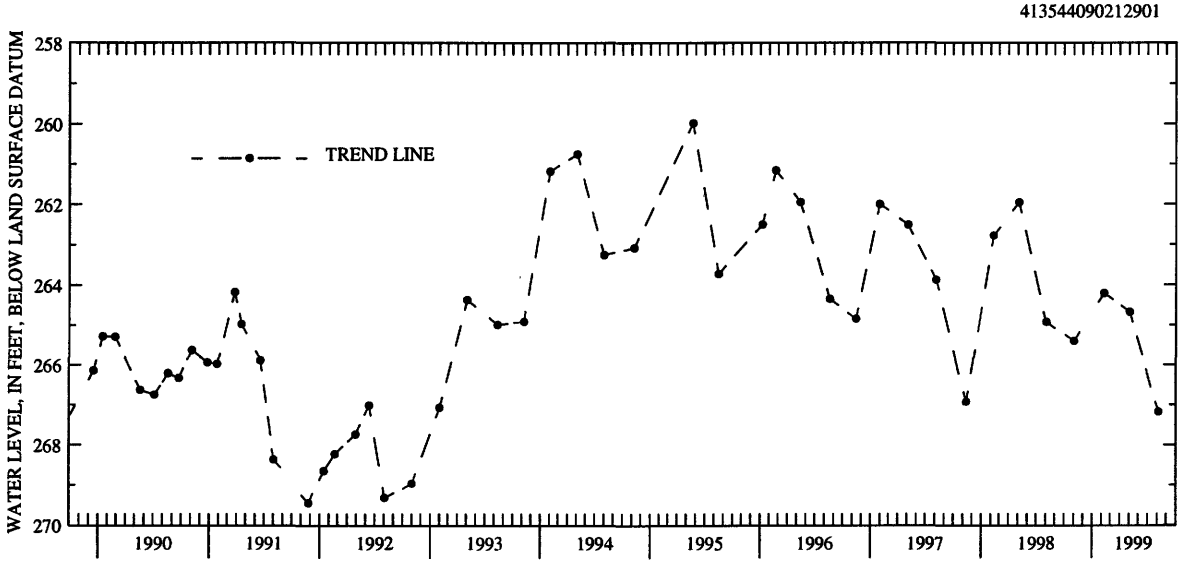
SCOTT COUNTY

413544090212901. Local number, 78-5E-03 AADA.
LOCATION.--Lat 41°35'44", long 91°21'29", Hydrologic Unit 07080101, at the Bridgeview Elementary School corner of 12th and Davenport Streets, Le Claire. Owner: City of Le Claire.
AQUIFER.--Cambrian-Ordovician: sandstone of Late Cambrian and sandstone and sandy dolomite of Early Ordovician age.
WELL CHARACTERISTICS.--Drilled unused municipal artesian water well, diameter 16 to 10 in., depth 1,607 ft, cased to 1,300 ft, open hole 1,300-1,607 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel. Graphic water-level recorder July 1975 to December 1984.
DATUM.--Elevation of land-surface datum is 703 ft above sea level, from topographic map. Measuring point: Nipple on plate welded to casing, 2.11 ft above land-surface datum.
REMARKS.--Le Claire Well No. 3.
PERIOD OF RECORD.--July 1975 to current year.
REVISED RECORDS.--WRD IA-84-1, WDR IA-88-1.
EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 247.46 ft below land-surface datum, July 8, 1975; lowest recorded, 276.86 ft below land-surface datum, September 1, 1978.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	265.40	FEB 09	264.21	MAY 04	264.68	AUG 06	267.18

WATER YEAR 1999 HIGHEST 264.21 FEB 09, 1999 LOWEST 267.18 AUG 06, 1999



SHELBY COUNTY

413255095070401. Local number, 78-37-17 DDDD.
LOCATION.--Lat 41°32'55", long 95°07'04", Hydrologic Unit 10240003, 3 mi south and 3 mi west of the Town of Elkhorn on the east side of County Road M-56 near Elkhorn Creek. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Dakota and Pennsylvanian: sandstone of Cretaceous age and shale and limestone of Pennsylvanian age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 181 ft, screened 121-179 ft, gravel-packed, open to Dakota 121-140 ft, Pennsylvanian 140-181 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,208 ft above sea level, from topographic map. Measuring point: Top of casing, 2.80 ft above land-surface datum.
REMARKS.--Well WC-16.
PERIOD OF RECORD.--August 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 36.60 ft below land-surface datum, August 11, 1993; lowest measured, 42.86 ft below land-surface datum, September 24, 1981.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	40.74	FEB 12	41.54	MAY 14	39.06	AUG 09	39.35

WATER YEAR 1999 HIGHEST 39.06 MAY 14, 1999 LOWEST 41.54 FEB 12, 1999

413359095182701. Local number, 78-39-11 CCBC.
LOCATION.--Lat 41°33'59", long 95°18'27", Hydrologic Unit 10240002, approximately 5.5 mi south of the City of Harlan, 0.75 mi south of County Road F-58, and 1.5 mi east of U.S. Highway 59. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Fremont buried channel: sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 541 ft, screened 520-535 ft, gravel-packed. Pennsylvanian shale 537-541 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,310 ft above sea level, from topographic map. Measuring point: Top of casing, 1.65 ft above land-surface datum.
REMARKS.--Well WC-227.
PERIOD OF RECORD.--July 1983 to current year.
REVISION.--Lowest water level measured, 153.32 below land-surface datum, April 12, 1990.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 146.61 ft below land-surface datum, September 6, 1983; lowest measured, 153.32 ft below land-surface datum, April 12, 1990.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	151.12	FEB 12	151.15	MAY 14	150.85	AUG 09	151.18

WATER YEAR 1999 HIGHEST 150.85 MAY 14, 1999 LOWEST 151.18 AUG 09, 1999

SHELBY COUNTY--Continued

413953095302601. Local number, 79-40-09 DBCA.
LOCATION.--Lat 41°39'53", long 95°30'26", Hydrologic Unit 10230006, east of State Highway 191, approximately 1 mi northeast of the Town of Portsmouth. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Glacial drift of Pleistocene age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 210 ft, screened 160-175 ft, gravel packed, open hole 200-210 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,205 ft above sea level, from topographic map. Measuring point: Top of casing, 4.10 ft above land-surface datum.
REMARKS.--Well WC-15.
PERIOD OF RECORD.--August 1992 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 18.29 feet below land-surface datum, May 9, 1995; lowest measured, 19.38 ft below land-surface datum, November 04, 1998.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	19.38	FEB 11	19.34	MAY 10	18.95	AUG 11	19.33

WATER YEAR 1999 HIGHEST 18.95 MAY 10, 1999 LOWEST 19.38 NOV 04, 1998

414624095252301. Local number, 80-39-06 AADC.
LOCATION.--Lat 41°46'24", long 95°25'22", Hydrologic Unit 10230006, west of the Town of Earling on the north side of Iowa Highway 37 near the junction of Iowa Highways 37 and 191. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Dakota: sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 370 ft, screened 332-347 ft, open to Pennsylvanian sandstone, shale, and limestone 347-370 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,305 ft above sea level, from topographic map. Measuring point: Top of casing, 2.60 ft above land-surface datum.
REMARKS.--Well WC-10.
PERIOD OF RECORD.--June 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 89.91 ft below land-surface datum, April 10, 1984; lowest measured, 131.70 ft below land-surface datum, April 12, 1990.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	107.39	FEB 11	106.83	MAY 10	106.94	AUG 11	106.84

WATER YEAR 1999 HIGHEST 106.83 FEB 11, 1999 LOWEST 107.39 NOV 04, 1998

414856095160101. Local number, 81-38-21 ADAD
LOCATION.--Lat 41°48'56", long 95°16'01", Hydrologic Unit 10240002, approximately 3.75 mi east of the Town of Defiance on the west side of County Road M-36. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Fremont buried channel: sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 535 ft, screened 525-535 ft, gravel-packed. Open to Pennsylvanian shale 530-535 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,370 ft above sea level, from topographic map. Measuring point: Top of casing, 2.90 ft above land-surface datum.
REMARKS.--Well WC-222.
PERIOD OF RECORD.--August 1983 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 208.09 ft below land-surface datum, April 15, 1987; lowest measured, 212.97 ft below land-surface datum, October 11, 1990.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	210.19	FEB 11	210.20	MAY 10	209.95	AUG 09	210.37

WATER YEAR 1999 HIGHEST 209.95 MAY 10, 1999 LOWEST 210.37 AUG 09, 1999

SIOUX COUNTY

430140095573101. Local number, 95-43-07 AAAA.
LOCATION.--Lat 43°04'10", long 95°57'32", Hydrologic Unit 10230002, just south of County Road B-40, 1 mi east of the Village of Newkirk. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Dakota: sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 681 ft, screened 641-681 ft. Open to Paleozoic rock from 674-681 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,390 ft above sea level, from topographic map. Measuring point: Top of casing, 3.70 ft above land-surface datum.
REMARKS.--Well D-43.
PERIOD OF RECORD.--July 1980 to December 1980, May 1982 to current year.
REVISED RECORDS.--WDR IA-88-1.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 213.66 ft below land-surface datum, March 13, 1984; lowest measured, 219.57 ft below land-surface datum, February 5, 1996.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	216.73	FEB 10	218.17	MAY 11	218.02	AUG 10	218.48

WATER YEAR 1999 HIGHEST 216.73 NOV 02, 1998 LOWEST 218.48 AUG 10, 1999

430913096033201. Local number, 96-44-08 ADAA.
LOCATION.--Lat 43°09'13", long 96°03'32", Hydrologic Unit 10230002, west side of County Road K-64, approximately 2.5 mi west of the Town of Boyden and approximately 2.2 mi south of U.S. Highway 18. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Dakota: sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 682 ft, screened 647-667 ft. Open to Paleozoic rock 681-682 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,373 ft above sea level, from topographic map. Measuring point: Top of casing, 3.70 ft above land-surface datum.
REMARKS.--Well D-44.
PERIOD OF RECORD.--August 1980 to December 1980, May 1982 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 187.85 ft below land-surface datum, October 16, 1984; lowest measured, 196.30 ft below land-surface datum, November 7, 1991.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	195.96	FEB 10	195.61	MAY 11	195.46	AUG 10	196.03

WATER YEAR 1999 HIGHEST 195.46 MAY 11, 1999 LOWEST 196.03 AUG 10, 1999

STORY COUNTY

420129093273701. Local Number, 83-22-06 CDBD.
LOCATION.-- Lat 42°01'30", long 93°27'33", Hydrologic Unit 07080105, approximately one mile north of Highway 30 near 1st and N Ave. Owner: City of Nevada.
AQUIFER.--Cambrian/Ordovician.
WEL CHARACTERISTICS.--Drilled observation public supply well, diameter 16 in, depth 2630 ft, open hole 2015-2630 ft.
INSTRUMENTATION.--Quarterly measurement using airline by USGS personnel.
DATUM.--Elevation of land-surface datum is 991 ft above sea level, from topographic map.
REMARKS.--Nevada Well No. 4
PERIOD OF RECORD.--February 1997 to current year
EXTREMES FOR PERIOD OF RECORD.-- Highest water level measured, 295 ft below land-surface datum, February 08, 1999 and August 4, 1997; lowest measured, 373 ft below land surface datum, February 11, 1997.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	342	FEB 08	295	MAY 03	330	AUG 02	310

WATER YEAR 1999 HIGHEST 295 FEB 08, 1999 LOWEST 342 NOV 02, 1998

STORY COUNTY-Continued

420137093361501. Local number, 83-24-02 DABC.
LOCATION.--Lat 42°01'32", long 93°36'32", Hydrologic Unit 07080105, in Ames, north of the Chicago and Northwestern Railroad and County Road E-41, approximately 0.75 mi east of U.S. Highway 69. Owner: City of Ames.
AQUIFER.--Glacial drift of Pleistocene age.
WELL CHARACTERISTICS.--Drilled municipal well, depth 124 ft, casing information unavailable.
INSTRUMENTATION.--Quarterly measurement with chalked tape or electric line by USGS personnel.
DATUM.--Elevation of land-surface datum is 926 ft above sea level, from topographic map. Measuring point: Top of casing, 0.82 ft above land-surface datum.
REMARKS.--Ames city well No. 4.
PERIOD OF RECORD.--September 1987 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 49.98 ft below land-surface datum, March 14, 1991; lowest measured, 75.97 ft below land-surface datum, November 2, 1995.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	73.90	FEB 08	62.93	AUG 02	58.71

WATER YEAR 1999 HIGHEST 58.71 AUG 02, 1999 LOWEST 73.90 NOV 02, 1998

TAMA COUNTY

420957092181801. Local number, 85-13-24 ABAC.
LOCATION.--Lat 42°09'57", long 92°18'21", Hydrologic Unit 07080208, located on county road 0.5 mi east of the Town of Dysart on county road, 1 mi south of State Highway 8. Owner: Town of Dysart.
AQUIFER.--Cambrian/ Ordovician-Prairie Du Chien Formation dolomite
WELL CHARCTERISTICS.--Drilled observation well, diameter 20 in., depth 1880 ft., casing open from 1300-1880.
INSTRUMENTATION.--Quarterly measurements using an airline by USGS personnel.
DATUM.--Elevation of land-surface datum is 961 ft above sea level, from topographic map.
REMARKS.--Dysart Park well.
PERIOD OF RECORD-January 1997 to current year
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 350 feet below land-surface datum, August 4, 1997; lowest measured, 367 ft below land-surface datum, November 02, 1998.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	367	FEB 10	328	MAY 03	327

WATER YEAR 1999 HIGHEST 327 MAY 03, 1999 LOWEST 367 NOV 02, 1998

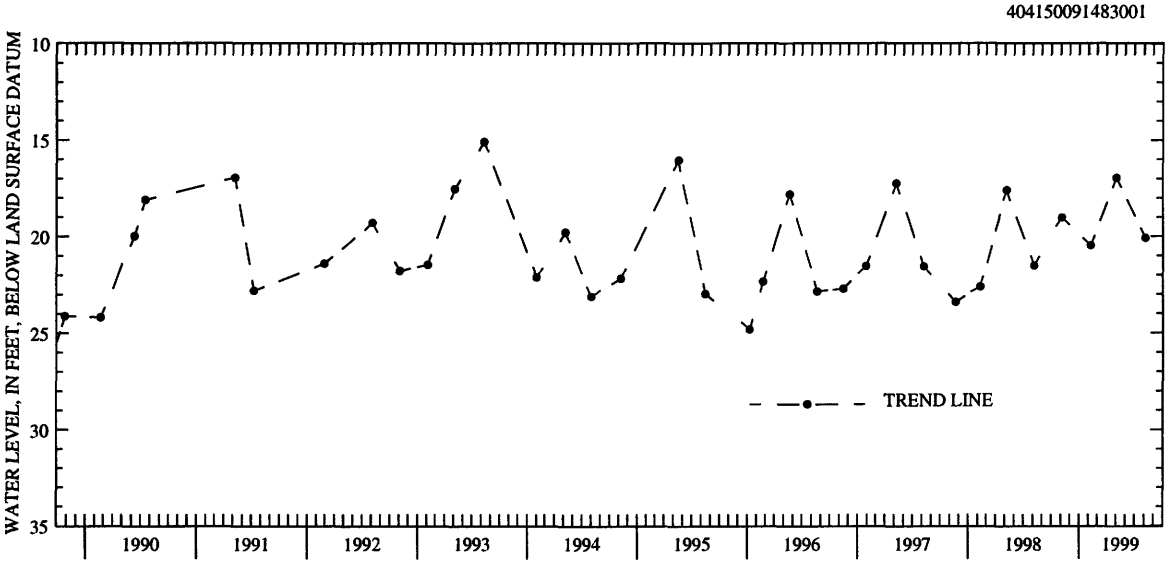
VAN BUREN COUNTY

404150091483001. Local number, 68-08-08 CDD.
LOCATION.--Lat 40°41'50", long 91°48'30", Hydrologic Unit 07100009, located at the west end of the park in the City of Bonaparte, south of County Road J-40. Owner: City of Bonaparte.
AQUIFER.--Mississippian: limestone and dolomite of Mississippian age.
WELL CHARACTERISTICS.--Drilled unused semi-confined public-supply well, diameter 6 in., depth 205 ft, cased to 18 ft, open hole 18-205 ft.
INSTRUMENTATION.--Intermittent measurement with chalked tape by USGS personnel. Graphic water-level recorder December 1988 to July 1990. Intermittent measurement with chalked tape by USGS personnel August 1988 to December 1988.
DATUM.--Elevation of land-surface datum is 552 ft above sea level, from topographic map. Measuring point: Top of recorder platform, 0.65 ft above land-surface datum.
REMARKS.--Bonaparte No. 1 well. Recorder removed July 17, 1990.
PERIOD OF RECORD.--August 1988 to present.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 15.08 ft below land-surface datum, August 10, 1993; lowest measured, 32.13 ft below land-surface datum, August 16, 1989.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	19.02	FEB 08	20.48	MAY 03	16.95	AUG 05	20.09

WATER YEAR 1999 HIGHEST 16.95 MAY 03, 1999 LOWEST 20.48 FEB 08, 1999



WASHINGTON COUNTY

411300091320701. Local number, 74-06-15 BDAC.
LOCATION.--Lat 41°13'00", long 91°32'09", Hydrologic Unit 07080107, in the water treatment plant, beneath the water tower in Crawfordsville. Owner: Town of Crawfordsville.
AQUIFER.--Mississippian: dolomite of Mississippian age.
WELL CHARACTERISTICS.--Drilled unused municipal artesian water well, diameter 6.5 in., depth 215 ft, cased to 132 ft, open hole 132-215 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 725 ft above sea level, from topographic map. Measuring point: Nipple on plate welded to casing, 1.10 ft above land-surface datum.
PERIOD OF RECORD.--September 1983, March 1987 to current year.
REMARKS: Crawfordsville North.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 69.23 ft below land-surface datum, March 25, 1987; lowest measured, 78.09 ft below land-surface datum, August 05, 1999.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 05	73.20	FEB 09	71.94	MAY 05	70.57	AUG 05	78.09

WATER YEAR 1999 HIGHEST 70.57 MAY 05, 1999 LOWEST 78.09 AUG 05, 1999

WASHINGTON COUNTY-Continued

412037091564701. Local number, 76-09-31 CBBC.
LOCATION.--Lat 41°20'37", long 91°56'47", Hydrologic Unit 07080107, at Pepper Quarry on County Road V-15, 1 mi south of the City of Keota. Owner: River Products Co.
AQUIFER.--Mississippian: limestone of Mississippian age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 5 in., depth 136 ft, cased to 19 ft, open hole 19-136 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel. Graphic water-level recorder August 1979 to December 1989.
DATUM.--Elevation of land-surface datum is 745 ft above sea level, from topographic map. Measuring point: Top of casing, 2.88 ft above land-surface datum.
REMARKS.--Water levels affected by quarrying operations.
PERIOD OF RECORD.--August 1979 to current year.
REVISED RECORDS.--WDR IA-84-1.
EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 8.45 ft below land-surface datum, May 3, 1993; lowest recorded, 25.72 ft below land-surface datum, December 10, 1989.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL
NOV 03	10.29

412750091495201. Local number, 77-09-24 AADA.
LOCATION.--Lat 41°27'46", long 91°50'10", Hydrologic Unit 07080209, north of the city sewage treatment plant and west of First Avenue SE, Wellman. Owner: City of Wellman.
AQUIFER.--Mississippian: dolomite of Mississippian age.
WELL CHARACTERISTICS.--Drilled unused artesian water well, diameter 10 in. to 27 ft, 8 in. to 47 ft, depth 110 ft, cased to 47 ft, open hole 47 to 110 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 595 ft above sea level, from topographic map. Measuring point: Nipple on plate welded to casing, 1.87 ft above land-surface datum.
REMARKS.--City test well No. 1.
PERIOD OF RECORD.--May 1963 to October 1971, May 1973 to current year.
REVISED RECORDS.--WDR IA-84-1, WDR IA-88-1.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 0.59 ft above land-surface datum, November 04, 1998; lowest measured, 6.80 ft below land-surface datum, October 20, 1964.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
(READINGS ABOVE LAND SURFACE INDICATED BY "+")

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	+.59	FEB 08	.35	MAY 05	+.20	AUG 05	2.71

WATER YEAR 1999 HIGHEST +.59 NOV 04, 1998 LOWEST 2.71 AUG 05, 1999

421829091304701. Local number, 75-06-14 ABBB.
LOCATION.--Lat 41°18'29", long 91°30'47", Hydrologic Unit 07080209, 1 mi north and 1.5 mi east of the junction of U.S. Highway 218 and Iowa Highway 92. Owner: Mrs. David Armstrong.
AQUIFER.--Glacial drift of Pleistocene age.
WELL CHARACTERISTICS.--Bored unused water-table well, diameter 12 in., depth 45 ft, lined with tile.
INSTRUMENTATION.--Monthly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 745 ft above sea level, from topographic map. Measuring point: Nipple welded to barrel, 4.08 ft above land-surface datum.
PERIOD OF RECORD.--November 1983 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 1.29 ft below land-surface datum, April 16, 1999; lowest measured, 12.65 ft below land-surface datum, November 1, 1988.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 13	2.73	JAN 12	3.33	APR 16	1.29	JUL 15	5.05
NOV 20	2.83	FEB 17	2.63	MAY 11	3.41	AUG 16	5.04
DEC 11	2.83	MAR 16	1.84	JUN 16	3.57	SEP 09	7.51

WATER YEAR 1999 HIGHEST 1.29 APR 16, 1999 LOWEST 7.51 SEP 09, 1999

WASHINGTON COUNTY--Continued

411813091411202. Local number, 75-07-17 ACBC.
LOCATION.--Lat 41°18'13", long 91°41'14", Hydrologic Unit 07080107, located in the Town of Washington just east of the water-tower. Owner: The Town of Washington.
AQUIFER.--Cambrian/Ordovician Jordan sandstone.
WELL CHARACTERISTICS.--Drilled public-use well, diameter 12.3 in, depth 1900 ft., casing open from 1400-1900.
INSTRUMENTATION.--Quarterly measurements using an airline by USGS personnel.
DATUM.--Elevation of land-surface is 755 feet above sea level, by topographic map.
REMARKS.--Washington No. 5
PERIOD OF RECORD.--October 1996 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 248 feet below land-surface datum, April 25, 1997; lowest measured, 256 ft below land-surface datum, May 06, 1998.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	252	FEB 01	252	MAY 10	254	AUG 06	253

WATER YEAR 1999 HIGHEST 252 NOV 03, 1998 FEB 01, 1999 LOWEST 254 MAY 10, 1999

411822091411001. Local number, 75-07-17 ABCA.
LOCATION.--Lat 41°18'22", long 91°41'13", Hydrologic Unit 07080107, located on north side of railroad tracks on county road within the Town of Washington. Owner: The Town of Washington.
AQUIFER.--Cambrian/Ordovician- Jordan sandstone.
WELL CHARACTERISTICS.--Drilled public-use well, diameter 26 in, depth 1900 ft., casing open from 1400-1900 ft.
INSTRUMENTATION.--Quarterly measurements using an airline by USGS personnel.
DATUM.--Elevation of land-surface 757 feet above sea level, by topographic map.
REMARKS.--Washington No.6
PERIOD OF RECORD.--April 1997 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 249 feet below land-surface datum, May 10, 1999; lowest measured, 304 feet below land-surface datum, April 24, 1997.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	260	FEB 01	251	MAY 10	249	AUG 10	257

WATER YEAR 1999 HIGHEST 249 MAY 10, 1999 LOWEST 260 NOV 04, 1998

411812091412601. Local number, 75-07-17 BCCC
LOCATION.--Lat 41°18'08", long 91°41'49", Hydrologic Unit 07080107, located in the Town of Washington approximately.5 miles east and.10 mile north of Washington Well No. 5. Owner: Town of Washington.
AQUIFER.--Cambrian/Ordovician-Trempealeau Group
WELL CHARACTERISTICS.--Drilled public-use well, diameter 26 to 13.375 in., depth 1825, cased to 1450 ft, open from 1450-1825 ft.
INSTRUMENTATION.--Quarterly measurements using an airline by USGS personnel.
DATUM.--Elevation of land-surface is 748 feet above sea level, by topographic map.
REMARKS.--Washington Well No. 7
PERIOD OF RECORD.--October 1996 to current year
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 240 feet below land-surface datum, November 04, 1998; lowest measured 259 ft below land-surface datum, October 11, 1996.

WATER LEVELS, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 04	240	FEB 01	252	MAY 10	250	AUG 06	256

WATER YEAR 1999 HIGHEST 240 NOV 04, 1998 LOWEST 256 AUG 06, 1999

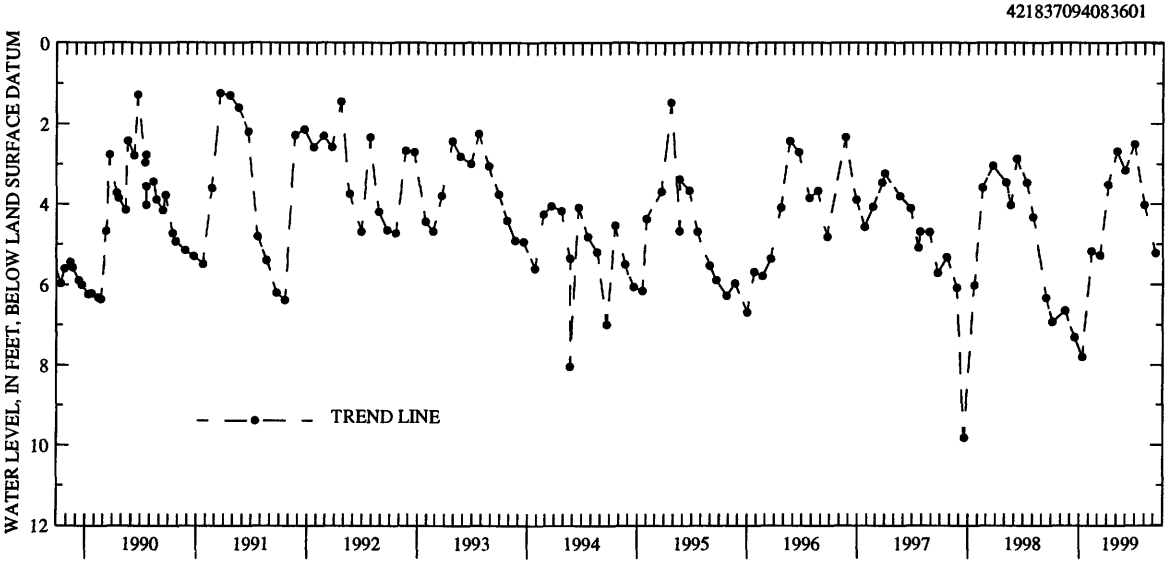
WEBSTER COUNTY

421837094083601. Local number, 87-28-29 CCCD.
LOCATION.--Lat 41°18'37", long 94°08'36", Hydrologic Unit 07100006, 3 mi north and 2 mi east of the Town of Harcourt. Owner: Grace Helms.
AQUIFER.--Glacial drift of Pleistocene age.
WELL CHARACTERISTICS.--Drilled unused water-table well, diameter 12 in., depth 42 ft, lined with tile.
INSTRUMENTATION.--Monthly measurement with chalked tape by USGS personnel. Graphic water-level recorder October 1942 to December 1976.
DATUM.--Elevation of land-surface datum is 1,165 ft above sea level, from topographic map. Measuring point: Top of casing, 1.29 ft above land-surface datum.
PERIOD OF RECORD.--October 1942 to June 1956, March 1958 to current year.
REMARKS.--Sometimes called Harcourt well.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 0.05 ft below land-surface datum, August 1, 1972; lowest measured, 13.62 ft below land-surface datum, March 12, 1956.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 07	6.93	JAN 12	7.80	APR 06	3.52	JUL 01	2.50
NOV 17	6.65	FEB 11	5.18	MAY 05	2.68	AUG 02	4.05
DEC 17	7.31	MAR 11	5.28	JUN 01	3.16	SEP 09	5.22

WATER YEAR 1999 HIGHEST 2.50 JUL 01, 1999 LOWEST 7.80 JAN 12, 1999



423018094214701. Local number, 89-30-23 CCBB.
LOCATION.--Lat 42°30'18", long 94°21'47", Hydrologic Unit 07100004, 75 ft west of the new school addition, Barnum. Owner: Johnson Township Consolidated School.
AQUIFER.--Dakota: sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled unused artesian water well, diameter 4 in., depth 208 ft, screened 203-208 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,174 ft above sea level, from topographic map. Measuring point: Top of casing at land-surface datum.
PERIOD OF RECORD.--October 1942 to September 1945, May 1947 to current year.
REVISED RECORDS.--WDR IA-88-1.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 30.36 ft below land-surface datum, October 21, 1942; lowest measured, 45.85 ft below land-surface datum, July 28, 1980.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEARS OCTOBER 1997 TO SEPTEMBER 1998

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 05	43.00	FEB 11	42.57	MAY 06	42.53	AUG 04	42.80

WATER YEAR 1999 HIGHEST 42.53 MAY 06, 1999 LOWEST 43.00 NOV 05, 1998

WOODBURY COUNTY

422058095573701. Local number, 87-44-15 CBBB.
LOCATION.--Lat 42°20'58", long 95°57'37", Hydrologic Unit 10230003, approximately 3.5 mi west and 5.5 mi north of the Village of Oto. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Dakota: sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 197 ft, screened 185-189 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,165 ft above sea level, from topographic map. Measuring point: Top of casing, 1.50 ft above land-surface datum.
REMARKS.--Well D-34.
PERIOD OF RECORD.--April 1980 to December 1980, May 1982 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 51.54 ft below land-surface datum, August 7, 1996; lowest measured, 63.56 ft below land-surface datum, November 2, 1982.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	53.61	FEB 09	53.90	MAY 12	54.25	AUG 10	52.77

WATER YEAR 1999 HIGHEST 52.77 AUG 10, 1999 LOWEST 54.25 MAY 12, 1999

422830096000511. Local number, 88-44-16 BAAB11.
LOCATION.--Lat 42°28'30", long 96°00'05", Hydrologic Unit 10230004, approximately 3 mi east and 0.5 mi south of the Town of Moville. Owner: Geological Survey Bureau, DNR and U.S. Geological Survey.
AQUIFER.--Dakota: sandstone of Cretaceous age.
WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 4 in. to 235 ft, 2 in. to 337 ft, depth 337 ft, screened 332-337 ft.
INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.
DATUM.--Elevation of land-surface datum is 1,340 ft above sea level, from topographic map. Measuring point: Top of casing, 3.50 ft above land-surface datum.
REMARKS.--Well D-33. Damaged March 1998
PERIOD OF RECORD.--October 1979 to December 1980, May 1982 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 198.70 ft below land-surface datum, August 10, 1999; lowest measured, 202.90 ft below land-surface datum, October 17, 1979.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	198.90	FEB 09	198.84	MAY 12	198.86	AUG 10	198.70

WATER YEAR 1999 HIGHEST 198.70 AUG 10, 1999 LOWEST 198.90 NOV 02, 1998

GROUND WATER QUALITY MONITORING

WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

STATION NUMBER	STATION NAME	COUNTY	DATE	TIME	GEO-LOGIC UNIT	DEPTH OF WELL, TOTAL (FEET) (72008)
411727094374001075N33W15DDBB	1976Fontanelle 5	Adair	07-13-99	1130	111ALVM	39
412852094275101077N31W07CAAB	1977Menlo 3	Adair	07-13-99	1200	111ALVM	30
405632094534401071N35W20AACB	1990Nodaway 4	Adams	07-13-99	1600	111ALVM	35
431638091282902098N05W30ACDC	1899Waukon 2	Allamakee	08-11-99	1215	371JRDN	577
413234094552401078N35W19BCDB	1976Brayton 1	Audubon	07-13-99	0945	111ENRV	41
415950091574301083N10W13CDB	1940Newhall 1	Benton	08-16-99	1430	350SLRN	473
420451093561301084N27W13DCAA	1940Boone 20	Boone	06-10-99	0830	111ALVM	63.7
420959094001901085N27W16CCDC	1967Pilot Mound 3	Boone	06-09-99	1500	112PLSC	30
422852092040101089N10W31AAB	1957Jesup 2	Buchanan	08-16-99	1215	358KNKK	380
424708094570801092N35W14BCCC	1949Albert City 1	Buena Vista	06-07-99	1400	112PLSC	190
425344095090401093N37W01DDDD	1977Sioux Rapids 2	Buena Vista	06-07-99	1600	111ALVM	54
415233094403201082N33W34ABBD	1938Coon Rapids 1, North	Carroll	07-14-99	1025	217DKOT	191
411622094520901075N35W27BBAB	1921Cumberland 1	Cass	07-13-99	0945	112PLSC	155
423744095383301090N41W11ADAD	1967Quimby 1	Cherokee	06-09-99	1615	217DKOT	225
414652090153201081N06E33ADA	1956Camanche 2	Clinton	06-14-99	1130	111ALVM	61.2
414930090321601081N04E18ACBB	1923De Witt 3	Clinton	06-14-99	1345	371JRDN	1646
420336095115601084N37W30BDAD	1936Vail (1),2	Crawford	07-14-99	1430	111ALVM	32
415057094065301081N28W09ABBB	1987Perry 9R	Dallas	07-14-99	0825	111ALVM	45
423020091273701089N05W20DBBB	1981Manchester 7	Delaware	08-16-99	0930	350SLRN	270
423135090383201089N03E18AADD	1969Dubuque 9	Dubuque	08-10-99	1045	111ALVM	125
423602090595201090N01W19AA	1987Holy Cross 1	Dubuque	08-10-99	1315	364GLEN	665
432349094285201099N31W14BBCD	1995Armstrong 7	Emmet	06-08-99	0905	112PLSC	136
425717091382602094N07W14CBAD	1954Elgin 2	Fayette	08-10-99	1600	364GLEN	220
425341093132501093N20W05DDAB	1956Sheffield 2	Franklin	08-12-99	1140	111ALVM	27
404327095284801068N40W07BCAA	1980Farragut 79-2 (North)	Fremont	07-14-99	1230	111ALVM	65
421322092522001086N17W31ABDA	1962Conrad 3	Grundy	07-13-99	1000	339HMPN	120
430015093360501095N23W31ACA	1959Klemme 2	Hancock	06-08-99	1610	341LMCK	185
414236096012501080N45W25DABD	1951Mondamin 2, South	Harrison	07-12-99	0900	111ALVM	90
432650092170401100N12W29DBD	1968Lime Springs 2	Howard	08-11-99	0900	364GLEN	380
422106095280201087N40W14ACBB	1965Ida Grove 3	Ida	06-10-99	0800	112PLSC	65
422915095323504089N39W33CDDD	1985Holstein 3	Ida	06-09-99	1400	111ALVM	54
414520092112001080N12W12ADDC	1952Ladora 1	Iowa	08-09-99	1400	112PLSC	72.5
420414090113201084N07E20BCDD	1895Sabula 1	Jackson	06-14-99	0900	360OVCB	973
413048093062101078N20W36DBDA	1981Monroe 7	Jasper	07-14-99	1030	325DSMS	300
413913093070001079N20W13ADDA	1955Newton 13	Jasper	07-14-99	1330	111ALVM	45
403745091174701067N04W02CBBC	1991Fort Madison 4	Lee	06-17-99	0900	111ALVM	147
420005091431201083N08W13ACDB	1970Cedar Rapids S6	Linn	07-12-99	1030	111ALVM	65
411644091110703075N03W22DCBD	1975Grandview 3	Louisa	06-17-99	1215	112AFNN	174
432608096201503100N47W36DCBD	1988Lester (4) 2	Lyon	06-08-99	1315	111ALVM	32
420405092545601084N18W23CACA	1977Marshalltown 8	Marshall	07-13-99	1330	112PLSC	223

*Geologic unit abbreviations used in this table:

Geological Unit Abbrev.	Geological Unit	Geological Unit Abbrev.	Geological Unit
110QRCU	Quarternary-Cretaceous Undifferentiated	339WSVL	Wassonville Member of 339HMPN
110QRNR	Quarternary System	341LMCK	Lime Creek Formation
111ALVM	Holocene Alluvium	344CDVL	Cedar Valley Limestone
111ENRV	East Nishnabotna River Alluvial	350SLRN	Silurian System
111SDRV	Soldier River Alluvial	355HPKN	Hopkinton Dolomite
112AFNN	Aftonian Interglacial Deposits	358KNKK	Kankakee Formation
112PLSC	Pleistocene Series	360OVCB	Ordovician-Cambrian System
217DKOT	Dakota Group	364GLEN	Galena Formation
325DSMS	Das Moinesian Series	364PLVL	Platteville Formation
339HMPN	Hampton Formation	371JRDN	Jordon Sandstone
339KDRK	Kinderhookian Series		

GROUND WATER QUALITY MONITORING--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

STATION NUMBER	DATE	FLOW RATE (G/M) (00058)	PUMP OR FLOW PERIOD PRIOR TO SAMPLING (MIN) (72004)	TEMPERATURE WATER (DEG C) (00010)	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STANDARD UNITS) (00400)	OXYGEN, DISSOLVED (MG/L) (00300)	HARDNESS TOTAL (MG/L AS CACO3) (00900)	ALKALINITY LAB (MG/L AS CACO3) (90410)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	IRON, DISSOLVED (UG/L AS FE) (01046)
411727094374001	07-13-99	100	30	12.0	586	7.0	.2	270	200	320	17000
412852094275101	07-13-99	10	30	10.7	444	7.4	1.1	200	180	300	<20
405632094534401	07-13-99	55	>30	12.0	540	6.8	.6	220	150	400	530
431638091282902	08-11-99	295	--	9.8	565	7.1	--	350	280	400	<20
413234094552401	07-13-99	50	30	11.6	824	6.8	.1	360	310	540	5900
415950091574301	08-16-99	780	30	11.5	840	7.0	--	430	310	560	560
420451093561301	06-10-99	380	35	10.6	715	7.3	1.1	370	280	470	<20
420959094001901	06-09-99	33	30	9.8	680	7.4	.4	380	310	450	2700
422852092040101	08-16-99	185	30	10.6	491	7.2	--	390	240	310	<20
424708094570801	06-07-99	80	30	10.0	1310	7.3	.2	570	360	1010	4400
425344095090401	06-07-99	285	45	10.0	1110	7.4	3.6	520	320	640	<20
415233094403201	07-14-99	100	30	12.0	394	7.3	2.1	210	160	240	310
411622094520901	07-13-99	30	30	14.0	342	7.2	2.7	150	170	200	<20
423744095383301	06-09-99	100	>30	11.5	999	7.3	.3	460	290	690	1700
414652090153201	06-14-99	210	30	12.9	410	6.9	6.9	160	120	260	<20
414930090321601	06-14-99	300	30	14.5	615	7.2	--	210	250	360	660
420336095115601	07-14-99	--	30	13.4	802	7.3	1.3	400	270	550	<20
415057094065301	07-14-99	450	30	11.4	775	7.1	.1	390	290	540	2400
423020091273701	08-16-99	--	--	10.5	454	7.4	4.5	350	180	310	<20
423135090383201	08-10-99	625	>30	13.1	419	7.3	.1	250	160	260	2100
423602090595201	08-10-99	--	30	14.1	550	7.0	--	370	270	350	100
423349094285201	06-08-99	304	20	10.0	1050	7.2	.2	500	450	720	2000
425717091382602	08-10-99	400	30	10.1	596	6.9	.3	410	260	430	<20
425341093132501	08-12-99	100	30	13.3	514	7.1	4.1	360	220	350	20
404327095284801	07-14-99	160	30	13.5	627	6.8	1.0	280	230	410	860
421322092522001	07-13-99	165	30	11.0	640	7.1	2.0	330	280	390	<20
430015093360501	06-08-99	120	35	12.7	868	7.1	.3	450	340	560	3500
414236096012501	07-12-99	120	>60	12.5	1290	7.3	.4	580	500	790	10000
432650092170401	08-11-99	200	30	9.0	370	7.3	--	240	210	270	550
422106095280201	06-10-99	125	>30	12.5	1100	7.2	.9	450	360	660	<20
422915095323504	06-09-99	110	>30	13.0	716	7.5	2.2	380	270	480	50
414520092112001	08-09-99	90	30	11.9	1020	7.5	.7	430	360	660	1400
420414090113201	06-14-99	230	30	15.1	472	7.1	--	240	250	270	60
413048093062101	07-14-99	--	--	12.6	792	7.0	1.8	410	350	510	260
413913093070001	07-14-99	150	30	11.1	599	7.1	7.3	330	250	400	<20
403745091174701	06-17-99	690	>30	16.8	474	7.1	.1	180	210	260	3600
420005091431201	07-12-99	1000	30	11.4	533	7.2	.5	280	240	340	90
411644091110703	06-17-99	30	40	12.3	446	7.2	.2	210	250	260	1800
432608096201503	06-08-99	40	>30	9.5	1180	7.4	.2	590	350	840	3400
420405092545601	07-13-99	750	30	10.6	651	7.2	.2	300	290	420	2200

GROUND WATER QUALITY MONITORING--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

STATION NUMBER	DATE	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)
411727094374001	07-13-99	880	86	16	8.8	2.2	.20	24	11	30	.3
412852094275101	07-13-99	250	75	11	13	<1.0	.25	25	8.5	29	<.1
405632094534401	07-13-99	80	71	22	12	<1.0	.25	23	4.3	120	<.1
431638091282902	08-11-99	<20	100	22	5.9	<1.0	<.10	17	15	25	<.1
413234094552401	07-13-99	1200	110	33	29	1.1	.35	24	55	67	<.1
415950091574301	08-16-99	<20	80	38	61	10	1.4	7.4	2.6	160	3.6
420451093561301	06-10-99	150	100	35	12	2.3	.35	20	20	62	<.1
420959094001901	06-09-99	210	100	32	7.0	2.5	.35	30	11	72	.2
422852092040101	08-16-99	<20	74	25	6.1	1.8	.90	11	6.6	20	<.1
424708094570801	06-07-99	130	180	54	65	7.7	.25	32	<1.0	380	1.8
425344095090401	06-07-99	20	150	41	24	3.1	.20	26	110	70	<.1
415233094403201	07-14-99	70	57	17	6.2	<1.0	.30	24	3.6	34	<.1
411622094520901	07-13-99	<20	49	12	8.2	1.2	.30	25	1.0	11	<.1
423744095383301	06-09-99	150	140	35	37	6.3	.85	19	2.6	250	.5
414652090153201	06-14-99	<20	48	17	11	1.1	<.10	24	23	31	<.1
414930090321601	06-14-99	<20	49	24	47	8.5	.70	12	24	33	.7
420336095115601	07-14-99	<20	120	28	25	1.1	.25	27	44	93	<.1
415057094065301	07-14-99	480	130	32	6.9	2.1	.30	27	7.4	130	<.1
423020091273701	08-16-99	<20	77	20	7.6	2.2	.15	14	18	26	<.1
423135090383201	08-10-99	2800	51	19	10	2.2	.10	15	14	20	.5
423602090595201	08-10-99	<20	81	34	2.1	1.7	.20	10	1.4	22	<.1
432349094285201	06-08-99	510	140	43	47	3.9	.25	30	1.3	180	.9
425717091382602	08-10-99	<20	100	28	5.4	2.4	.30	13	16	55	<.1
425341093132501	08-12-99	<20	80	25	4.2	<1.0	.10	27	8.2	16	<.1
404327095284801	07-14-99	130	83	24	18	2.7	.30	27	13	73	<.1
421322092522001	07-13-99	40	89	35	11	1.5	.25	15	18	43	<.1
430015093360501	06-08-99	170	130	42	13	3.1	.45	23	36	90	.3
414236096012501	07-12-99	480	170	52	45	6.8	.30	37	38	140	1.4
432650092170401	08-11-99	<20	70	20	4.4	1.8	.50	12	2.7	20	.3
422106095280201	06-10-99	320	150	29	49	2.5	.25	25	100	74	<.1
422915095323504	06-09-99	<20	120	27	14	<1.0	.30	19	22	53	<.1
414520092112001	08-09-99	<20	91	31	110	2.6	.55	15	5.0	180	5.1
420414090113201	06-14-99	<20	52	34	1.8	4.3	.25	11	1.9	15	<.1
413048093062101	07-14-99	20	120	32	34	2.6	.35	22	1.6	110	1.5
413913093070001	07-14-99	<20	88	31	7.2	<1.0	.25	29	16	31	<.1
403745091174701	06-17-99	2400	54	18	9.3	2.5	.15	20	19	6.1	4.1
420005091431201	07-12-99	390	79	21	9.3	1.9	.20	13	19	28	<.1
411644091110703	06-17-99	70	66	17	7.4	.72	.25	24	<1.0	<1.0	.7
432608096201503	06-08-99	1300	170	50	24	2.5	.40	15	25	260	.1
420405092545601	07-13-99	60	90	32	15	2.2	.35	16	16	69	1.2

GROUND WATER QUALITY MONITORING--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

STATION NUMBER	DATE	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, ORGANIC DISSOLVED (MG/L AS N) (00607)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	ATRAZINE WATER UNFLTRD REC (UG/L) (39630)	CYANAZINE TOTAL (UG/L) (81757)	METOLACHLOR WATER UNFLTRD REC (UG/L) (39356)	ALACHLOR TOTAL RECOVER (UG/L) (77825)	METRIBUZIN WHOLE WATER (UG/L) (81408)
411727094374001	07-13-99	<.1	.1	.4	.5	2.0	<.10	<.10	<.10	<.10	<.10
412852094275101	07-13-99	5.5	<.1	<.1	.2	<1.0	<.10	<.10	<.10	<.10	<.10
405632094534401	07-13-99	1.3	<.1	.1	<.1	<1.0	<.10	<.10	<.10	<.10	<.10
431638091282902	08-11-99	2.2	<.1	<.1	<.1	<1.0	<.10	<.10	<.10	<.10	<.10
413234094552401	07-13-99	<.1	.1	.1	.1	<1.0	<.10	<.10	<.10	<.10	<.10
415950091574301	08-16-99	<.1	.4	4.0	<.1	1.3	<.10	<.10	<.10	<.10	<.10
420451093561301	06-10-99	8.8	<.1	<.1	<.1	2.0	<.10	<.10	<.10	<.10	<.10
420959094001901	06-09-99	<.1	<.1	.1	<.1	<1.0	<.10	<.10	<.10	<.10	<.10
422852092040101	08-16-99	2.5	<.1	<.1	<.1	<1.0	<.10	<.10	<.10	<.10	<.10
424708094570801	06-07-99	1.1	<.1	1.8	<.1	3.1	<.10	<.10	<.10	<.10	<.10
425344095090401	06-07-99	9.2	<.1	.2	<.1	<1.0	<.10	<.10	1.40	<.10	<.10
415233094403201	07-14-99	1.7	<.1	<.1	<.1	<1.0	<.10	<.10	<.10	<.10	<.10
411622094520901	07-13-99	<.1	<.1	<.1	<.1	<1.0	<.10	<.10	<.10	<.10	<.10
423744095383301	06-09-99	<.1	<.1	.5	<.1	<1.0	<.10	<.10	<.10	<.10	<.10
414652090153201	06-14-99	5.8	<.1	<.1	<.1	<1.0	<.10	<.10	<.10	<.10	<.10
414930090321601	06-14-99	<.1	<.1	.6	<.1	<1.0	<.10	<.10	<.10	<.10	<.10
420336095115601	07-14-99	6.3	<.1	<.1	.1	<1.0	<.10	<.10	<.10	<.10	<.10
415057094065301	07-14-99	<.1	.2	.2	<.1	2.0	<.10	<.10	<.10	<.10	<.10
423020091273701	08-16-99	8.4	.1	.1	<.1	<1.0	.17	<.10	.13	<.10	<.10
423135090383201	08-10-99	<.1	.1	.6	.5	4.4	<.10	<.10	<.10	<.10	<.10
423602090595201	08-10-99	<.1	<.1	<.1	<.1	<1.0	<.10	<.10	<.10	<.10	<.10
432349094285201	06-08-99	<.1	<.1	.8	<.1	1.9	<.10	<.10	<.10	<.10	<.10
425717091382602	08-10-99	4.7	<.1	<.1	<.1	<1.0	<.10	<.10	<.10	<.10	<.10
425341093132501	08-12-99	13.0	<.1	<.1	<.1	<1.0	<.10	<.10	<.10	<.10	<.10
404327095284801	07-14-99	1.1	.2	.2	.2	<1.0	<.10	<.10	<.10	<.10	<.10
421322092522001	07-13-99	4.6	<.1	<.1	.1	16	.12	<.10	<.10	<.10	<.10
430015093360501	06-08-99	<.1	<.1	.3	<.1	1.2	<.10	<.10	<.10	<.10	<.10
414236096012501	07-12-99	<.1	.2	1.6	.4	4.5	<.10	<.10	<.10	<.10	<.10
432650092170401	08-11-99	<.1	<.1	.4	<.1	1.5	<.10	<.10	<.10	<.10	<.10
422106095280201	06-10-99	2.2	<.1	<.1	<.1	1.0	<.10	<.10	<.10	<.10	<.10
422915095323504	06-09-99	18.0	<.1	<.1	<.1	2.3	.25	<.10	.77	<.10	<.10
414520092112001	08-09-99	<.1	.5	5.6	.3	4.0	<.10	<.10	<.10	<.10	<.10
420414090113201	06-14-99	<.1	<.1	<.1	<.1	<1.0	<.10	<.10	<.10	<.10	<.10
413048093062101	07-14-99	<.1	.2	1.7	<.1	12	<.10	<.10	<.10	<.10	<.10
413913093070001	07-14-99	9.9	<.1	<.1	.1	12	<.10	<.10	<.10	<.10	<.10
403745091174701	06-17-99	<.1	<.1	4.1	.6	5.5	<.10	<.10	<.10	<.10	<.10
420005091431201	07-12-99	4.5	.3	.3	<.1	2.1	.31	<.10	<.10	<.10	<.10
411644091110703	06-17-99	<.1	<.1	.7	.3	<1.0	<.10	<.10	<.10	<.10	<.10
432608096201503	06-08-99	<.1	.2	.4	<.1	2.7	<.10	<.10	<.10	<.10	<.10
420405092545601	07-13-99	<.1	<.1	1.2	<.1	17	<.10	<.10	<.10	<.10	<.10

GROUND WATER QUALITY MONITORING--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

STATION NUMBER	DATE	BUTYLATE WATER WHLREC (UG/L) (30236)	TRIFLURALIN TOTAL RECOVER (UG/L) (39030)	ACETOCHLOR, WATER, UNFLTRD REC (UG/L) (49259)	DEETHYL ATRAZINE, WATER, WHOLE, TOTAL (UG/L) (75981)	DE-ISO PROPYL ATRAZIN WATER, WHOLE, TOTAL (UG/L) (75980)	PROMETONE TOTAL (UG/L) (39056)	GROSS ALPHA, DISSOLVED (PCI/L AS U-NAT) (01515)	GROSS BETA, DISSOLVED (PCI/L AS CS-137) (03515)	RADIUM 226, DISSOLVED (PCI/L) (09503)	RADIUM 228 DISSOLVED (PCI/L AS RA-228) (81366)
411727094374001	07-13-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
412852094275101	07-13-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
405632094534401	07-13-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
431638091282902	08-11-99	<.10	<.10	<.10	<.10	<.10	<.10	1.5	1.2	<.6	1.1
413234094552401	07-13-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
415950091574301	08-16-99	<.10	<.10	<.10	<.10	<.10	<.10	4.7	10	2.5	1.8
420451093561301	06-10-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
420959094001901	06-09-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
422852092040101	08-16-99	<.10	<.10	<.10	<.10	<.10	<.10	1.9	2.2	<.6	.70
424708094570801	06-07-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
425344095090401	06-07-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
415233094403201	07-14-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
411622094520901	07-13-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
423744095383301	06-09-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
414652090153201	06-14-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
414930090321601	06-14-99	<.10	<.10	<.10	<.10	<.10	<.10	6.2	8.3	2.7	1.2
420336095115601	07-14-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
415057094065301	07-14-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
423020091273701	08-16-99	<.10	<.10	<.10	.25	<.10	<.10	--	--	--	--
423135090383201	08-10-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
423602090595201	08-10-99	<.10	<.10	<.10	<.10	<.10	<.10	4.1	12	2.2	2.6
432349094285201	06-08-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
425717091382602	08-10-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
425341093132501	08-12-99	<.10	<.10	<.10	.13	.19	<.10	--	--	--	--
404327095284801	07-14-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
421322092522001	07-13-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
430015093360501	06-08-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
414236096012501	07-12-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
432650092170401	08-11-99	<.10	<.10	<.10	<.10	<.10	<.10	1.8	2.1	.7	.80
422106095280201	06-10-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
422915095323504	06-09-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
414520092112001	08-09-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
420414090113201	06-14-99	<.10	<.10	<.10	<.10	<.10	<.10	7.1	5.1	1.4	.40
413048093062101	07-14-99	<.10	<.10	<.10	<.10	<.10	<.10	2.3	5.1	2.1	3.1
413913093070001	07-14-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
403745091174701	06-17-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
420005091431201	07-12-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
411644091110703	06-17-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
432608096201503	06-08-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
420405092545601	07-13-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--

GROUND WATER QUALITY MONITORING--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

STATION NUMBER	DATE	BENZENE TOTAL (UG/L) (34030)	CARBON TETRA-CHLO-RIDE TOTAL (UG/L) (32102)	1,2-DI-CHLORO-ETHANE TOTAL (UG/L) (32103)	ETHYL-BENZENE TOTAL (UG/L) (34371)	METHYL ENE CHLO-RIDE TOTAL (UG/L) (34423)	TETRA-CHLORO-ETHYL-ENE TOTAL (UG/L) (34475)	TOLUENE TOTAL (UG/L) (34010)	1,1,1-TRI-CHLORO-ETHANE TOTAL (UG/L) (34506)	XYLENE WATER UNFLTRD REC (UG/L) (81551)
411727094374001	07-13-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
412852094275101	07-13-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
405632094534401	07-13-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
431638091282902	08-11-99	--	--	--	--	--	--	--	--	--
413234094552401	07-13-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
415950091574301	08-16-99	--	--	--	--	--	--	--	--	--
420451093561301	06-10-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
420959094001901	06-09-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
422852092040101	08-16-99	--	--	--	--	--	--	--	--	--
424708094570801	06-07-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
425344095090401	06-07-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
415233094403201	07-14-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
411622094520901	07-13-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
423744095383301	06-09-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
414652090153201	06-14-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
414930090321601	06-14-99	--	--	--	--	--	--	--	--	--
420336095115601	07-14-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
415057094065301	07-14-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
423020091273701	08-16-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
423135090383201	08-10-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
423602090595201	08-10-99	--	--	--	--	--	--	--	--	--
432349094285201	06-08-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
425717091382602	08-10-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
425341093132501	08-12-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
404327095284801	07-14-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
421322092522001	07-13-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
430015093360501	06-08-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
414236096012501	07-12-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
432650092170401	08-11-99	--	--	--	--	--	--	--	--	--
422106095280201	06-10-99	22.0	<.5	<.5	<.5	<1.0	.9	<.5	<.5	<.5
422915095323504	06-09-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
414520092112001	08-09-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
420414090113201	06-14-99	--	--	--	--	--	--	--	--	--
413048093062101	07-14-99	--	--	--	--	--	--	--	--	--
413913093070001	07-14-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
403745091174701	06-17-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
420005091431201	07-12-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
411644091110703	06-17-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
432608096201503	06-08-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
420405092545601	07-13-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5

GROUND WATER QUALITY MONITORING--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

STATION NUMBER	STATION NAME	COUNTY	DATE	TIME	GEO-LOGIC UNIT	DEPTH OF WELL, TOTAL (FEET) (72008)
410656095380201073N42W23AAAC	1978Silver City 3	MILLS	07-16-99	0915	111ALVM	60
432241092550802099N18W24CABA	1960Saint Ansgar 2	MONONA	08-12-99	0930	344CDVL	240
420241095422001084N42W35CABB	1974Ute 3	MONONA	06-10-99	1000	111SDRV	58
405850095061701071N37W04ACD	1953Stanton 1	MONTGOMERY	07-13-99	1400	217DKOT	158
413521090511001078N01E04CAA	1948Stockton 1	MUSCATINE	06-15-99	1400	355HPKN	247
431157095502901097N42W29BBBC	1949Sheldon 5	O'BRIEN	06-08-99	0845	111ALVM	24
403906095015001067N37W01AAAA	1985Shambaugh 3	PAGE	07-14-99	0745	111ALVM	30
423537095583901090N43W19CCBB	1956Kingsley 1	PLYMOUTH	06-09-99	1030	110QRNR	37
411501095251301075N40W35CBCA	1975Carson (5) 3	POTTAWATTAMIE	07-15-99	1030	111ALVM	25
421617095051001086N36W07CDBB	1971Wall Lake 3	SAC	06-07-99	1120	112PLSC	43
413040090455001078N02E32CC	1971Blue Grass (2),1	SCOTT	06-15-99	1045	364PLVL	640
413923090350901079N03E11CCBD	1929Eldridge 2	SCOTT	06-15-99	0900	350SLRN	515
413049095254501078N39W34ACCD	1968Shelby 5	SHELBY	07-12-99	1130	111ALVM	48.5
430017096285301095N48W35BDDC	1931Hawarden 2	SIOUX	06-08-99	1115	110QRCU	36
415252093411401082N24W30DCBB	1945Slater 1	STORY	06-09-99	1010	112PLSC	180
415417092180101082N13W24AAAD	1961Belle Plaine 4	TAMA	07-15-99	1100	111ALVM	42
415753092350201083N15W27CDD	1966Tama 5	TAMA	07-15-99	0900	111ALVM	43
403659094285301067N32W12CAAD	1960Blockton 1	TAYLOR	07-14-99	1000	112PLSC	271
410907092375301073N15W06CADA	1995Eddyville 3	WAPELLO	06-16-99	1400	111ALVM	35
413040093290501078N23W34DDBD	1979Carlisle 5	WARREN	08-09-99	1045	111ALVM	30
412013091485701076N08W31DDCC	1957West Chester 1	WASHINGTON	06-16-99	1100	339WSVL	243
412850091342901077N06W17BBA	1961Riverside 5	WASHINGTON	06-16-99	0830	112PLSC	250
423028094115101089N28W19CAA	1931Fort Dodge 12	WEBSTER	06-10-99	1300	339KDRK	541
431828091473201098N08W16ACBC	1972Decorah 6	WINNESHIEK	08-11-99	1510	111ALVM	82
422831095465102089N42W34DDDD	1927Correctionville 1 W	WOODBURY	06-09-99	1200	111ALVM	26
422929096253401089N47W29CCDA	1971SIOUX CITY RIVER 3	WOODBURY	06-09-99	0800	217DKOT	312
423958093535701091N26W27DBAB	1980Eagle Grove 5	WRIGHT	06-08-99	1310	112PLSC	70

GROUND WATER QUALITY MONITORING--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

STATION NUMBER	DATE	FLOW RATE (G/M) (00058)	PUMP OR FLOW PERIOD PRIOR TO SAMPLING (MIN) (72004)	TEMPERATURE WATER (DEG C) (00010)	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STANDARD UNITS) (00400)	OXYGEN, DISSOLVED (MG/L) (00300)	HARDNESS TOTAL (MG/L AS CACO3) (00900)	ALKALINITY LAB (MG/L AS CACO3) (90410)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	IRON, DISSOLVED (UG/L AS FE) (01046)
410656095380201	07-16-99	85	30	12.0	949	7.5	.2	460	320	580	3800
432241092550802	08-12-99	325	30	9.9	475	7.1	4.4	410	250	440	<20
420241095422001	06-10-99	82	30	12.5	878	7.3	4.3	440	340	520	<20
405850095061701	07-13-99	140	20	12.5	599	7.0	.2	300	240	360	2400
413521090511001	06-15-99	--	<30	12.2	605	7.0	.2	300	310	360	690
431157095502901	06-08-99	55	>30	9.0	808	7.4	1.7	400	280	520	1200
403906095015001	07-14-99	30	45	12.0	466	6.8	.6	160	140	300	3800
423537095583901	06-09-99	165	30	11.0	851	7.5	7.4	420	310	540	<20
411501095251301	07-15-99	40	30	11.5	732	7.4	.3	410	300	460	1100
421617095051001	06-07-99	350	>60	11.0	920	7.3	.7	430	300	580	810
413040090455001	06-15-99	200	30	13.2	632	7.0	--	310	350	360	<20
413923090350901	06-15-99	195	>30	12.5	460	7.1	--	200	250	250	1900
413049095254501	07-12-99	15	>60	13.0	514	7.2	5.6	230	140	320	80
430017096285301	06-08-99	145	>30	11.0	880	7.5	8.1	420	310	560	<20
415252093411401	06-09-99	90	25	11.7	721	7.8	.5	270	430	460	7500
415417092180101	07-15-99	220	30	14.2	667	11.1	.1	210	100	380	<20
415753092350201	07-15-99	450	30	10.9	604	7.2	2.5	400	220	420	<20
403659094285301	07-14-99	70	40	14.0	1760	7.6	.2	140	410	1100	570
410907092375301	06-16-99	175	>30	12.4	762	6.9	1.6	340	220	510	40
413040093290501	08-09-99	185	>30	12.4	640	7.0	.6	370	270	390	330
412013091485701	06-16-99	100	<30	12.1	818	7.1	.2	340	360	480	1100
412850091342901	06-16-99	190	60	15.8	665	7.6	.5	220	340	380	890
423028094115101	06-10-99	700	35	10.5	883	7.0	--	460	270	590	740
431828091473201	08-11-99	400	30	10.9	613	6.9	2.5	360	240	420	20
422831095465102	06-09-99	25	30	12.0	831	7.4	5.9	450	310	510	<20
422929096253401	06-09-99	1080	>60	12.5	1270	7.4	--	490	240	920	1600
423958093535701	06-08-99	350	25	11.0	713	7.2	.2	380	380	450	1500

GROUND WATER QUALITY MONITORING--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

STATION NUMBER	DATE	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)
410656095380201	07-16-99	550	130	36	22	2.4	.30	25	68	81	<.1
432241092550802	08-12-99	<20	99	32	12	1.2	.15	13	30	59	<.1
420241095422001	06-10-99	30	130	38	9.6	4.0	.25	25	30	49	<.1
405850095061701	07-13-99	230	82	20	13	1.5	.30	28	36	19	.4
413521090511001	06-15-99	<20	85	29	11	<1.0	.25	12	6.7	12	<.1
431157095502901	06-08-99	980	110	36	15	1.6	.45	23	25	120	.2
403906095015001	07-14-99	420	59	12	21	<1.0	.20	32	22	56	<.1
423537095583901	06-09-99	<20	130	34	10	2.4	.35	26	15	83	<.1
411501095251301	07-15-99	1200	110	28	8.7	<1.0	.40	9.4	16	62	<.1
421617095051001	06-07-99	560	130	34	26	3.7	.40	22	50	110	<.1
413040090455001	06-15-99	<20	84	34	11	1.3	.25	14	1.3	12	<.1
413923090350901	06-15-99	20	52	25	11	<1.0	.45	12	1.2	<1.0	2.4
413049095254501	07-12-99	<20	68	19	8.0	<1.0	.30	23	16	21	<.1
430017096285301	06-08-99	<20	130	36	16	2.3	.35	25	16	90	<.1
415252093411401	06-09-99	100	72	24	65	5.9	.35	12	2.5	<.50	6.6
415417092180101	07-15-99	<20	90	<.1	15	2.1	.70	39	38	75	.2
415753092350201	07-15-99	30	94	25	13	1.1	.20	30	22	71	<.1
403659094285301	07-14-99	40	39	11	340	2.4	.85	18	90	320	2.4
410907092375301	06-16-99	100	120	27	12	1.2	.15	16	24	120	<.1
413040093290501	08-09-99	380	92	28	13	1.4	.15	26	24	40	<.1
412013091485701	06-16-99	<20	73	39	53	2.5	.25	13	2.3	65	2.0
412850091342901	06-16-99	50	59	20	59	2.6	.15	11	2.6	13	3.7
423028094115101	06-10-99	50	120	42	30	5.2	.70	15	3.3	130	.8
431828091473201	08-11-99	<20	110	20	11	1.9	.10	15	25	28	<.1
422831095465102	06-09-99	<20	120	32	16	2.3	.20	21	20	63	<.1
422929096253401	06-09-99	1100	150	42	81	8.5	.40	15	48	370	.4
423958093535701	06-08-99	270	99	37	15	2.6	.45	34	1.5	22	.7

GROUND WATER QUALITY MONITORING--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

STATION NUMBER	DATE	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, ORGANIC DIS-SOLVED (MG/L AS N) (00607)	NITRO-GEN, AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	ATRA-ZINE WATER UNFLTRD REC (UG/L) (39630)	CYAN-AZINE TOTAL (UG/L) (81757)	METOLA-CHLOR WATER UNFLTRD REC (UG/L) (39356)	ALA-CHLOR TOTAL RECOVER (UG/L) (77825)	METRI-BUZIN IN WHOLE WATER (UG/L) (81408)
410656095380201	07-16-99	<.1	.3	.3	<.1	<1.0	<.10	<.10	<.10	<.10	<.10
432241092550802	08-12-99	6.7	<.1	<.1	<.1	<1.0	<.10	<.10	<.10	<.10	<.10
420241095422001	06-10-99	13.0	<.1	<.1	<.1	<1.0	<.10	<.10	<.10	<.10	<.10
405850095061701	07-13-99	<.1	<.1	.5	<.1	<1.0	<.10	<.10	<.10	<.10	<.10
413521090511001	06-15-99	<.1	<.1	<.1	<.1	3.0	<.10	<.10	<.10	<.10	<.10
431157095502901	06-08-99	<.1	.1	.3	.1	1.8	<.10	<.10	<.10	<.10	<.10
403906095015001	07-14-99	<.1	.2	.2	.3	1.8	--	--	--	--	--
423537095583901	06-09-99	12.0	<.1	<.1	.1	<1.0	<.10	<.10	<.10	<.10	<.10
411501095251301	07-15-99	1.7	<.1	<.1	<.1	<1.0	<.10	<.10	<.10	<.10	<.10
421617095051001	06-07-99	3.3	.1	.1	<.1	1.3	<.10	<.10	.25	<.10	<.10
413040090455001	06-15-99	<.1	<.1	<.1	<.1	<1.0	<.10	<.10	<.10	<.10	<.10
413923090350901	06-15-99	<.1	<.1	2.4	.3	2.8	<.10	<.10	<.10	<.10	<.10
413049095254501	07-12-99	18.0	<.1	<.1	<.1	<1.0	<.10	<.10	<.10	<.10	<.10
430017096285301	06-08-99	14.0	<.1	<.1	<.1	<1.0	<.10	<.10	<.10	<.10	<.10
415252093411401	06-09-99	<.1	<.1	6.2	<.1	16	<.10	<.10	<.10	<.10	<.10
415417092180101	07-15-99	5.5	.2	.4	<.1	<1.0	.13	<.10	<.10	<.10	<.10
415753092350201	07-15-99	4.2	<.1	<.1	<.1	20	<.10	<.10	<.10	<.10	<.10
403659094285301	07-14-99	<.1	1.0	3.4	.4	13	<.10	<.10	<.10	<.10	<.10
410907092375301	06-16-99	4.2	<.1	<.1	<.1	<1.0	<.10	<.10	<.10	<.10	<.10
413040093290501	08-09-99	<.1	<.1	<.1	<.1	<1.0	<.10	<.10	<.10	<.10	<.10
412013091485701	06-16-99	<.1	<.1	1.9	<.1	1.3	<.10	<.10	<.10	<.10	<.10
412850091342901	06-16-99	<.1	.1	3.8	.3	2.3	<.10	<.10	<.10	<.10	<.10
423028094115101	06-10-99	<.1	<.1	.7	<.1	<1.0	<.10	<.10	<.10	<.10	<.10
431828091473201	08-11-99	4.0	<.1	<.1	<.1	<1.0	<.10	<.10	<.10	<.10	<.10
422831095465102	06-09-99	14.0	<.1	<.1	<.1	<1.0	<.10	<.10	<.10	<.10	<.10
422929096253401	06-09-99	<.1	<.1	.4	<.1	1.6	<.10	<.10	<.10	<.10	<.10
423958093535701	06-08-99	<.1	<.1	.7	<.1	<1.0	<.10	<.10	<.10	<.10	<.10

GROUND WATER QUALITY MONITORING--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

STATION NUMBER	DATE	BUTYL-ATE WATER WHLREC (UG/L) (30236)	TRI-FLURA-LIN TOTAL RECOVER (UG/L) (39030)	ACETO-CHLOR, WATER, UNFLTRD REC (UG/L) (49259)	DEETHYL ATRA-ZINE, WATER, WHOLE, TOTAL (UG/L) (75981)	DE-ISO PROPYL ATRAZIN WATER, WHOLE, TOTAL (UG/L) (75980)	PROME-TONE TOTAL (UG/L) (39056)	GROSS ALPHA, DIS-SOLVED (PCI/L AS U-NAT) (01515)	GROSS BETA, DIS-SOLVED (PCI/L AS CS-137) (03515)	RADIUM 226, DIS-SOLVED (PCI/L) (09503)	RADIUM 228 DIS-SOLVED (PCI/L AS RA-228) (81366)
410656095380201	07-16-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
432241092550802	08-12-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
420241095422001	06-10-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
405850095061701	07-13-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
413521090511001	06-15-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
431157095502901	06-08-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
403906095015001	07-14-99	--	--	--	--	--	--	--	--	--	--
423537095583901	06-09-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
411501095251301	07-15-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
421617095051001	06-07-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
413040090455001	06-15-99	<.10	<.10	<.10	<.10	<.10	<.10	4.0	6.7	.9	<.40
413923090350901	06-15-99	<.10	<.10	<.10	<.10	<.10	<.10	2.4	5.0	.6	.80
413049095254501	07-12-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
430017096285301	06-08-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
415252093411401	06-09-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
415417092180101	07-15-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
415753092350201	07-15-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
403659094285301	07-14-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
410907092375301	06-16-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
413040093290501	08-09-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
412013091485701	06-16-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
412850091342901	06-16-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
423028094115101	06-10-99	<.10	<.10	<.10	<.10	<.10	<.10	5.7	6.7	1.8	<.60
431828091473201	08-11-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
422831095465102	06-09-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
422929096253401	06-09-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--
423958093535701	06-08-99	<.10	<.10	<.10	<.10	<.10	<.10	--	--	--	--

GROUND WATER QUALITY MONITORING--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

STATION NUMBER	DATE	BENZENE TOTAL (UG/L) (34030)	CARBON TETRA-CHLO-RIDE TOTAL (UG/L) (32102)	1,2-DI-CHLORO-ETHANE TOTAL (UG/L) (32103)	ETHYL-BENZENE TOTAL (UG/L) (34371)	METHYL ENE CHLO-RIDE TOTAL (UG/L) (34423)	TETRA-CHLORO-ETHYL-ENE TOTAL (UG/L) (34475)	TOLUENE TOTAL (UG/L) (34010)	1,1,1-TRI-CHLORO-ETHANE TOTAL (UG/L) (34506)	XYLENE WATER UNFLTRD REC (UG/L) (81551)
410656095380201	07-16-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
432241092550802	08-12-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
420241095422001	06-10-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
405850095061701	07-13-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
413521090511001	06-15-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
431157095502901	06-08-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
403906095015001	07-14-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
423537095583901	06-09-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
411501095251301	07-15-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
421617095051001	06-07-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
413040090455001	06-15-99	--	--	--	--	--	--	--	--	--
413923090350901	06-15-99	--	--	--	--	--	--	--	--	--
413049095254501	07-12-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
430017096285301	06-08-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
415252093411401	06-09-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
415417092180101	07-15-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	1.3
415753092350201	07-15-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
403659094285301	07-14-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
410907092375301	06-16-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
413040093290501	08-09-99	<.5	<.5	<.5	<.5	<1.0	3.3	<.5	<.5	<.5
412013091485701	06-16-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
412850091342901	06-16-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
423028094115101	06-10-99	--	--	--	--	--	--	--	--	--
431828091473201	08-11-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
422831095465102	06-09-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
422929096253401	06-09-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5
423958093535701	06-08-99	<.5	<.5	<.5	<.5	<1.0	<.5	<.5	<.5	<.5

405747093233201 MCNAY RESEARCH STATION NEAR CHARITON, IOWA

LOCATION.--Lat 40`57'47", long 93`23'34", in SW1/4 NE1/4 sec. 9, T.71 N., R.23 W., Lucas County, Hydrologic Unit 10280201, 3.1 mi east and 2.0 mi north of Derby, Iowa, 3.4 mi west and 2.8 mi south of Chariton, Iowa.

OWNER.--U.S. Geological Survey.

PERIOD OF RECORD.--September 1984 to current year.

INSTRUMENTATION.--Wet/dry precipitation collector, weighing-bucket type recording rain gage with alter wind shield and event recorder. National Weather Service standard 8-inch rain and snow gage (back-up only).

REMARKS.--Samples collected by Jim Secor and Steve Goben.

EXTREMES FOR PERIOD OF RECORD.--Maximum field pH, 7.07, April 19-26, 1988; minimum field pH, 3.84, February 12-19, 1985.

EXTREMES FOR CURRENT YEAR.--Maximum field pH, 5.9, March 23-30; minimum field pH, 4.3, September 28 to October 5.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
[The parameter codes for the 1999 water year have been updated to more accurately describe atmospheric deposition data]

DATE	PH FIELD ATM DEP WET T (UNITS) (83106)	SPEC. CONDUC-TANCE FIELD ATM DEP WET TOT (US/CM) (83154)	CALCIUM ATM DEP WET DIS (MG/L) (82932)	MAG-NESIUM ATM DEP WET DIS (MG/L) (83002)	POTAS-SIUM ATM DEP WET DIS (MG/L) (83120)	SODIUM ATM DEP WET DIS (MG/L) (83138)	NI-TROGEN AMMON. ATM DEP WET DIS AS N (MG/L) (83044)	NI-TROGEN NITRATE ATM DEP WET DIS AS N (MG/L) (83068)	CHLO-RIDE ATM DEP WET DIS (MG/L) (82944)	SULFATE ATM DEP WET DIS AS SO4 (MG/L) (83160)	PHOS-PHORUS ORTHO ATM DEP WET DIS AS P (MG/L) (83108)
OCT 06-13	--	--	--	--	--	--	--	--	--	--	--
OCT 13-20	5.5	4	.04	.01	.01	.03	.12	.05	.05	.40	<.001
OCT 20-27	--	--	.99	.06	.05	.06	.57	.63	.16	2.5	<.001
OCT 27-NOV 03	4.8	11	.18	.02	.01	.05	.24	.24	.07	1.3	<.001
NOV 03-10	4.7	14	.14	.02	.01	.06	.28	.27	.09	1.4	<.001
NOV 10-17	--	--	1.1	.06	.08	.05	.97	1.52	.18	4.1	<.004
NOV 17-24	--	--	--	--	--	--	--	--	--	--	--
NOV 24-DEC 01	5.2	4	.08	.01	.00	.01	.20	.08	.04	.43	<.001
DEC 01-08	5.4	6	.13	.01	.02	.03	.23	.15	.04	.69	<.001
DEC 08-15	--	--	--	--	--	--	--	--	--	--	--
DEC 15-22	--	--	--	--	--	--	--	--	--	--	--
DEC 22-29	--	--	.06	.01	.04	.03	.05	.02	.08	.04	.004
DEC 29 1998-JAN 05 1999	5.4	5	.26	.01	.07	.03	.19	.12	.10	.18	<.001
JAN 05-12	--	--	1.4	.05	.04	.15	.51	.67	.22	1.3	<.003
JAN 12-19	4.9	22	.31	.02	.02	.05	1.00	.93	.13	1.8	<.001
JAN 19-26	4.5	23	.13	.01	.02	.02	.47	.49	.08	2.4	<.001
JAN 26-FEB 02	--	--	--	--	--	--	--	--	--	--	--
FEB 02-09	4.9	22	.69	.05	.02	.06	.96	1.13	.19	1.9	<.001
FEB 09-16	5.0	10	.24	.02	.03	.15	.45	.21	.14	1.8	<.001
FEB 16-23	4.6	20	.15	.01	.01	.02	.49	.75	.09	1.2	<.001
FEB 23-MAR 02	5.2	15	.47	.03	.05	.11	1.12	.58	.22	1.8	<.001
MAR 02-09	5.1	11	.52	.03	.02	.04	.50	.42	.07	1.3	<.001
MAR 09-16	--	--	--	--	--	--	--	--	--	--	--
MAR 16-23	--	--	--	--	--	--	--	--	--	--	--
MAR 23-30	5.9	18	.57	.04	.02	.01	1.38	.11	.08	1.2	<.001
MAR 30-APR 06	5.8	11	.37	.03	.03	.08	.79	.21	.12	1.5	<.001
APR 06-13	5.5	18	1.2	.11	.10	.35	.89	.47	.31	2.7	.004
APR 13-20	4.4	25	.38	.04	.01	.02	.47	.74	.07	2.0	<.001
APR 20-27	5.0	10	.35	.04	.03	.06	.30	.28	.08	1.3	<.001
APR 27-MAY 04	5.6	8	.20	.02	.02	.01	.55	.34	.04	1.1	<.001
MAY 04-11	5.6	11	.37	.05	.08	.05	.82	.33	.09	1.1	<.001
MAY 11-18	5.4	7	.23	.03	.04	.07	.39	.22	.07	1.0	<.001

405747093233201 - MCNAY RESEARCH STATION NEAR CHARITON, IOWA--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	PH FIELD ATM DEP WET T (UNITS) (83106)	SPEC. CONDUC-TANCE FIELD ATM DEP WET TOT (US/CM) (83154)	CALCIUM ATM DEP WET DIS (MG/L) (82932)	MAG-NESIUM ATM DEP WET DIS (MG/L) (83002)	POTAS-SIUM ATM DEP WET DIS (MG/L) (83120)	SODIUM ATM DEP WET DIS (MG/L) (83138)	NI-TROGEN AMMON. ATM DEP WET DIS AS N (MG/L) (83044)	NI-TROGEN NITRATE ATM DEP WET DIS AS N (MG/L) (83068)	CHLO-RIDE ATM DEP WET DIS (MG/L) (82944)	SULFATE ATM DEP WET DIS AS SO4 (MG/L) (83160)	PHOS-PHORUS ORTHO ATM DEP WET DIS AS P (MG/L) (83108)
MAY 18-25	5.8	11	.49	.04	.04	.03	.83	.34	.07	.72	<.001
MAY 25-JUN 01	5.5	7	.18	.01	.01	.01	.24	.14	.03	.57	<.001
JUN 01-08	5.6	14	.84	.06	.07	.14	.66	.32	.18	1.8	<.001
JUN 08-15	5.5	10	.30	.04	.07	.06	.45	.23	.08	1.1	.035
JUN 15-22	--	--	--	--	--	--	--	--	--	--	--
JUN 22-29	5.0	8	.10	.01	.01	.01	.18	.19	.05	.72	<.001
JUN 29-JUL 06	5.7	8	.67	.05	.02	.06	.26	.19	.09	.56	<.001
JUL 06-13	5.5	4	.23	.02	.02	.03	.19	.17	.05	.45	<.001
JUL 13-20	5.7	20	1.8	.12	.14	.18	.86	.79	.25	2.3	<.001
JUL 20-27	--	--	--	--	--	--	--	--	--	--	--
JUL 27-AUG 03	5.2	10	.36	.02	.02	.03	.22	.30	.05	.77	<.001
AUG 03-10	4.6	17	.22	.01	.00	.01	.32	.36	.04	1.5	<.001
AUG 10-17	5.1	12	.64	.04	.03	.07	.33	.46	.12	1.7	<.001
AUG 17-24	5.4	25	2.5	.12	.05	.07	.93	1.08	.17	3.2	<.001
AUG 24-31	--	--	--	--	--	--	--	--	--	--	--
AUG 31-SEP 07	5.0	7	.21	.01	.01	.01	.09	.16	.03	.65	<.001
SEP 07-14	5.3	11	.58	.03	.04	.03	.47	.50	.06	1.3	<.001
SEP 14-21	--	--	.40	.04	.03	.02	.17	.16	<.22	1.2	<.007
SEP 21-28	4.9	8	.10	.01	.01	.01	.16	.11	<.03	.58	<.001
SEP 28-OCT 05	4.3	42	.50	.06	.05	.03	.68	.75	.10	3.5	<.001

425435091281101 BIG SPRING FISH HATCHERY NEAR ELKADER, IOWA

LOCATION.--Lat 42`54'35", long 91`28'11", in SE1/4 NE 1/4 SE1/4 sec. 31, T.94 N., R.5 W., Clayton County, Hydrologic Unit 07060004, 3.0 mi north and 2.8 mi west of Elkader, Iowa.

OWNER.--U.S. Geological Survey.

PERIOD OF RECORD.--August 1984 to current year.

INSTRUMENTATION.--Wet/dry precipitation collector, weighing-bucket type recording rain gage with alter wind shield and event recorder and National Weather Service standard 8-inch rain and snow gage (back-up only).

REMARKS.--Samples Collected by Robert Zach.

EXTREMES FOR PERIOD OF RECORD.--Maximum field pH, 6.9, April 2-9 1996; minimum field pH, 3.7, August 31 to September 7, 1999.

EXTREMES FOR CURRENT YEAR.--Maximum field pH, 6.1, July 13-20; minimum field pH, 3.7, August 31 to September 7.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
[The parameter codes for the 1999 water year have been updated to more accurately describe atmospheric deposition data]

DATE	PH FIELD ATM DEP WET T (UNITS) (83106)	SPEC. CONDUC-TANCE FIELD ATM DEP WET TOT (US/CM) (83154)	CALCIUM ATM DEP WET DIS (MG/L) (82932)	MAG-NESIUM ATM DEP WET DIS (MG/L) (83002)	POTAS-SIUM ATM DEP WET DIS (MG/L) (83120)	SODIUM ATM DEP WET DIS (MG/L) (83138)	NI-TROGEN AMMON. ATM DEP WET DIS AS N (MG/L) (83044)	NI-TROGEN NITRATE ATM DEP WET DIS AS N (MG/L) (83068)	CHLO-RIDE ATM DEP WET DIS (MG/L) (82944)	SULFATE ATM DEP WET DIS AS SO4 (MG/L) (83160)	PHOS-PHORUS ORTHO ATM DEP WET DIS AS P (MG/L) (83108)
OCT 06-13	5.1	6	.09	.01	.03	.04	.25	.15	.08	.70	<.001
OCT 13-20	5.8	5	.24	.05	.04	.03	.14	.11	.06	.53	.006
OCT 20-27	5.1	11	.31	.04	.02	.17	.26	.27	.22	1.1	<.001
OCT 27-NOV 03	4.5	18	.11	.03	.03	.09	.42	.32	.12	1.9	<.001
NOV 03-10	4.5	20	.34	.06	.12	.04	.39	.44	.09	2.1	.003
NOV 10-17	5.6	14	.03	.01	1.7	.02	.14	.33	.20	1.6	<.001
NOV 17-24	--	--	4.5	.38	.19	.10	4.45	2.57	.34	13.5	<.001
NOV 24-DEC 01	5.6	27	1.3	.07	.07	.06	1.38	.39	.48	4.2	<.001
DEC 01-08	--	--	--	--	--	--	--	--	--	--	--
DEC 08-15	--	--	--	--	--	--	--	--	--	--	--
DEC 15-22	--	--	--	--	--	--	--	--	--	--	--
DEC 22-29	5.8	16	1.5	.12	.04	.11	.45	.45	.13	.89	<.001
DEC 29 1998-JAN 05 1999	5.5	4	.27	.05	.01	.02	.06	.12	.06	.12	<.001
JAN 05-12	4.8	10	.25	.03	.01	.13	.10	.36	.17	.47	<.001
JAN 12-19	3.9	68	.69	.06	.05	.12	1.25	1.86	.39	4.8	<.001
JAN 19-26	4.3	25	.19	.02	.03	.02	.39	.69	.09	1.5	<.001
JAN 26-FEB 02	--	--	--	--	--	--	--	--	--	--	--
FEB 02-09	--	--	--	--	--	--	--	--	--	--	--
FEB 09-16	4.9	14	.38	.04	.06	.17	.54	.30	.14	2.2	<.001
FEB 16-23	--	--	--	--	--	--	--	--	--	--	--
FEB 23-MAR 02	4.3	41	.83	.15	.05	.26	1.03	1.18	.42	4.1	<.001
MAR 02-09	4.4	17	.29	.05	.01	.02	.13	.43	.15	.97	<.001
MAR 09-16	--	--	--	--	--	--	--	--	--	--	--
MAR 16-23	--	--	--	--	--	--	--	--	--	--	--
MAR 23-30	4.9	9	.28	.06	.04	.02	.14	.11	.04	1.1	<.001
MAR 30-APR 06	5.3	15	.62	.06	.09	.10	.79	.40	.14	2.1	<.001
APR 06-13	5.1	13	.60	.07	.05	.14	.48	.30	.15	2.1	<.001
APR 13-20	5.5	27	1.2	.18	.09	.03	1.71	1.08	.20	3.2	<.001
APR 20-27	4.5	21	.27	.04	.04	.06	.54	.55	.09	2.0	<.001
APR 27-MAY 04	4.2	32	.09	.02	.02	.01	.26	.39	.05	2.9	<.001
MAY 04-11	5.7	17	.85	.25	.18	.04	.93	.36	.12	1.7	<.001
MAY 11-18	5.2	11	.27	.07	.22	.05	.42	.30	.08	1.6	<.001

425435091281101 - BIG SPRING FISH HATCHERY NEAR ELKADER, IOWA--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	PH FIELD ATM DEP WET T (UNITS) (83106)	SPEC. CONDUC-TANCE FIELD ATM DEP WET TOT (US/CM) (83154)	CALCIUM ATM DEP WET DIS (MG/L) (82932)	MAG-NESIUM ATM DEP WET DIS (MG/L) (83002)	POTAS-SIUM ATM DEP WET DIS (MG/L) (83120)	SODIUM ATM DEP WET DIS (MG/L) (83138)	NI-TROGEN AMMON. ATM DEP WET DIS AS N (MG/L) (83044)	NI-TROGEN NITRATE ATM DEP WET DIS AS N (MG/L) (83068)	CHLO-RIDE ATM DEP WET DIS (MG/L) (82944)	SULFATE ATM DEP WET DIS AS SO4 (MG/L) (83160)	PHOS-PHORUS ORTHO ATM DEP WET DIS AS P (MG/L) (83108)
MAY 18-25	5.4	20	1.6	.14	.06	.09	.68	.73	.17	2.0	<.001
MAY 25-JUN 01	5.4	22	2.7	.25	.10	.02	.68	.64	.13	2.6	<.001
JUN 01-08	5.5	10	.24	.05	.06	.05	.75	.26	.09	1.5	<.001
JUN 08-15	5.5	8	.59	.11	.07	.05	.33	.31	.10	.97	<.001
JUN 15-22	5.8	18	2.0	.24	.02	.01	.53	.19	.04	.53	<.001
JUN 22-29	5.4	13	.77	.15	.06	.01	.56	.32	.06	2.2	<.001
JUN 29-JUL 06	5.5	9	.48	.08	.09	.13	.35	.28	.15	1.1	<.001
JUL 06-13	--	--	--	--	--	--	--	--	--	--	--
JUL 13-20	6.1	8	.41	.04	.02	.06	.30	.30	.08	.89	<.001
JUL 20-23	--	--	--	--	--	--	--	--	--	--	--
JUL 27-AUG 03	5.3	19	1.8	.13	.10	.09	.62	.83	.14	2.1	<.001
AUG 03-10	4.8	12	.38	.07	.01	.01	.29	.32	.06	1.6	<.001
AUG 10-17	5.0	21	1.0	.11	.06	.11	.86	.93	.19	2.9	<.001
AUG 17-24	4.8	14	.33	.04	.04	.01	.41	.36	.05	1.9	<.001
AUG 24-31	--	--	--	--	--	--	--	--	--	--	--
AUG 31-SEP 07	3.7	119	4.7	.53	.18	.04	1.34	1.92	.32	18.1	<.001
SEP 07-14	5.5	27	3.3	.29	.11	.04	.75	.83	.13	2.7	<.001
SEP 14-21	--	--	.75	.06	.04	.01	.43	.19	.04	.84	<.001
SEP 21-28	5.2	8	.48	.07	.04	.04	.30	.20	.04	.67	<.001
SEP 28-OCT 05	4.9	21	1.4	.14	.05	.03	.79	.79	.07	2.3	<.001

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CONVERSION FACTORS AND VERTICAL DATUM

Multiply	By	To obtain
	Length	
inch (in.)	2.54×10^{1}	millimeter
	2.54×10^{-2}	meter
foot (ft)	3.048×10^{-1}	meter
mile (mi)	1.609×10^{0}	kilometer
	Area	
acre	4.047×10^{3}	square meter
	4.047×10^{-1}	square hectometer
	4.047×10^{-3}	square kilometer
square mile (mi^2)	2.590×10^{0}	square kilometer
	Volume	
gallon (gal)	3.785×10^{0}	liter
	3.785×10^{0}	cubic decimeter
	3.785×10^{-3}	cubic meter
million gallons (Mgal)	3.785×10^{3}	cubic meter
	3.785×10^{-3}	cubic hectometer
cubic foot (ft^3)	2.832×10^{1}	cubic decimeter
	2.832×10^{-2}	cubic meter
cubic-foot-per-second day [(ft^3/s) d]	2.447×10^{3}	cubic meter
	2.447×10^{-3}	cubic hectometer
acre-foot (acre-ft)	1.233×10^{3}	cubic meter
	1.233×10^{-3}	cubic hectometer
	1.233×10^{-6}	cubic kilometer
	Flow	
cubic foot per second (ft^3/s)	2.832×10^{1}	liter per second
	2.832×10^{1}	cubic decimeter per second
	2.832×10^{-2}	cubic meter per second
gallon per minute (gal/min)	6.309×10^{-2}	liter per second
	6.309×10^{-2}	cubic decimeter per second
	6.309×10^{-5}	cubic meter per second
million gallons per day (Mgal/d)	4.381×10^{1}	cubic decimeter per second
	4.381×10^{-2}	cubic meter per second
	Mass	
ton (short)	9.072×10^{-1}	megagram or metric ton

Sea level: In this report "sea level" refers to the National Geodetic Vertical Datum of 1929 (NGVD of 1929)—a geodetic datum derived from a general adjustment for the first-order level nets of both the United States and Canada, formerly called Sea Level Datum of 1929.

U.S. DEPARTMENT OF THE INTERIOR
U.S. Geological Survey
P.O. Box 1230
Iowa City, IA 52244

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