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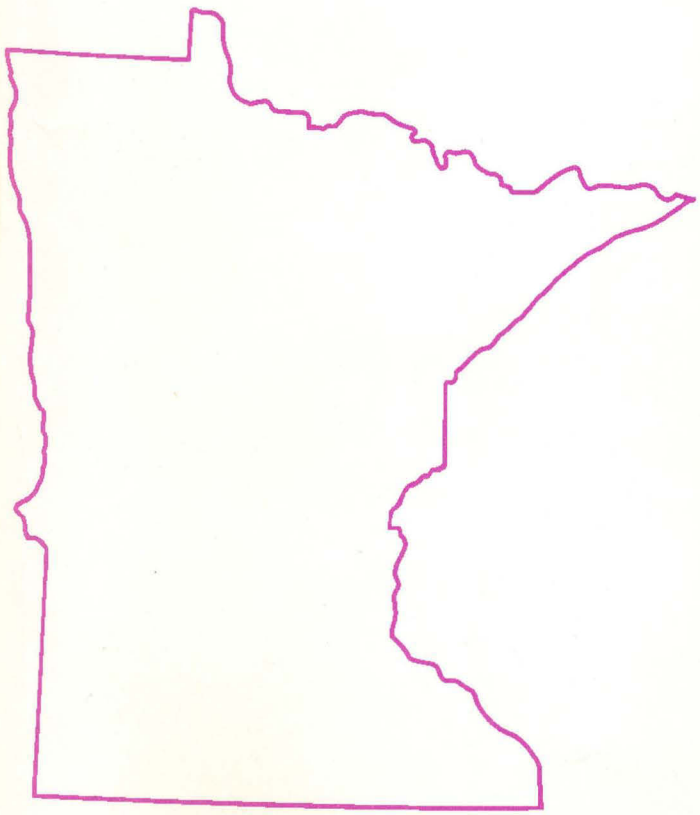
Water Resources Data Minnesota Water Year 1999

Water-Data Report MN-99-1



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

Prepared in cooperation with the Minnesota Department of Natural Resources, Division of Waters; the Minnesota Department of Transportation; and with other State, municipal, and 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 Minnesota Water Year 1999

By G.B. Mitton, K.G. Guttormson, G.W. Stratton, and E.S. Wakeman

Water-Data Report MN-99-1

Prepared in cooperation with the Minnesota Department of Natural Resources, Division of Waters; the Minnesota Department of Transportation; and with other State, municipal, and Federal agencies

U.S. Department of the Interior
Bruce Babbitt, Secretary

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Mounds View, Minnesota, 2000

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Water-Data Report MN-99-1

Preface

This volume of the annual hydrologic report of Minnesota is one of a series of annual reports that documents 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 water quality provide the hydrologic information needed by state, local, and Federal agencies, and the private sector for developing and managing our Nation's land and water resources. Hydrologic data for Minnesota, including four major basins; Great Lakes, Souris-Red Rainy River, Upper Mississippi River, and Missouri River, are contained in this volume.

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 U.S. Geological Survey policy and established guidelines.

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13. ABSTRACT *(Maximum 200 words)*

Water resources data for the 1999 water year for Minnesota consist of records of stage, discharge, and water quality of streams; stage of lakes and reservoirs; ground-water quality; and water quality in wells. This report contains discharge records for 103 stream-gaging stations; stage for 11 lakes and reservoirs; water quality for 13 stream-gaging stations; peak flow data for 87 high-flow partial-record stations, and water levels for 15 groundwater observation wells. Additional water data were collected at various sites that are not part of the systematic data collection program, and are published as miscellaneous measurements. These data represent that part of the National Water Data System operated by the U.S. Geological Survey for cooperating State and Federal agencies in Minnesota.

14. SUBJECT TERMS
*Minnesota, *Hydrologic data, *Surface water, *Ground water, *Water quality, Flow rate, Gaging stations, Lakes, Reservoirs, Chemical analyses, Sediments, Water temperatures, Sampling sites, Water levels, Water analyses, Data collection

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ILLUSTRATIONS

Note.--Data for partial-record stations and miscellaneous sites for both surface-water quantity and quality are published in separate sections of the data report. See references at the end of this list for page numbers for these sections.

[Letters after station name designates type of data: (d) discharge; (e) gage height, elevation, or contents; (c) chemical, radio-chemical, or pesticides; (b) biological or micro-biological; (p) physical (water temperature, sediment, or specific conductance)]

ST. LAWRENCE RIVER BASIN

HUDSON BAY BASIN

STREAMS TRIBUTARY TO LAKE WINNIPEG (head of Nelson River):

RED RIVER OF THE NORTH BASIN

GROUND-WATER WELLS, BY COUNTY, FOR WHICH RECORDS ARE PUBLISHED IN THIS VOLUME

GROUND-WATER LEVELS

QUALITY OF GROUND-WATER RECORDS

The following continuous-record surface-water discharge or stage-only stations (gaging stations) in Minnesota 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. Those stations with an asterisk (*) after the station number are currently operated as crest-stage partial-record stations. 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.

[Letters after station name designate type of data collected: (d) discharge, (e) elevation (stage only)].

Station name	Station number	Drainage area (mi^2)	Period of record
Pigeon River above mouth of Arrow River, MN (d)	04010000	256	1924-27
Poplar River at Lutsen, MN (d)	04012500	114	1911 (e), 1912-17, 1928-47, 1952-61
Cross River at Schroeder, MN (d)	04013000	91	1931-32
Baptism River near Beaver Bay, MN (d)	04014500	140	1928-93
Beaver Creek (Beaver Bay Run) at Beaver Bay, MN (d)	04015000	126	1911-14, 1928-31
South Branch Partridge River near Babbitt, MN (d)	04015455	18.5	1977-80
Partridge River above Colby Lake, at Hoyt Lakes, MN (d)	04015475	106	1979-88
Second Creek near Aurora, MN (d)	04015500	29	1955-80
Partridge River near Aurora, MN (d)	04016000	161	1942-82
St. Louis River near Aurora, MN (d)	04016500	290	1942-87
Embarrass River at Embarrass, MN (d)	04017000	93.8	1942-64
Embarrass River near McKinley, MN (d)	04018000	171	1953-62
St. Louis River at Forbes, MN (d)	04018750	713	1965-90
East Two Rivers near Iron Junction, MN (d)	04018900	40.0	1966-79
West Two Rivers near Iron Junction, MN (d)	04019000	65.3	1953-62, 1965-79
West Swan River near Silica, MN (d)	04019300	16.3	1963-79
East Swan River near Toivola, MN (d)	04019500	112	1953-62, 1964-71
Swan River near Toivola, MN (d)	04020000	254	1952-61
Whiteface River below (at) Meadowlands, MN (d)	04021000	453	1909-17
Cloquet River at Independence, MN (d)	04023000	750	1909-17
Elim Creek near Holyoke, MN (d)	04024090	1.06	1976-78
Skunk Creek below Elim Creek near Holyoke, MN (d)	04024093	8.83	1976-78
Otter Tail River near Detroit Lakes, MN (d)	05030000	270	1937-71
Pelican River at Detroit Lakes, MN (d)	05033900	-	1968-71
Pelican River at Detroit Lk. out. nr. Detroit Lakes, MN (d)	05034100	-	1968-71, 1974-75
Long Lake outlet near Detroit Lakes, MN (d)	05035100	-	1968-71
West Branch Cty. Ditch No. 14 nr. Detroit Lakes, MN (d)	05035200	-	1968-71
East Branch County Ditch No. 14 nr. Detroit Lakes, MN (d)	05035300	-	1968-71
St. Clair Lake outlet near Detroit Lakes, MN (d)	05035500	-	1968-75
Pelican River at Muskrat Lk outlt nr Detroit Lakes, MN (d)	05035600	-	1968-75
Pelican River at Sallie Lk outlet nr Detroit Lakes, MN (d)	05037100	-	1968-75
Pelican River at Lake Melissa olt nr Detroit Lakes, MN (d)	05039100	-	1968-75
Pelican River near Detroit Lakes, MN (d)	05040000	123	1942-53
Pelican River near Fergus Falls, MN (d)	05040500	482	1909-12
Otter Tail River near Breckenridge, MN (d)	05046500	2,040	1931-32, 1939-46
Mustinka River (head of Bois de Sioux River) nr Norcross, MN (d)	05047000	-	1940-47
Mustinka Ditch above West Branch Mustinka River (Twelve Mile Creek) near Charlesville, MN (d)	05047500	-	1943-55
Mustinka Ditch below West Branch Mustinka River (Twelve Mile Creek) near Charlesville, MN (d)	05048000	-	1943-55
W. Branch Mustinka River (Twelve Mile Creek) below Mustinka Ditch near Charlesville, MN (d)	05048500	-	1943-55
Mustinka River above Wheaton, MN (d)	05049000	834	1915-24, 1930-58
Bois de Sioux River below Fairmont, ND (d)	05050500	1,540	1919-44
Rabbit River at Campbell, MN (d)	05051000	266	1942-52
Red River of the North below Fargo, ND (d)	05054020	-	1969-78
Whiskey Creek at Barnesville, MN (d)	05061200*	25.3	1964-66
Wild Rice River near Ada, MN (d)	05063000	1,100	1948-54
South Branch Wild Rice River near Borup, MN (d)	05063500	254	1944-49
Marsh River below Ada, MN (d)	05067000	-	1948-52
Sand Hill River at Beltrami, MN (d)	05068000	324	1943-58
Sand Hill Ditch at Beltrami, MN (d)	05068500	-	1943-58
Red Lake River near Red Lake, MN (d)	05074500	1,950	1933-94
Thief River near Gatske, MN (d)	05075500	-	1953-56
Red Lake River at Thief River Falls, MN (d)	05076500	3,450	1909-18, 1920-30

Station name	Station number	Drainage area (mi^2)	Period of record
Clearwater River near Pinewood, MN (d)	05077000	132	1940-45
Clearwater River near Leonard, MN (d)	05077500	153	1934-47
Ruffy Brook near Gonvick, MN (d)	05077700*	45.2	1960-78
Red River of the North at Oslo, MN (d)	05083500	31,200	1936-37, 1941-43, 1945-60, 1973-78
Snake River at Warren, MN (d)	05085500	-	1945, 1953-56
Snake River above Alvarado, MN (d)	05085900	218	1993-96
Snake River at Alvarado, MN (d)	05086000	220	1945, 1953-56
Middle River near Strandquist, MN (d)	05087000	-	1953-56
Tamarac River near Strandquist, MN (d)	05090500	-	1953-56
Tamarac River near Stephen, MN (d)	05091500	320	1945
Two Rivers (Middle Fork Two Rivers) nr Hallock, MN (d)	05092500	131	1931-38
South Branch (South Fork) Two Rivers near Pelan, MN (d)	05093000	281	1928-38, 1953-56
South Branch Two Rivers (Two Rivers) at Hallock, MN (d)	05094500	-	1940-47
Two Rivers (South Branch Two Rivers) at Hallock, MN (d)	05095000	-	1911-14, 1929-30, 1938-39, 1941-43
Two Rivers below Hallock, MN (d)	05095500	644	1945-55
North Branch (North Fk) Two Rivers nr Lancaster, MN (d)	05096000	32	1929-38, 1941-55 1953-55
State Ditch 85 near Lancaster, MN (d)	05096500	95	1929-38, 1942-55
North Branch Two Rivers at Lancaster, MN (d)	05096500	209	1941-42, 1953-56
North Branch Two Rivers near Northcote, MN (d)	05097500	386	1941-42, 1945-51
Two Rivers below North Branch near Hallock, MN (d)	05098000	1,060	1941-43
Roseau River (at) near Malung, MN (d)	05103000	252	1928-46
South Fork (W. Branch) Roseau River nr Malung, MN (d)	05104000	312	1911-14, 1928-46
Roseau River at Roseau, MN (d)	05105000	-	1940-47
Roseau River near Roseau, MN (d)	05105500	-	1930-60
Sprague Creek near Sprague, Manitoba (d)	05106000	176	1928-81
Pine Creek near Pine Creek, MN (d)	05107000	74.6	1928-53
Roseau River at Roseau Lake, MN (e)	05106500	-	1939-91
Roseau River near Badger, MN (d)	05108000	-	1928-69
Roseau River near Duxby, MN (d)	05108500	-	1929-51, 1952-56
Badger Creek near Badger, MN (d)	05109000	2.2	1929-30, 1931-38
Roseau River near Haug, MN (d)	05109500	-	1932-66
Roseau River at otlt of State Ditch 69 nr Oak Point, MN (d)	05110000	-	1939-42
Roseau R. at head of State Ditch 51 nr Oak Point, MN (d)	05110500	-	1933-42
Roseau River at Oak Point, MN (d)	05111000	-	1933-39, 1941-60
Roseau River at international boundary, nr Caribou, MN (d)	05112500	1,590	1933-69
Shagawa Lake tributary at Ely, MN (d)	05127219	1.84	1971-78
Burgo Creek near Ely, MN (d)	05127220	3.04	1967-78
Shagawa River near Ely, MN (d)	05127230	99	1967-78
Vermilion Lake near Soudan, MN (e)	05128200	-	1913-15, 1941-42, 1946-87
Pike River near Biwabik, MN (d)	05128340	-	1977-79
Pike River near Embarrass, MN (d)	05128500	115	1953-64, 1976-79
Rainy River at International Falls, MN (d)	05129500	14,900	1905-60
Sturgeon River (Lake) at Side Lake, MN (d)	05130000	-	1938-47
Dark River near Chisholm, MN (d)	05131000	50.6	1942-61, 1965-79
Deer Lake outlet (Deer Lake) near Effie, MN (d)	05131800	-	1937-39, 1940-46 1982-93
Rapid River near Baudette, MN (d)	05134200	543	1956-85
Warroad River near Warroad, MN (d)	05139500	162	1946-80
Bulldog Run near Warroad, MN (d)	05140000	14.2	1946-51, 1966-77
East Branch Warroad River nr Warroad, MN (d)	05140500	102	1946-54, 1966-77
Williams lake near Akeley, MN (e) (data stored under station number 465724094402601)	05202000	0.88	1988-96.
Mississippi River near Deer River, MN (d)	05210000	3,190	1945-50
Prairie River near Taconite, MN (d)	05212700	360	1967-83
Prairie River near Grand Rapids, MN (d)	05213000	485	1909 (e), 1925-49
O'Brien Creek near Pengilly, MN (d)	05216800	-	1963-68
Initial tailings basin outflow near Keewatin, MN (d)	05216820	2.5	1982-85
Swan River near Calumet, MN (d)	05216850	114	1964-90
Swan River near Warba, MN (d)	05217000	254	1954-69

Station name	Station number	Drainage area (mi^2)	Period of record
Mississippi River above Sandy River near Libby, MN (d)	05218000	4,560	1895-1915, 1925-29
Mississippi River below Sandy River near Libby, MN (d)	05220500	5,060	1930-90
Pelican Brook (Long Lake) near Pequot Lakes, MN (d)	05232000	-	1938-42, 1943-47
Rabbit River near Crosby, MN (d)	05241500	8.38	1945-63
Little Sand Lake outlet (Sand Lake outlet) nr Dorset, MN (d	05242700	74	1930-41
Straight River at County Highway 125 near Osage, MN (d)	05243721	-	1986-91
Straight River at Cty. Hwy. 115 near Park Rapids, MN (d)	05243723	-	1986-89
Crow Wing River at Motley, MN (d)	05244500	2,140	1909 (e), 1913-17 1930-31
Diversion from Long Prairie River near Osakis, MN (d)	05244980	-	1939-47
Long Prairie River near Osakis, MN (d)	05245000	-	1949-54
Long Prairie near Motley	05245500	973	1909-17, 1930-31
Crow Wing River at Pillager, MN (d)	05246000		1909-13, 1925-50
Platte (Platt) River at Pillager, MN (d)	05268000*	338	1929-36
Mississippi River near Sauk Rapids, MN (d)	05269000	12,400	1903-06
Mississippi River at Sartell, MN (d)	05270000	12,450	1929, 1943-47(e)
Clearwater River at Clearwater, MN (d)	05273500	-	1937, 1940-42
St. Francis River at Santiago, MN (d)	05274700	-	1965-70, 1980-81
St. Francis River above Zimmerman, MN (d)	05274750	-	1980-84
St. Francis River near Big Lake, MN (d)	05274900	-	1965-70
Mississippi River at Elk River, MN (d)	05275500	14,500	1915-56
North Fork Crow River near Regal, MN (d)	05276000	215	1943-54
North Fork Crow River above Paynesville, MN (d)	05276005	232	1996-98
Middle Fork Crow River at New London, MN (e)	05277000	-	1939-42, 1943-47
Middle Fork Crow River (Calhoun Lk Diversion) nr Spicer, MN (e)	05277500	-	1939, 1940-46
Middle Fork Crow River near Spicer, MN (d)	05278000	179	1949-87
South Fork Crow River at Cosmos, MN (d)	05278500	221	1945-64
Buffalo Creek near Glencoe, MN (d)	05278930*	374	1972-80
South Fork Crow River near Mayer, MN (d)	05279000	1,170	1934-79
South Fork Crow River near Rockford, MN (d)	05279500	1,250	1909-12
Mississippi River at Anoka, MN (d)	05283500	17,100	1897, 1905-13
Rum River at Onamia, MN (d)	05284500	414	1910-12
Rum River at Spencer Brook, MN (d)	05284750	-	1960-64
Rum River at Cambridge, MN (d)	05285000	1,160	1909-14
Rum River near Anoka, MN (d)	05286500	1,430	1905-06, 1909
Minnetonka Lake (head of Minnehaha Creek) near Wayzata (at Excelsior), MN (d)	05289000	-	1938-64
Minnehaha Creek at Minnetonka Mills, MN (d)	05289500	130	1953-64
Big Stone Lake near Big Stone City, SD (formerly Big Stone Lake at Ortonville, MN (e)	05291500	-	1937-93
Minnesota River near Odessa, MN (d)	05292500	1,340	1909-12, 1944-63
Pomme de Terre River near Morris, MN (d)	05293500	-	1937-39, 1940-47
Canby Creek at Canby, MN (d)	05299500	-	1938-39, 1940-46
Chippewa River at diversion dam near Hancock, MN (d)	05303000	-	1930-39, 1940-46
Chippewa River at Benson, MN (d)	05303500	1,270	1949-51
Shakopee Creek near Benson, MN (d)	05304000	352	1949-54
Chippewa River near Watson, MN (d)	05305000	2,050	1910-17, 1931-36
South Branch Yellow Medicine River at Minneota, MN (d)	05311400	111	1960-81, 1983-87
Spring Creek near Hazel Run, MN (d)	05312500	101	1945-48
Chetomba Creek near Maynard, MN (d)	05314000	200	1949-51
Hawk Creek near Maynard, MN (d)	05314500*	474	1949-54
Prairie Ravine near Marshall, MN (d)	05315200	5.63	1959-64
Redwood River near Green Valley, MN (d)	05315500	436	1947-57
Minnesota River at New Ulm, MN (d)	05316770	9,536	1968-76
Dry Creek near Jeffers, MN (d)	05316900	3.13	1982-85
Minnesota River at Judson, MN (d)	05317500	11,200	1938-50
East Branch (East Fork) Blue Earth River near Bricelyn, MN (d)	05318000	132	1951-70
South Fork Watonwan River at diversion dam near St. James, MN (d)	05319000	-	1939, 1940-46
Blue Earth River at Mankato, MN (d)	05321000	3,550	1938-39, 1940-42
Sand Creek at diversion dam near Jordan, MN (d)	05330400	-	1938-39, 1940-46

Station name	Station number	Drainage area (mi^2)	Period of record
Purgatory Creek at Eden Prairie, MN (d)	05330800	-	1975-80
Nine Mile Creek at Bloomington, MN (d)	05330900	-	1963-73
Glaisby Brook near Kettle River, MN (d)	05336200*	24.2	1959-70
Kettle River near Sandstone, MN (d)	05336500	825	1908-16
Grindstone River at Hinckley, MN (d)	05337000	-	1940-47
Snake River at Mora, MN (d)	05337500	422	1909-13
St. Croix River near Rush City, MN (d)	05339500	5,120	1923-61
Sunrise River near Stacy, MN (d)	05340000	167	1949-65
Sunrise River near Lindstrom, MN (d)	05340050	231	1965-85
Vermillion River at Hastings, MN (d)	05346000	195	1942-47, 90
South Fork Zumbro River near Rochester, MN (d)	05373000	304	1952-81
Zumbro River (South Branch) near Zumbro Falls, MN (d)	05373500	821	1911-17
Zumbro River at Zumbro Falls, MN (d)	05374000*	-	1909-17, 1929-80
Zumbro River at Theilman, MN (d)	05374500	1,320	1938-56
Zumbro River at Kellogg, MN (d)	05374900	1,400	1975-90
North Fork Whitewater River near Elba, MN (d)	05376000	101	1939-41, 1967-93
Middle Fork Whitewater River near St. Charles, MN (d)	05376100	-	1988-92
South Fork Whitewater River near Altura, MN (d)	05376500	76.8	1939-71
Whitewater River at Beaver, MN (d)	05377500	288	1936-38, 1939-56
Stockton Valley Creek at Stockton, MN (d)	05378230	-	1982-85
Garvin Brook near Minnesota City, MN (d)	05378235	-	1982-91
Straight Valley Creek near Rollingstone, MN (d)	05378300	5.16	1970-85
Gilmore Creek at Winona, MN (d)	05379000	8.95	1939-63
Mississippi River at LaCrosse, WI (d)	05383500	-	1929-55
North Branch Root River tributary near Stewartville, MN (d)	05383600	0.73	1959-64
Root River near Lanesboro, MN (d)	05384000*	615	1910, 11-17, 1940-85, 87-90
Rush Creek near Rushford, MN (d)	05384500*	129	1942-79
South Fork Root River near Houston, MN (d)	05385500*	275	1953-83
Root River below South Fork near Houston, MN (d)	05386000	1,560	1938-61
Turtle Creek near Austin, MN (d)	05456500	144	1947-51
Heron Lake outlet nr Heron Lake, MN (d)	05475000	-	1930-43
Rock River at Luverne, MN (d)	06483000*	419	1911-14, 1996-97
Little Sioux River near Lakefield, MN (d)	06603000	17.1	1948-63
Jackson County Ditch No. 11 near Lakefield, MN (d)	06603500	7.69	1948-61

Station name	Station number	Drainage area (mi^2)	Type of record	Period of record
Baptism River near Beaver Bay, MN	04014500	140	C., Bio., Sed., Temp., D.O., pH., S.C.	1968-93
Partridge River abv Colby Lake at Hoyt Lakes, MN	04015475	106	Temp., S.C.	1976-85
St. Louis River at Forbes, MN	04018750	713	Sed.	1968-70
St. Louis River at Scanlon, MN	04024000	3430	C., Bio., Sed., Temp., D.O., pH, S.C.	1958-66, 68-94
Elim Creek near Holyoke, MN	04024090	1.06	Sed.	1976-79
Skunk Creek below Elim Creek near Holyoke, MN	04024093	8.83	C., Sed., Temp., D.O., pH, S.C.	1976-79
Deer Creek near Holyoke, MN	04024098	7.77	C., Bio., Temp., D.O., pH, S.C.	1977-79
			Sed.	1977-81
Otter Tail River below Orwell Dam, near Fergus Falls, MN	05046000	1740	C., Sed., Temp., D.O., pH, S.C.	1961-63, 65-66, 85-86, 93-95
Bois de Sioux River near Doran, MN	05051300	1880	C., Sed., Temp., D.O., pH, S.C.	1993-95
Buffalo River near Dilworth, MN	05062000	1040	Sed.	1971-81
Clearwater River at Red Lake Falls, MN	05078500	1370	C., Sed., Temp., D.O., pH, S.C.	1964-66, 79, 92, 95
Red Lake River at Crookston, MN	05079000	5270	C., Sed., Temp., D.O., pH, S.C.	1962, 74-76, 79-95.
Snake River above Alvarado, MN (d)	05085900	218	C., Temp., D.O., pH, S.C.	1994-96
Roseau River below Roseau, MN	05105300		C., Bio., Sed., Temp., D.O., pH, S.C.	1973-83
Roseau River below State Ditch 51, near Caribou, MN	05112000	1560	C., Bio., Sed., Temp., D.O., pH, S.C	1972-95
Kawishiwi River near Ely, MN	05124480	253	C., Bio., Sed., Temp., D.O., pH, S.C	1966-96
Little Fork River at Littlefork, MN	05131500	1730	C., Bio., Sed., Temp., D.O., pH, S.C.	1967, 69, 71, 73-86
Big Fork River at Big Falls, MN	05132000	1460	C., Bio., Sed., Temp., D.O., pH, S.C.	1968, 71-77
Rainy River at Manitou Rapids, MN	05133500	19,400	C., Bio., Sed., Temp., D.O., pH, S.C.	1968-70, 78-94
Mississippi River near Royalton, MN	05267000	11,600	C., Bio., Sed., Temp., D.O., pH, S.C.	1963-66, 1975-98
Elk River near Big Lake, MN	05275000	615	Sed., Temp.	1976-81
North Fork Crow River above Paynesville, MN	05276005	232	C., Bio., Sed., Temp., D.O., S.C.	1996-98
Crow River at Rockford, MN	05280000	2520	Sed., Temp.	1975-81
			C., Sed., Temp., D.O., pH, S.C.	1997
Mississippi River near Anoka, MN	05288500	19,100	Sed.	1963-67, 75-98
			C., Temp., D.O., pH, S.C.	1996-98
Mississippi River at Fridley, MN	05288550		Temp., D.O., pH, S.C.	1975-86
Mississippi River at Ford Plant at St. Paul, MN	05288950	19,700	Temp., D.O., pH, S.C.	1974-78, 81-82
Whetstone River near Big Stone City, SD	05291000	389	Sed., Temp.	1974-88
Yellow Bank River near Odessa, MN	05293000	398	Sed., Temp.	1974-88
Chippewa River near Milan, MN	05304500	1870	Sed., Temp.	1972-81
Yellow Medicine River near Granite Falls, MN	05313500	653	Sed., Temp.	1971-75, 77-81
Redwood River near Marshall, MN	05315000	259	Sed., Temp.	1968-71
Redwood River near Redwood Falls, MN	05316500	629	Sed., Temp.	1968-70
Cottonwood River near New Ulm, MN	05317000	1280	C., Bio., Temp., D.O., pH, S.C.,	1961-62, 64-68, 71-72, 74-76, 89-92, 95, 98
			Sed.,	1968-76
Watonwan River near Garden City, MN	05319500	812	Sed.	1977-80
Minnesota River near Jordan, MN	05330000	16,200	C., Bio., Temp., D.O., pH, S.C.,	1952-63, 69, 72-98
Minnesota River at Burnsville, MN	05330908		Temp., D.O., pH, S.C.	1980-83
Minnesota River at Fort Snelling State Pk., St. Paul, MN	05330920	16,900	Temp., D.O., pH, S.C.	1973-83
Mississippi River at Industrial Molasses, St. Paul, MN	05331005		Temp., D.O., pH, S.C.	1976-85
Mississippi River at Fifth at Newport, MN	05331545		Temp., D.O., pH, S.C.	1979-90
Mississippi River at Grey Cloud Island near Cottage Grove, MN	05331560		Temp., D.O., pH, S.C.	1977-90
Mississippi River at Ninninger	05331570	37,000	C., Bio., Sed., Temp., D.O., pH, S.C.,	1977-95
Mississippi River at Lock and Dam 2 at Hastings, MN	05331578		Temp., D.O., pH, S.C.	1975-90
Snake River near Pine City, MN	05338500	958	C., Bio., Temp., D.O., pH, S.C.	1963, 65, 67-68, 75-83, 85, 92-94, 98
St. Croix River at Afton, MN	05341770		Temp., D.O., pH, S.C.	1977-83
Vermillion River near Empire, MN	05345000	110	Temp., D.O., pH, S.C.	1974-91
			C., Bio.	1990-91, 97, 98
Mississippi River at Lock and Dam 3 near Red Wing, MN	05344980	46,000	Temp., D.O., pH, S.C.	1976-83
Mississippi River at Red Wing, MN	05355250	46,800	C., Bio., Sed., Temp., D.O., pH, S.C.	1996-98
South Fork Zumbro River at Rochester, MN	05372995	303	Sed., Temp.	1981-82
Zumbro River at Kellogg, MN	05374900	1400	Sed., Temp.	1975-81
North Fork Whitewater River near Elba, MN	05376000	101	C., Bio., Sed., Temp, D.O., pH, S.C.	1967-93
Middle Fork Whitewater River near St. Charles, MN	05376100		Sed., Temp., S.C.	1988-92
Whitewater River near Beaver, MN	05376800	271	Sed., Temp.	1975-81
Mississippi River at Winona, MN	05378500	59,200	C., Bio., D.O., pH	1963-66, 76-88
Root River near Houston, MN	05385000	1270	Sed.,Temp.	1975-81
South Fork Root River near Houston, MN	05385500	275	Sed., Temp.	1975-81
Cedar River near Austin, MN	05457000	425	Sed., Temp., S.C.	1971, 73-75, 78-81
Des Moines River at Jackson, MN	05476000	1220	C., Bio., D.O., pH, S.C.	1968-69, 73-76, 78, 83, 89-90, 94-95, 98
			Sed., Temp	1968-81

INTRODUCTION

Water Resources Division of the U.S. Geological Survey (USGS), in cooperation with State agencies, obtains a large amount of data pertaining to the water resources of Minnesota each water year. These data, accumulated during many years, constitute a valuable data base for developing an improved understanding of the water resources of the State. To make these data readily available to interested parties outside the USGS, the data are published annually in this report series entitled "Water Resources Data - Minnesota."

Water-resources data for the 1999 water year (hereinafter 1999) for Minnesota consist of records of stage, discharge, and water quality of streams; and stage of lakes and reservoirs; and water quality of ground water. This volume contains discharge records for 103 stream-gaging stations; stage for 11 lakes and reservoirs; water quality for 13 stream-gaging stations; peak flow data for 87 high-flow partial-record stations; and 15 ground-water observation wells. These data represent a part of the National Water Data System collected by the USGS and cooperating State and Federal agencies in Minnesota.

This series of annual reports for Minnesota began with the 1961 water year with a report that contained only data relating to the quantities of surface water. For the 1964 water year, a similar report was introduced that contained only data relating to water quality. Beginning with the 1975 water year, the report was changed to present, in one volume, data on quantities of surface water, quality of surface and ground water, and ground-water levels.

Prior to introduction of this series and for several water years concurrent with it, water-resources data for Minnesota were published in U.S. Geological Survey Water-Supply Papers. Data on stream discharge and stage and on lake or reservoir contents and stage, through September 1960, were published annually under the title "Surface-Water Supply of the United States, Parts 4, 5 and 6A." For the 1961 through 1970 water years, the data were published in two 5-year reports. Data on chemical quality, temperature, and suspended sediment for the 1941 through 1970 water years were published annually under the title "Quality of Surface Waters of the United States," and water levels for the 1935 through 1974 water years were published under the title "Ground-Water Levels in the United States." The above mentioned Water-Supply papers can be consulted in the libraries of the principal cities of the United States and may be purchased from the U.S. Geological Survey Branch of Information Services, Denver Federal Center, Box 25286, Denver, Colorado 80225.

Publications similar to this report are published annually by the USGS for all States. These official Survey reports have an identification number consisting of the two-letter State abbreviation, the last two digits of the water year, and volume number. For example, this volume is identified as the "U.S. Geological Survey Water-Data Report MN-99-1." For archiving and general distribution, the reports for 1971-74 water years also are identified as water-data reports. These water-data reports are for sale in paper copy or in microfiche by the National Technical Information Service, U.S. Department of Commerce, Springfield, Virginia 22161.

Additional information, including current prices, 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 (763) 783-3100.

COOPERATION

The USGS and agencies of the State of Minnesota have had cooperative agreements for the systematic collection of streamflow records since 1909, for ground-water levels since 1948, and for water-quality records since 1952. Organizations that assisted in collecting data through cooperative agreement with the USGS are:

— Minnesota Department of Natural Resources
— Minnesota Department of Transportation
— Minnesota Pollution Control Agency
— Grand Portage Reservation Tribal Council
— Elm Creek Conservation Commission
— Red River Watershed Management Board
— City of Rochester
— Bois Forte Reservation Tribal Council
— Prairie Island Indian Community.

Assistance in the form of funds or services was given by the U.S. Army Corps of Engineers, U.S. Department of State, and the Federal Energy Regulatory Commission. Other organizations that supplied data are acknowledged in station descriptions.

SUMMARY OF HYDROLOGIC CONDITIONS

Precipitation

Most of Minnesota received near normal precipitation ("normal" being the statistical median based on data from 1961-90) during the 1999 water year (figs. 1 and 2). The deviations from normal ranged from 0.3 inches below normal in the southwest to 13.8 inches above normal in the northeast. Statewide, the precipitation totals for the 1999 water year averaged 7.2 inches (127 percent) above normal.

Precipitation totals for the first quarter, October 1 to December 31, 1998, ranged from 231 percent of normal in the northwest to 93 percent of normal in the southeast, with the statewide average of 154 percent of normal. Most of the precipitation occurred in October, with the northwest part of the State receiving over 5 inches, or 331 percent of normal that month. The greatest snowfalls occurred in November, but unseasonably warm temperatures melted off most of the snow pack by mid-December.

Precipitation for the second quarter, January 1 to March 31, 1999, was an average of 94 percent below normal statewide. Greatest deviations from normal were 115 percent in the northwest to 74 percent in the southwest with most of the State having near-normal precipitation totals for this quarter. Largest monthly deviations occurred in the west-central and central parts of the State with just 21 and 18 percent respectively of normal precipitation during February.

For the third quarter, April 1 to June 30, 1999, precipitation totals were near normal to above normal for the entire state, ranging from 102 percent in the west-central to 152 percent of normal in the south-central. The southern one-third of the state received over 200 percent of normal precipitation for April. For the remainder of the state, May produced precipitation totals ranging from 118 percent of normal in the southwest to 232 percent of normal in the north-central.

The final quarter, July 1 to September 30, 1999, saw precipitation totals range from 180 percent of normal in the northeast to 74 percent of normal in the southwest. Precipitation amounts were generally above normal in the north to near normal for the remainder of the stage in July and by September were near normal in the north, to below normal in the south.

Precipitation data not derived from figures 1 and 2 were obtained through the World Wide Web at: http://mcc.sws.uiuc.edu/index.html

Surface Water

Figure 3 shows monthly-mean and annual-mean discharges for water year 1999 compared to normal (median of monthly-mean discharges for the period 1961-90) for 7 streamflow gaging stations. These stations are located in 4 major basins—Lake Superior, Red River of the North, Lake of the Woods, and the upper Mississippi River. The 1999 annual-mean discharges were greater than the 30-year median of annual mean discharges for all seven gaging stations except Crow River at Rockford, which was near normal.

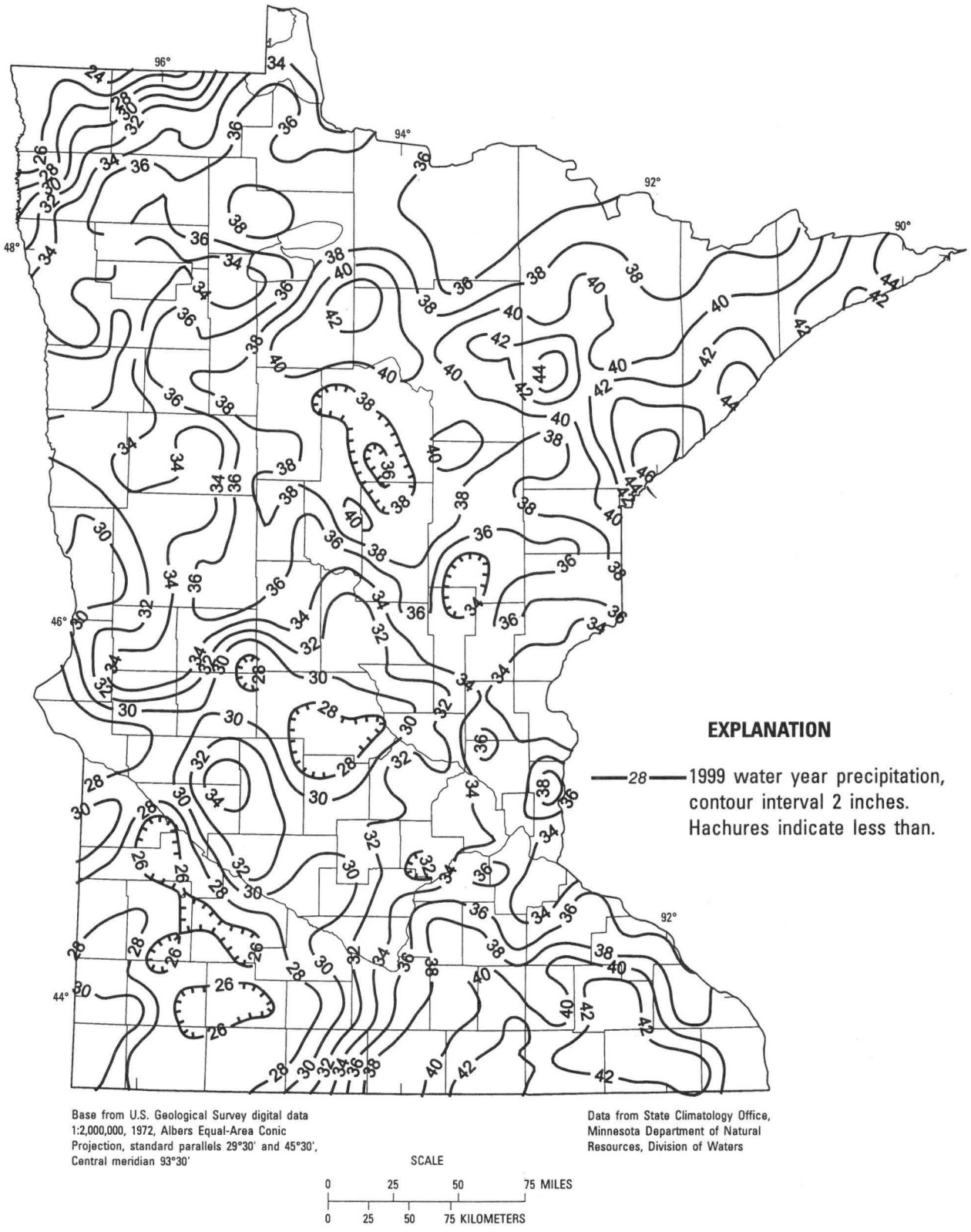


Figure 1. Precipitation, in inches, during 1999 water year in Minnesota.

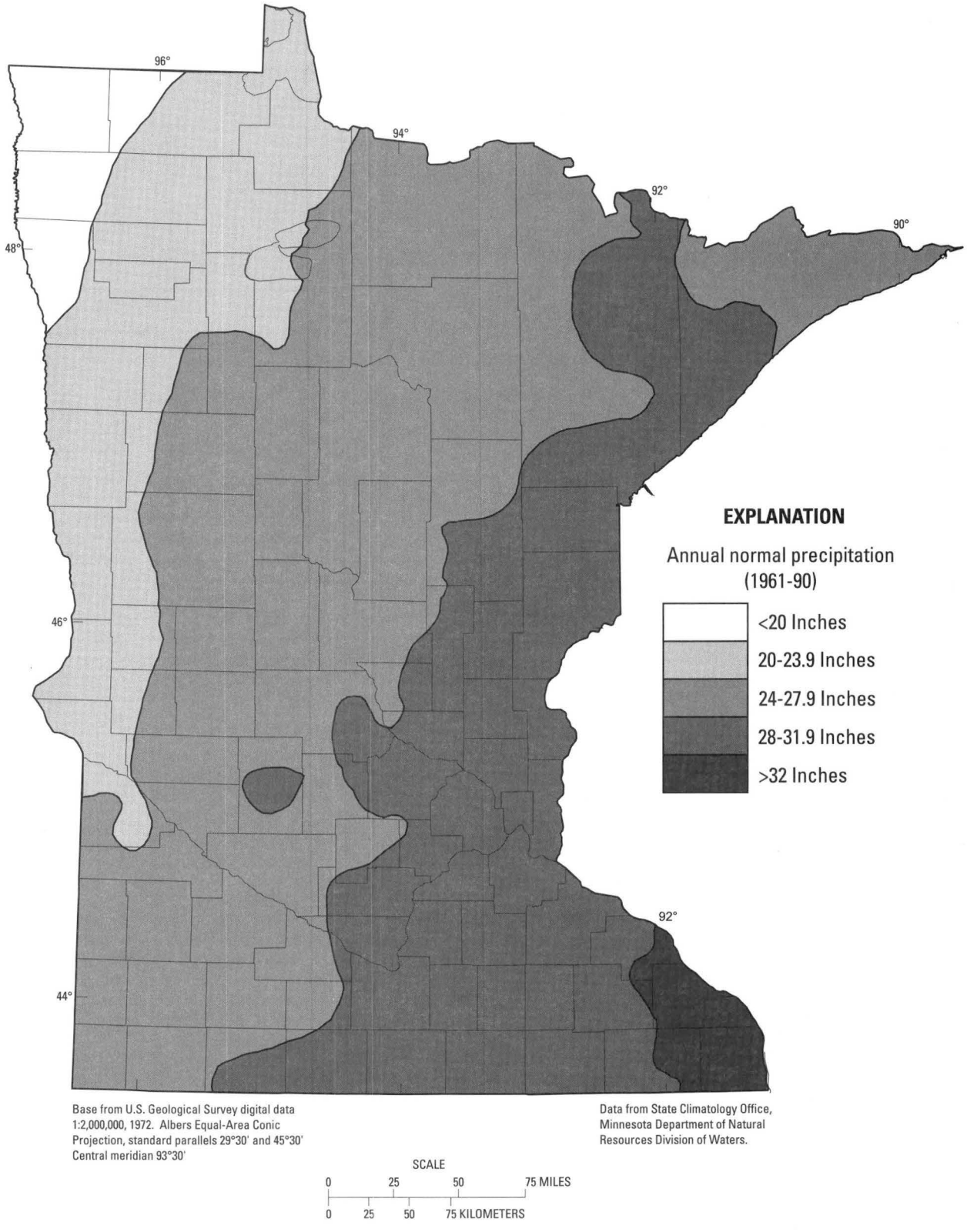


Figure 2. Average annual precipitation, in inches, for 30-year period, 1961-90, in Minnesota.

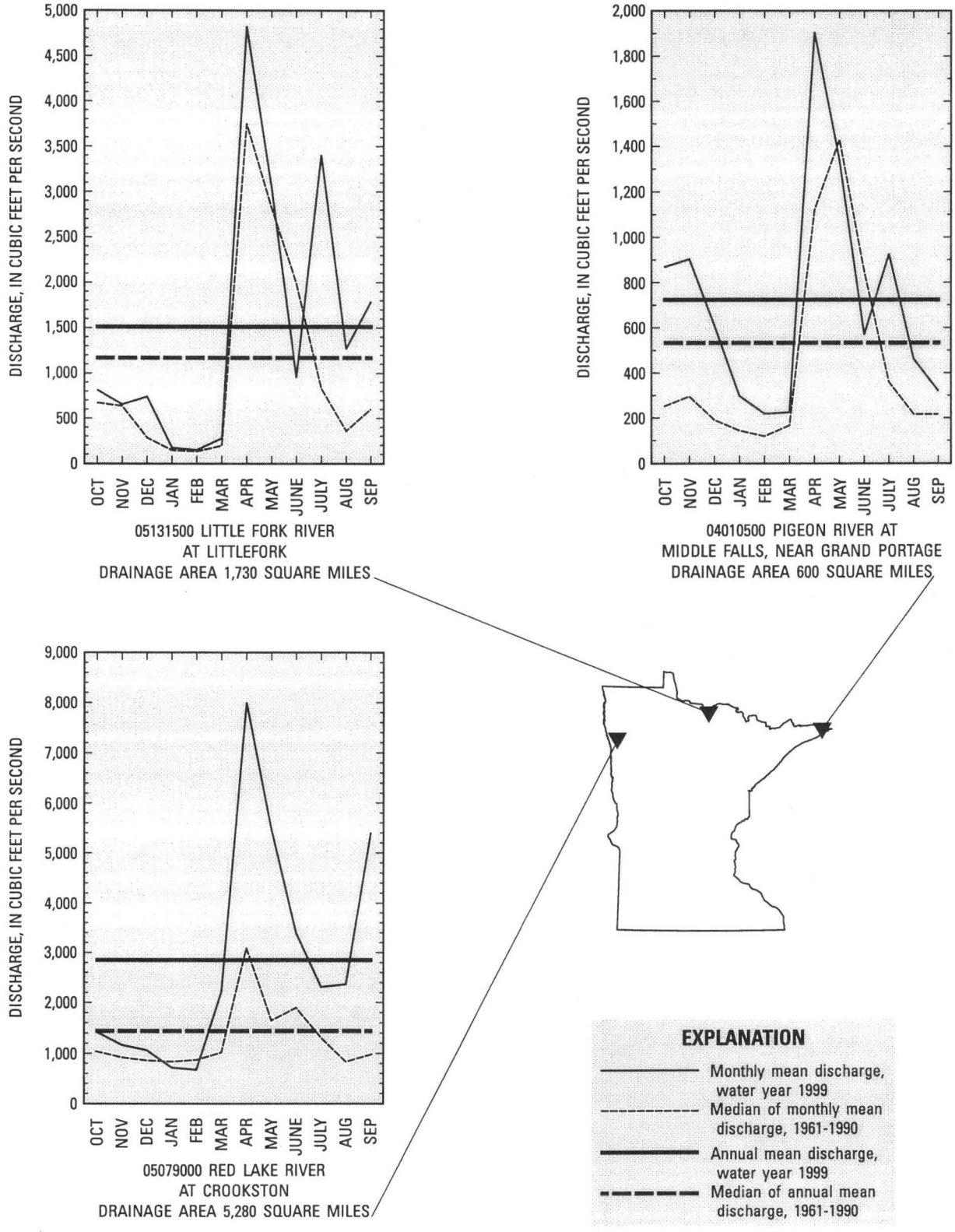
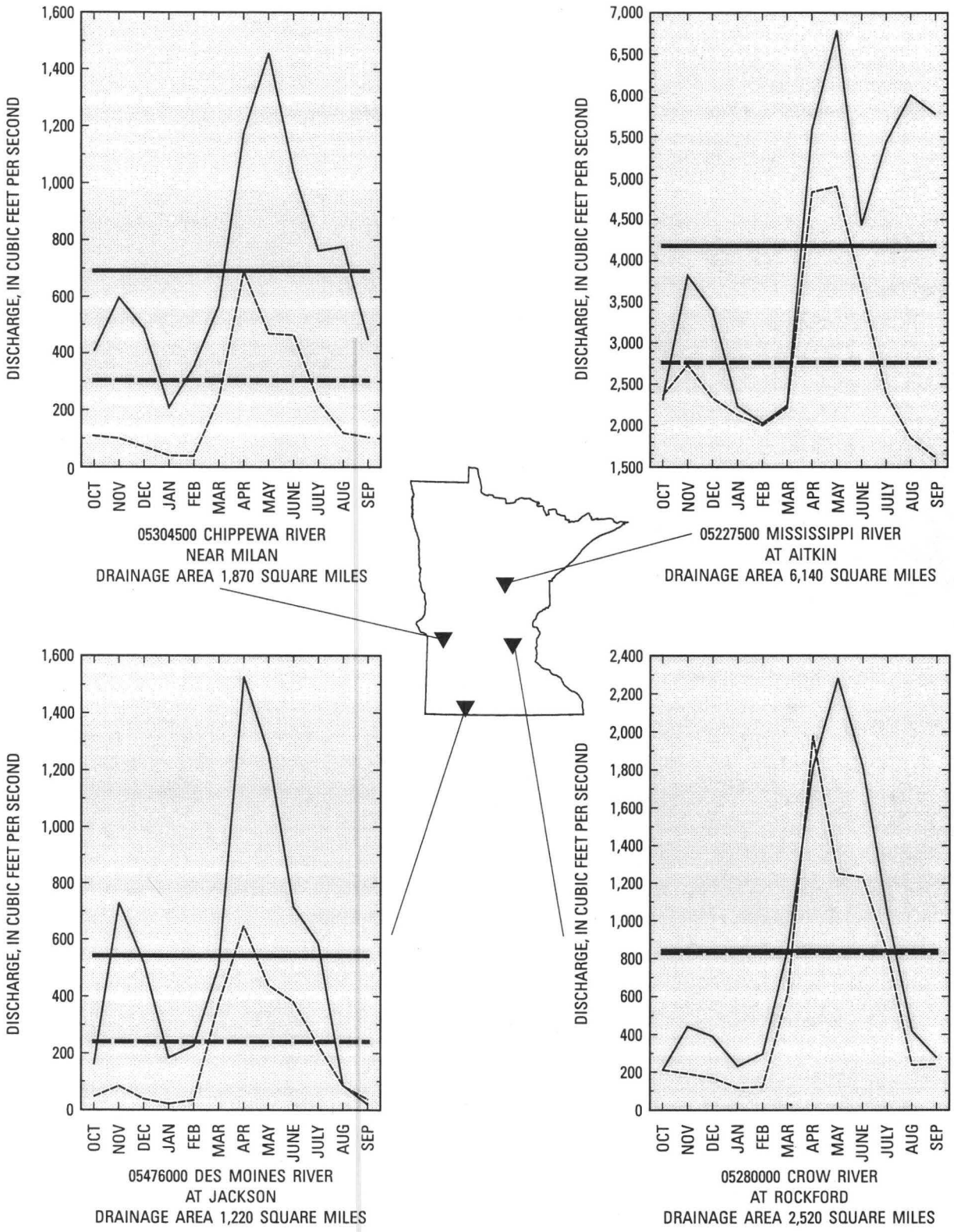


Figure 3. Comparison of mean discharge for the 1999 water year with the median



of mean discharges for 1961-90 at seven long-term representative gaging stations.

Monthly-mean discharges for the Pigeon River at Middle Falls near Grand Portage were above normal except during May and June. Departures from normal ranged from 67 percent below normal (June) to 344 percent above normal (October). The annual-mean discharge for 1999 was 720 ft^3/s, or 136 percent of normal. Annual runoff was 16.1 inches, an increase of 11.0 inches from the previous year.

Above normal monthly-mean discharges occurred every month except January and February, for the Red Lake River at Crookston, which is in the Red River of the North Basin. Flows in January and February were 86 and 77 percent of normal, while flows for the remaining months ranged from 124 percent of normal in December to 1,810 percent of normal in September. Annual runoff for 1999 was 7.4 inches, an increase of 2.3 inches from the previous year. Annual-mean discharge was 2,850 ft^3/s, which is 198 percent of normal.

Monthly-mean discharges for the Little Fork River at Littlefork, which is in the Lake of the Woods Basin, were above normal except during June. June flows were 48 percent of normal while flows for the year were from 103 percent (November) to 410 percent (July) above normal. Annual-mean discharge for 1999 was 1510 ft^3/s, which is 129 percent of normal. Annual runoff for 1999 was 12.2 inches, an increase of 7.3 inches from the previous year.

Flows in the Mississippi River at Aitkin were normal during October, February and March, and above normal the remainder of the year. Flows were as high as 356 percent of normal by September. The annual-mean discharge of 4,180 ft^3/s for 1999 is 151 percent of normal, and annual runoff was 9.2 inches or 3.5 inches greater than last year.

Flows in the Crow River at Rockford, located about 30 miles west of the Twin Cities in the Mississippi River Basin, were above normal except during October, which was normal, and April which was 91 percent of normal. Flows ranged as high as 197 and 243 percent of normal for January and February. The annual-mean discharge of 840 ft^3/s for 1999 is 101 percent of normal. Annual runoff was 4.3 inches, or 1.9 inches less than last year.

In the Chippewa River near Milan, monthly-mean flows were above normal for the entire year. Departures from normal ranged from 171 percent in April to 928 percent in February. The annual-mean discharge for 1999 was 690 ft^3/s, which was 227 percent of normal. Annual runoff was 5.0 inches, or 1.3 inches more than the previous year.

Flows in the Des Moines River at Jackson in southwest Minnesota were also above normal throughout the year except for August, which was normal, and September, which was 50 percent of normal. Aside from October 1997, September is the first month since May 1991 with flows below normal. Monthly-mean flows for the remainder of the year ranged from 135 percent to 1360 percent of normal. The annual-mean discharge of 540 ft^3/s for 1999 was 225 percent of normal. Annual runoff was 5.9 inches, or 3.0 inches more than last year.

For stations with over 10 years of continuous record, one site, Knife River at Two Harbors, had a peak flow of record in the 1999 water year. The discharge was 9100 ft^3/s at a peak stage of 12.14 ft. The peak occurred on July 5th. There were no record lows for long term stations.

Ground-Water Levels

The current observation-well network includes 15 wells of which 13 are equipped with recorders. These wells include three in surficial-sand aquifers, one in the St. Peter aquifer, eight in the Prairie du Chien-Jordan aquifer, two in the Franconia-Ironton-Galesville aquifer, and one in the Mount-Simon-Hinckley-Fond du Lac aquifer.The location of these wells is shown in figure 8.

SPECIAL NETWORKS AND PROGRAMS

Hydrologic Bench-Mark 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 to (1) describe the long-term trends and changes in concentration and transport of these constituents; (2) test findings of the NAWQA; (3) characterize processes unique to large-river systems such as storage and re-mobilization of sediments and associated contaminants; and (4) 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 SO_2 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 SO_2 and NO_x 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 Water-Quality Assessment (NAWQA) Program of the USGS 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 that 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. 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 NAWQA is available through the World Wide Web at:

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

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 the surface and ground water, and ground-water-level data. 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 were collected, analyzed, computed, and arranged for presentation.

STATION IDENTIFICATION NUMBERS

Each data station, whether stream site or well, in this report is assigned a unique identification number. This number is unique in that it applies specifically to a given station. The number usually is assigned when a station is first established and is retained for that station indefinitely. The system used by the USGS 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 and, in Minnesota, for surface-water stations where only miscellaneous measurements are made.

Downstream Order System and Station Number

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

As an added means of identification, each hydrologic station and partial-record station has been assigned a station number. These are in the same downstream order in this report. 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 05041000, which appears just to the left of the station name, includes the two-digit part number "05" plus the six-digit downstream order number "041000."

Numbering System for Wells and Miscellaneous Sites

The eight-digit downstream order station numbers are not assigned to wells and miscellaneous sites where only random water-quality samples or discharge measurements are taken.

The well and miscellaneous site numbering system of the USGS is based on the grid system of latitude and longitude. The system provides the geographic location of the well or miscellaneous site and a unique number for each site. 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 one-second grid. See figure 4. Each well site is also identified by a local well number, which consists of township, range, and section numbers, three letters designating 1/4, 1/4, 1/4 section location, and a two-digit sequential number.

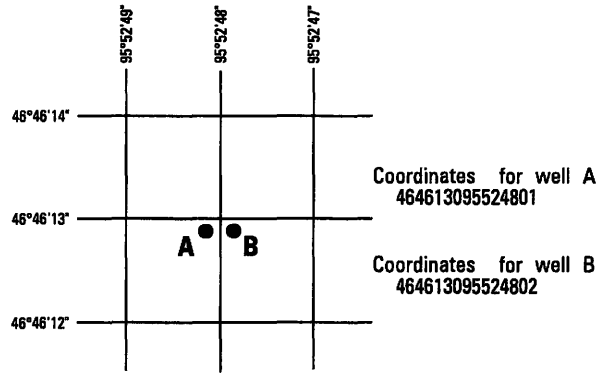


Figure 4. Example of system for numbering wells and miscellaneous sites.

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 discharge may be computed for anytime, 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."

By contrast, partial records are obtained through discrete measurements without using a continuous stage-recording device and pertain only to a few flow characteristics, or perhaps only one. The nature of the partial record is indicated by table titles such as "High-flow partial records," or "Low-flow partial records." Records of miscellaneous discharge measurements or of measurements from special studies, such as low-flow seepage studies, may be considered as partial records, but they are presented separately in this report. Location of all continuous-record, surface-water-quality, and high-flow partial-record stations for which data are given in this report are shown in figures 5, 6, and 7.

Data Collection and Computation

The data obtained at a complete-record gaging station on a stream or canal consist of a continuous record of stage, individual measurements of discharge throughout a range of stages, and notations regarding factors that may affect the relations between stage and discharge. These 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 consist of a record of stage and of notations regarding factors that may affect the relation between stage and lake content. These data are used with stage-area and stage-capacity curves or tables to compute water-surface areas and lake storage.

Records of stage are obtained with recorders that trace continuous graphs of stage or encode stage values at selected time intervals and store on a variety of media. Measurements of discharge are made with current

meters using methods adapted by the USGS as a result of experience accumulated since 1880. These methods are described in standard textbooks, in U.S. Geological Survey Water-Supply Paper 2175, and in U.S. Geological Survey Techniques of Water-Resources Investigations (TWRI), 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 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 relation 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 time since the last survey increases. Discharge over lake or reservoir spillways are computed from stage-discharge relations much as other stream discharges are computed.

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. For such periods, the daily discharges are estimated from the recorded range in stage, previous or following 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 preferences.

The records published for each continuous-record surface-water discharge station (gaging station) now 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 the 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, given for only a few stations, 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 when 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--Published records, because of new information, occasionally are found to be incorrect, and revisions are printed in later reports. Listed under this heading are all reports in which revisions have been published for the station and 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)" means that only the instantaneous minimum was revised; and "(P)" means 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 referred to National Geodetic Vertical Datum of 1929 (see glossary), and a condensed history of the types, locations, and datum 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. If

a remarks statement 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, to conditions that affect natural flow at the station 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 USGS by a cooperating organization are identified here.

EXTREMES OUTSIDE PERIOD OF RECORD--Included here is the 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 USGS.

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 Minnesota District office (address given on the back of title page of this report) to determine if the published records were ever revised after the station was discontinued. Of course, if the data 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 to 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, except for the listing of secondary instantaneous peak discharges in the EXTREMES FOR CURRENT YEAR paragraph, is now presented in the tabular summaries following the discharge table or in the REMARKS paragraph, as appropriate. No changes have been made to the data presentations of lake contents.

Peak Discharges Greater Than Base Discharge

Tables of peak discharges above base discharge are included for some stations where secondary instantaneous peak discharges are used in flood-frequency studies of highway and bridge design, flood-control structures, and other flood-related projects. The base discharge value is selected so an average of three peaks a year will be reported. This base discharge value has a recurrence interval of approximately 1.1 years.

Data Table of Daily-Mean Values

The daily table of discharge records for stream-gaging stations gives mean discharge for each day of the water year. In the monthly summary for the table, the line headed TOTAL gives the sum of the daily figures for each month; the line headed MEAN gives the average flow in cubic feet per second for the month; and the lines headed MAX and MIN give the maximum and minimum daily-mean discharges, respectively, for each 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 or in acre-feet may be omitted if there is extensive regulation or diversion or if the drainage area includes large noncontributing areas. At some stations, monthly and (or) yearly observed discharges are adjusted for reservoir storage or diversion, or diversion data 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 WATER YEARS 19__-19__, BY WATER YEAR (WY), and will list the first and last water years of the range of years selected from 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.

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, WATER YEARS 19__-19__, 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. 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 yearly-mean discharge is adjusted for reservoir storage or diversion. The adjusted figures are identified by 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 Minnesota District computer files for stations meeting certain criteria. Those discharge values may be obtained by writing to the Minnesota 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 (CFSM) 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 by 10 percent of the flow for the designated period.

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

90 PERCENT EXCEEDS--The discharge that is exceeded by 90 percent of the flow 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 discharge measurements at low-flow partial-record stations, and the second is a table of annual maximum stage and discharge at crest-stage stations. The tables of partial-record stations are followed by a listing of discharge measurements 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 either by flagging individual daily values with the letter symbol "e" and printing a table footnote, "e Estimated," or by listing the dates of the estimated record in the REMARKS paragraph of the station description.

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 the true; "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; to 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 unless satisfactory adjustments can be made for diversions, for changes in contents of reservoirs, or for other changes incident to use and control. Evaporation from a reservoir is not included in the adjustments for changes in reservoir contents, unless it is so stated. Even at those stations where adjustments are made, large errors in computed runoff may occur if adjustments or losses are large in comparison with the observed discharge

Other Records Available

Information of a more detailed nature than that published for most of the gaging stations, such as observations of water temperatures, discharge measurements, gage-height records, and rating tables, is on file in the Minnesota District office. Also most gaging-station records are available in computer-usable form and many statistical analyses have been made.

Information on the availability of unpublished data or statistical analyses may be obtained from the district office.

The National Water Data Exchange, Water Resources Division, U.S. Geological Survey, National Center, Reston, VA 22092, maintains an index of all discharge-measurement sites in the State as well as an index of records of discharge collected by other agencies but not published by the USGS. Information on records available at specific sites can be obtained upon request.

RECORDS OF SURFACE-WATER QUALITY

Records of surface-water quality ordinarily are obtained at or near stream-gaging 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 are collected on a regularly scheduled basis. Frequency may be one or more times daily, weekly, monthly, or quarterly. A **partial-record station** is a site where limited water-quality data are 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 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, most data are obtained only monthly or less frequently. Locations of stream-gaging stations for which records on the quality of surface water appear in this report are shown in figure 6.

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 Measurement and Sample Collection

Water-quality data must be representative of the in situ quality of water. To assure this, certain measurements, such as water temperature, pH, and dissolved oxygen, need to be made onsite when the samples are taken. To assure that measurements made in the laboratory also represent the in situ water, carefully prescribed procedures need to be 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 for on-site measurements and for collecting, treating, and shipping samples are given in publications on U.S. Geological Survey Techniques of Water-Resources Investigations, book 1, chap. D2; book 3, chap. C2; book 5 chaps. A1, A3, and A4. All of these references are listed on pages 22-24 of this report. Also, detailed information on collecting, treating, and shipping samples may be obtained from the USGS Minnesota 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 a representative sample needed for an accurate mean concentration and for use in calculating load. All samples obtained for the National Stream Quality Accounting Network (see definitions) 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 the 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. In the rare case where an apparent inconsistency exists between a reported pH value and the relative abundance of carbon dioxide species (carbonate and bicarbonate), the inconsistency is the result of a slight uptake of carbon dioxide from the air by the sample between measurement of pH in the field and determination of carbonate and bicarbonate in the laboratory.

For chemical-quality stations equipped with digital monitors, the records consist of daily maximum, minimum, and mean values for each constituent measured and are based upon hourly punches beginning at 0100 hours and ending at 2400 hours for the day of record. More detailed records (hourly values) may be obtained from the USGS Minnesota District office.

Water Temperature

Water temperatures are measured at most of the water-quality stations. In addition, water temperatures are taken at time of discharge measurements for water-discharge stations. For stations where water temperatures are taken manually once or twice daily, the water temperatures are taken at about the same time each day. Large streams have a small diurnal temperature change; shallow streams may have a daily range of several degrees and may follow closely the changes in air temperature. Some streams may be affected by waste-heat discharges.

At stations where recording instruments are used, either mean temperatures or maximum and minimum temperatures for each day are published. Water temperatures measured at the time of water-discharge measurements are on file in the Minnesota District office.

Sediment

Suspended-sediment concentrations are determined from samples collected by using depth-integrating samplers. 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 loads 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 suspended-sediment discharge, records of the periodic measurements of the particle-size distribution of the suspended sediment and bed material are included for some stations.

Laboratory Measurements

Samples for indicator bacteria and specific conductance are analyzed locally. All other samples are analyzed in the Geological Survey

laboratories in Arvada, Colorado; Doraville, Georgia; or Iowa City, Iowa. Methods used in analyzing sediment samples and computing sediment records are given in U.S. Geological Survey Techniques of Water Resources Investigations, book 5, chap. C1. Methods used by the USGS laboratories are given in U.S. Geological Survey Techniques of Water Resources Investigation, book 1, chap. D2; book 3, chap. C2; book 5, chaps. A1, A3, and A4.

Data Presentation

For continuous-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, 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, when 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 recorder, 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 USGS 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 USGS water-quality data are encouraged to obtain all required data from the appropriate computer file to ensure 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.

Remark Codes

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

PRINTED OUTPUT	REMARK
e	Estimated value
>	Actual value is known 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 organisms count less than 0.5 percent (organisms may be observed rather than counted)
D	Biological organism count equal to or greater than 15 percent (dominant)
V	Analyte was detected in both the environmental sample and the associated blanks
&	Biological organism estimated as dominant.

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 SAMPLE--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

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 USGS 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, Colorado 80523 (303-491-5643).

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.

Data Collection and Computation

The records of ground-water quality in this report were obtained mostly as a part of special studies in specific areas. Consequently, a number of chemical analyses are presented for some counties, but none are presented for others. As a result, the records for this year, by themselves, do not provide a balanced view of ground-water quality statewide. Such a view can be attained only by considering records for this year in context with similar records obtained for these and other counties in earlier years.

Most methods for collecting and analyzing water samples are described in the U.S. Geological Survey Techniques of Water-Resources Investigation manuals listed on pages 22-25. 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, possibly metal, comprising the casings.

Data Presentation

The records of ground-water quality are published in the section entitled QUALITY OF GROUND WATER. Data for quality of ground water are listed alphabetically, by county, and are identified by well number. The prime identification number for wells sampled is the 15-digit number derived from the latitude-longitude locations. No descriptive statements are given for ground-water-quality records; however, the well number, depth of well, date of sampling, 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 also are applicable to ground-water-quality records.

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 and discontinued gaging stations through the World Wide Web. These data may be accessed at:

http://www.water.usgs.gov

Some water-quality and ground-water data also are available through the World Wide Web. 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.

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.

Acid neutralizing capacity (ANC) is the equivalent sum of all bases or base-producing materials, solutes plus particulates, in an aqueous system that can be titrated with acid to an equivalence point. This term designates titration of an "unfiltered" sample (formerly reported as alkalinity).

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.

Adenosine triphosphate (ATP) is an organic, phosphate-rich, compound important in the transfer of energy in organisms. Its central role in living cells makes it an excellent indicator of the presence of living material in water. A measurement of ATP therefore provides a sensitive and rapid estimate of biomass. ATP is reported in micrograms per liter.

Algae are mostly aquatic single-celled, colonial, or multicelled plants containing chlorophyll and lacking roots, stems, and leaves.

Algal growth potential (AGP) is the maximum algal dry weight biomass that can be produced in a natural water sample under standardized laboratory conditions. The growth potential is the algal biomass present at stationary phase and is expressed as milligrams dry weight of algae produced per liter of sample.

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.

Aroclor is the registered trademark for a group of polychlorinated biphenyls that were manufactured by the Monsanto Company prior to 1976. Aroclors are assigned specific 4-digit reference numbers dependent upon molecular type and degree of substitution of the biphenyl ring hydrogen atoms by chlorine atoms. The first two digits of a numbered aroclor represent the molecular type and the last two digits represent the weight percent of the hydrogen substituted chlorine.

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.

Fecal streptococcal bacteria are bacteria found in the intestine of warm-blooded animals. Their presence in water is considered to verify fecal pollution. They are characterized as gram-positive, cocci bacteria that are capable of growth in brain-heart infusion broth. In the laboratory, they are defined as all the organisms that produce red or pink colonies within 48 hours at 35 °C plus or minus 1.0 °C on KF-streptococcus 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.

Benthic organisms (invertebrates) are the group of animals inhabiting the bottom of an aquatic environment. They include a number of types of organisms, such as bacteria, fungi, insect larvae and nymphs, snails, clams, and crayfish. They are useful as indicators of water quality.

Biochemical oxygen demand (BOD) is a measure of the quantity of dissolved oxygen, in milligrams per liter, necessary for the decomposition of organic matter by microorganisms, such as bacteria.

Biomass is the amount of living matter present at any given time, expressed as mass per unit area or volume of habitat.

Ash mass is the mass or amount of residue present after the residue from the dry mass determination has been ashed in a muffle furnace at a temperature of 500 °C for 1 hour. Ash mass of zooplankton and phytoplankton is expressed in grams per cubic meter (g/m^3), and periphyton and benthic organisms in grams per square meter (g/m^2).

Dry mass refers to the mass of residue present after drying in an oven at 105 °C for zooplankton and periphyton, until the mass remains unchanged. This mass represents the total organic matter, ash, and sediment in the sample. Dry mass is expressed in the same units as ash mass.

Organic mass or volatile mass of the living substance is the difference between the dry mass and ash mass and represents the actual mass of the living matter. Organic mass is expressed in the same units as for ash mass and dry mass.

Wet mass is the mass of living matter plus contained water.

Biomass pigment ratio is an indicator of the total proportion of periphyton which are autotrophic (plants). This is also called the Autotrophic Index.

Bottom material: See "Bed material."

Cells/volume refers to the number of plankton cells or natural units counted using a microscope and grid or counting cell. Results are generally reported as cells or units per milliliter.

Cells volume (biovolume) determination is one of several common methods used to estimate biomass of algae in aquatic systems. Cell members of algae are frequently used in aquatic surveys as an indicator of algal production. However, cell numbers alone cannot represent true biomass because of considerable cell-size variation among the algal species. Cell volume (μm^3) is determined by obtaining critical cell measurements on cell dimensions (for example, length, width, height, or radius) for 20 to 50 cells of each important species to obtain an average biovolume per cell. Cells are categorized according to the correspondence of their cellular shape to the nearest geometric solid or combinations of simple solids (for example, spheres, cones, or cylinders). Representative formulae used to compute biovolume are as follows:

sphere $4/3\ \pi r^3$ cone $1/3\ \pi r^3 h$ cylinder $\pi r^3 h$.

From cell volume, total algal biomass expressed as biovolume (μm^3/mL) is thus determined by multiplying the number of cells of a given species by its average cell volume and then summing these volumes over all species.

Chemical oxygen demand (COD) is a measure of the chemically oxidizable material in the water and furnishes an approximation of the amount of organic and reducing material present. The determined value may correlate with BOD or with carbonaceous organic pollution from sewage or industrial wastes.

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:

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.

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.

Diel is of or pertaining to a 24-hour period of time; a regular daily cycle.

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.

Diversity index is a numerical expression of evenness of distribution of aquatic organisms. The formula for diversity index is:

$$\bar{d} = -\sum_{i \approx 1}^{s} \frac{n_i}{n} \log_2 \frac{n_i}{n}$$

where n_i is the number of individuals per taxon, n is the total number of individuals, and s is the total number of taxa in the sample of the community. Diversity index values range from zero, when all the organisms in the sample are the same, to some positive number, when some or all of the organisms in the sample are different.

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").

Dry weight refers to the weight of animal tissue after it has been dried in an oven at 65 °C until a constant weight is achieved. Dry weight represents total organic and inorganic matter in the tissue.

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.

Gas chromatography/flame ionization detector (GC/FID) is a laboratory analytical method used as a screening technique for semivolatile organic compounds that are extractable from water in methylene chloride.

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 ($CaCO_3$).

High tide is the maximum height reached by each rising tide. The high-high and low-high tides are the higher and lower of the two high tides, respectively, of each tidal day. *See NOAA web site: http://www.co-ops.nos.noaa.gov/tideglos.html*

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.

Light-attenuation coefficient, also known as the extinction coefficient, is a measure of water clarity. Light is attenuated according to the Lambert-Beer equation

$$I = I_o e^{-\lambda L} \quad ,$$

where I_o is the source light intensity, I is the light intensity at length L (in meters) from the source, λ is the light-attenuation coefficient, and e is the base of the natural logarithm. The light attenuation coefficient is defined as

$$\lambda = -\frac{1}{L} \log_e \frac{I}{I_o} \quad .$$

Lipid is any one of a family of compounds that are insoluble in water and that make up one of the principal components of living cells. Lipids include fats, oils, waxes, and steroids. Many environmental contaminants such as organochlorine pesticides are lipophilic.

Low tide is the minimum height reached by each falling tide. The high-low and low-low tides are the higher and lower of the two low tides, respectively, of each tidal day. *See NOAA web site: http://www.co-ops.nos.noaa.gov/tideglos.html*

Macrophytes are the macroscopic plants in the aquatic environment. The most common macrophytes are the rooted vascular plants that are usually arranged in zones in aquatic ecosystems and restricted in the area by the extent of illumination through the water and sediment deposition along the shoreline.

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.

Metamorphic stage refers to the stage of development that an organism exhibits during its transformation from an immature form to an adult form. This developmental process exists for most insects, and the degree of difference from the immature stage to the adult form varies from relatively slight to pronounced, with many intermediates. Examples of metamorphic stages of insects are egg-larva-adult or egg-nymph-adult.

Methylene blue active substances (MBAS) are apparent detergents. The determination depends on the formation of a blue color when methylene blue dye reacts with synthetic anionic detergent compounds.

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.

Most probable number (MPN) is an index of the number of coliform bacteria that, more probably than any other number, would give the results shown by the laboratory examination; it is not an actual enumeration. MPN is determined from the distribution of gas-positive cultures among multiple inoculated tubes.

Multiple-plate samplers are artificial substrates of known surface area used for obtaining benthic invertebrate samples. They consist of a series of spaced, hardboard plates on an eyebolt.

Nanograms per liter (NG/L, ng/L) is a unit expressing the concentration of chemical constituents in solution as mass (nanograms) of solute per unit volume (liter) of water. One million nanograms per liter is equivalent to 1 milligram per liter.

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*

Nekton are the consumers in the aquatic environment and consist of large free-swimming organisms that are capable of sustained, directed mobility.

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.

Organism count/area refers to the number of organisms collected and enumerated in a sample and adjusted to the number per area habitat, usually square meter (m^2), acre, or hectare. Periphyton, benthic organisms, and macrophytes are expressed in these terms.

Organism count/volume refers to the number of organisms collected and enumerated in a sample and adjusted to the number per sample volume, usually milliliter (mL) or liter (L). Numbers of planktonic organisms can be expressed in these terms.

Total organism count is the total number of organisms collected and enumerated in any particular sample.

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.

Periphyton is the assemblage of microorganisms attached to and living upon submerged solid surfaces. While primarily consisting of algae, they also include bacteria, fungi, protozoa, rotifers, and other small organisms. Periphyton are useful indicators of water quality.

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).

Plankton is the community of suspended, floating, or weakly swimming organisms that live in the open water of lakes and rivers. Concentrations are expressed as a number of cells per milliliter (cells/mL of sample).

Phytoplankton is the plant part of the plankton. They are usually microscopic, and their movement is subject to the water currents. Phytoplankton growth is dependent upon solar radiation and nutrient substances. Because they are able to incorporate as well as release materials to the surrounding water, the phytoplankton have a profound effect upon the quality of the water. They are the primary food producers in the aquatic environment and are commonly known as algae.

Blue-green algae (*Cyanophyta*) are a group of phytoplankton organisms having a blue pigment, in addition to the green pigment called chlorophyll. Blue-green algae often cause nuisance conditions in water.

Diatoms are the unicellular or colonial algae having a siliceous shell. Their concentrations are expressed as number of cells per milliliter (cells/mL) of sample.

Euglenoids (*Euglenophyta*) are a group of algae that are usually free-swimming and rarely creeping. They have the ability to grow either photosynthetically in the light or heterotrophically in the dark.

Fire algae (*Pyrrhophyta*) are a group of algae that are free-swimming unicells characterized by a red pigment spot.

Green algae have chlorophyll pigments similar in color to those of higher green plants. Some forms produce algae mats or floating "moss" in lakes. Their concentrations are expressed as number of cells per milliliter (cells/mL) of sample.

Zooplankton is the animal part of the plankton. Zooplankton are capable of extensive movements within the water column and are often large enough to be seen with the unaided eye. Zooplankton are secondary consumers feeding upon bacteria, phytoplankton, and detritus. Because they are the grazers in the aquatic environment, the zooplankton are a vital part of the aquatic food web. The zooplankton community is dominated by small crustaceans and rotifers.

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.

Primary productivity is a measure of the rate at which new organic matter is formed and accumulated through photosynthetic and chemosynthetic activity of producer organisms (chiefly, green plants). The rate of primary production is estimated by measuring the amount of oxygen released (oxygen method) or the amount of carbon assimilated (carbon method) by the plants.

Primary productivity (carbon method) is expressed as milligrams of carbon per area per unit time [mg C/(m^2/time)] for periphyton and macrophytes or per volume [mg C/(m^3/time)] for phytoplankton. Carbon method defines the amount of carbon dioxide consumed as measured by radioactive carbon (carbon-14). The carbon-14 method is of greater sensitivity than the oxygen light and dark bottle method and is preferred for use in unenriched waters. Unit time may be either the hour or day, depending on the incubation period.

Primary productivity (oxygen method) is expressed as milligrams of oxygen per area per unit time [mg O/(m^2/time)] for periphyton and macrophytes or per volume [mg O/(m^3/time)] for phytoplankton. Oxygen method defines production and respiration rates as estimated from changes in the measured dissolved-oxygen concentration. The oxygen light and dark bottle method is preferred if the rate of primary production is sufficient for accurate measurements to be made within 24 hours. Unit time may be either the hour or day, depending on the incubation period.

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.

Total sediment discharge (tons/day) is the sum of the suspended-sediment discharge and the bed-load discharge. It is the total quantity of sediment, reported as dry weight, that passes a cross section in a given time.

Total sediment load or total load is a term that refers to the total sediment (bed load plus suspended-sediment load) that is in transport. 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 total sediment discharge.

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.

Stable isotope ratio (per MILL/MIL) is a unit expressing the ratio of the abundance of two radioactive isotopes. Isotope ratios are used in hydrologic studies to determine the age or source of specific waters, to evaluate mixing of different waters, as an aid in determining reaction rates, and other chemical or hydrologic processes.

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.

Substrate is the physical surface upon which an organism lives.

Artificial substrate is a device that is purposely placed in a stream or lake for colonization of organisms. The artificial substrate simplifies the community structure by standardizing the substrate from which each sample is taken. Examples of artificial substrates are basket samplers (made of wire cages filled with clean streamside rocks) and multiplate samplers (made of hardboard) for benthic organism collection, and plexiglass strips for periphyton collection.

Natural substrate refers to any naturally occurring immersed or submersed solid surface, such as a rock or tree, upon which an organism lives.

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.

Surficial bed material is the top 0.1 to 0.2 ft of the bed material that is sampled using U.S. Series Bed-Material Samplers.

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.

Taxonomy is the division of biology concerned with the classification and naming of organisms. The classification of organisms is based upon a hierarchial scheme beginning with Kingdom and ending with Species at the base. The higher the classification level, the fewer features the organisms have in common. For example, the taxonomy of a particular mayfly, *Hexagenia limbata,* is the following:

Kingdom	Animal
Phylum	Arthropoda
Class	Insecta
Order	Ephemeroptera
Family	Ephemeridae
Genus	*Hexagenia*
Species	*Hexagenia limbata*

Time-weighted average is computed by multiplying the number of days in the sampling period by the concentrations of individual constituents for the corresponding period and dividing the sum of the products by the total number of days. A time-weighted average represents the composition of water that would be contained in a vessel or reservoir that had received equal quantities of water from the stream each day for the year.

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 length (fish) is the straight-line distance from the anterior point of a fish specimen's snout, with the mouth closed, to the posterior end of the caudal (tail) fin, with the lobes of the caudal fin squeezed together.

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

The U.S. Geological Survey 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. Geological Survey, Branch of 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 sent by 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 "U.S. Geological Survey Techniques of Water-Resources Investigations" (TWRI).

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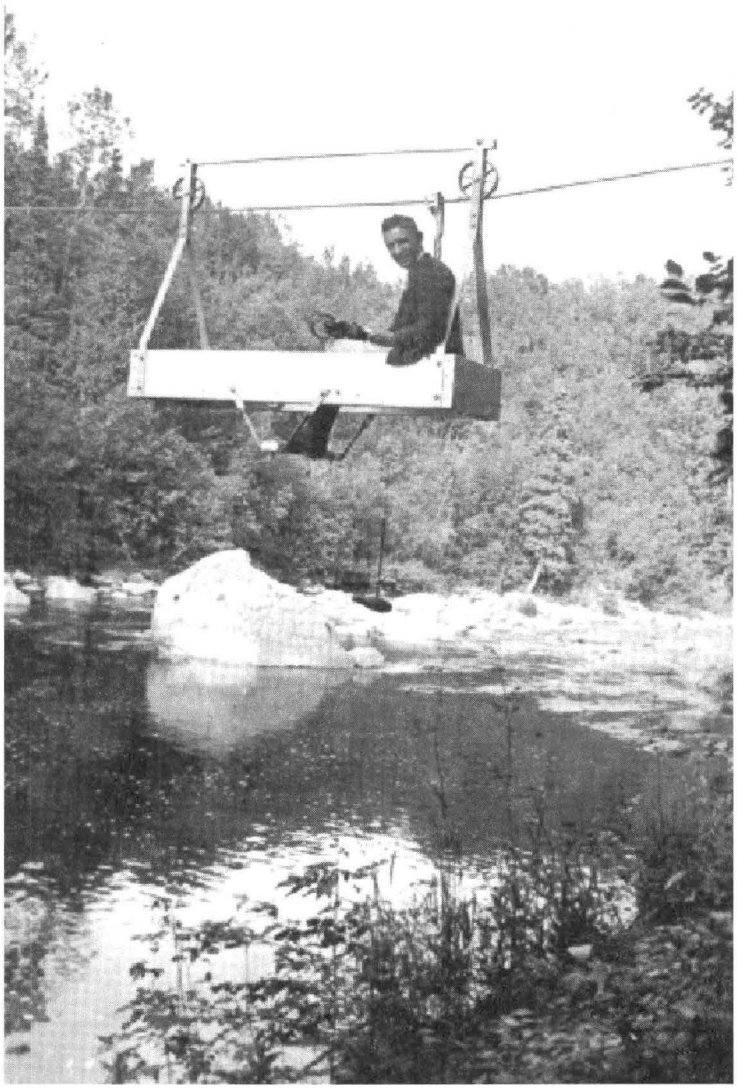
9-A9. *National Field Manual for the Collection of Water-Quality Data: Safety in Field Activities,* by S.L. Lane and R.G. Fay: USGS—TWRI Book 9, Chapter A9. 1998. 60 pages.

Surface-Water Stations



Cableway measurement of Baptism River, 1935.

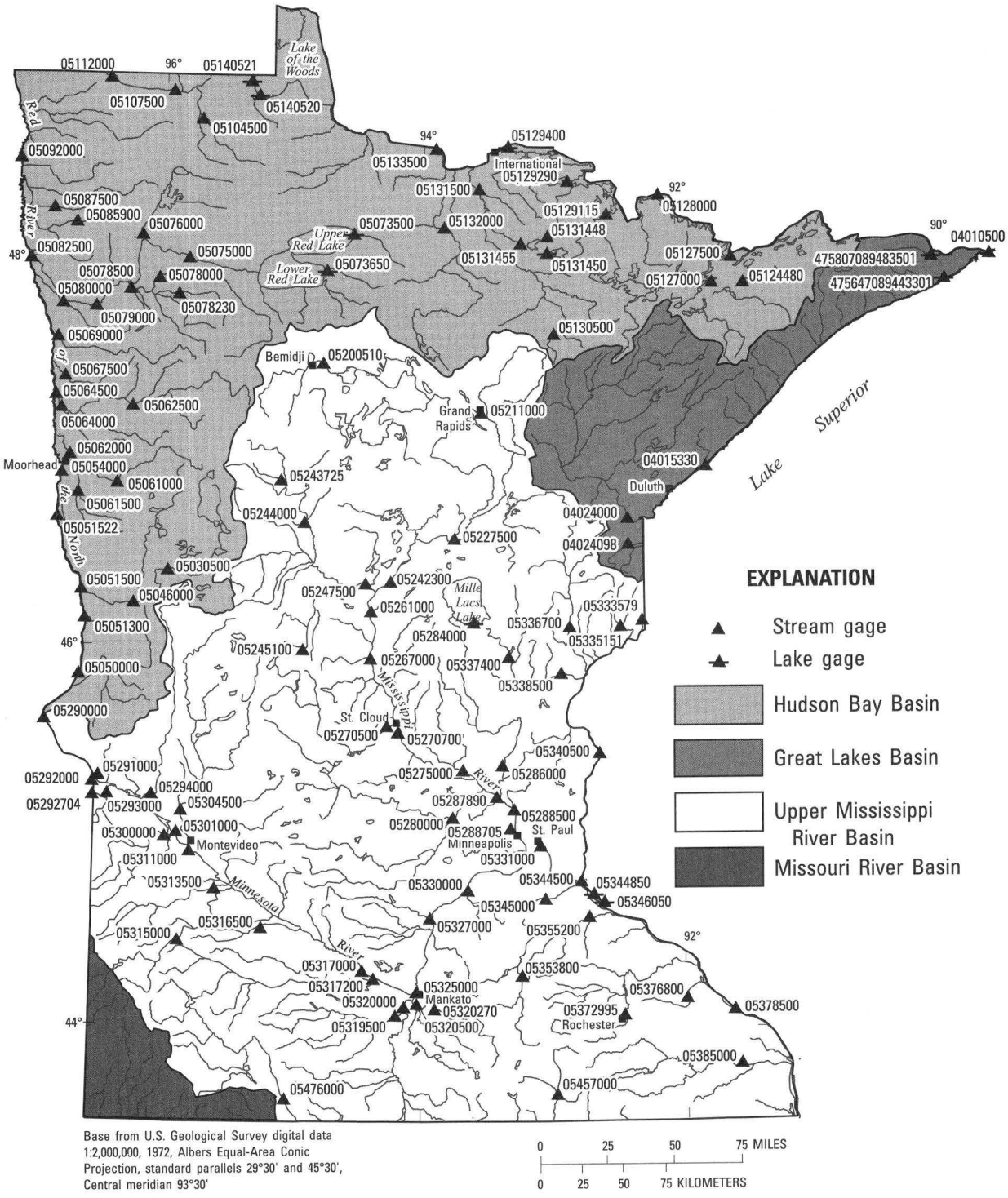


Figure 5. Location of lake and stream-gaging stations.

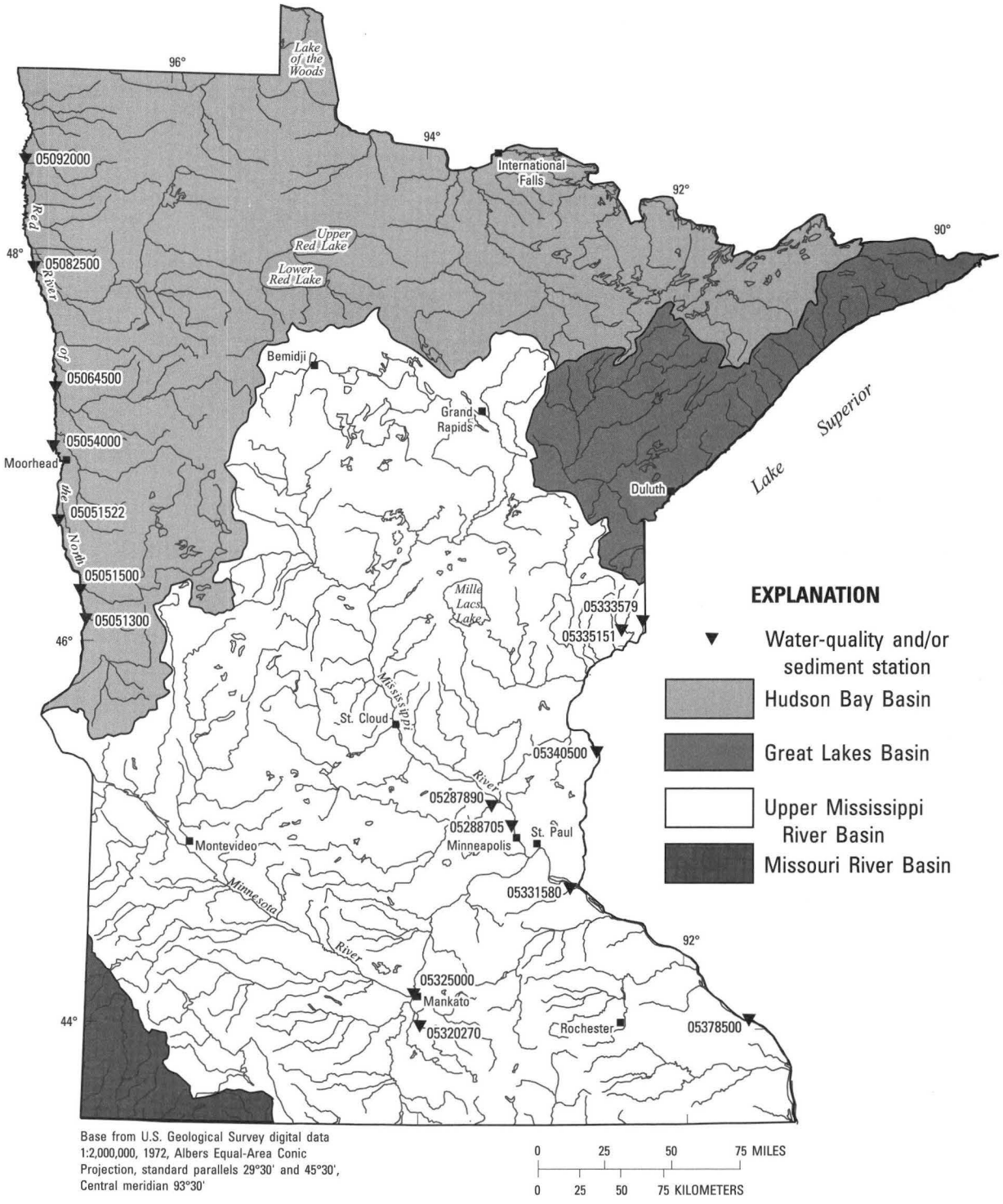


Figure 6. Location of surface-water quality stations.

04010500 PIGEON RIVER AT MIDDLE FALLS, NEAR GRAND PORTAGE, MN
(International gaging station)

LOCATION.--Lat 48°00'44", long 89°36'58", in SW¼NE¼ sec. 24, T.64 N., R.6 E., Cook County, Hydrologic Unit 04010101, on the Grand Portage Indian Reservation, on right bank 400 ft upstream from Middle Falls, 2.5 mi upstream from Grand Portage Port of Entry, 3.5 mi upstream from mouth, and 4.7 mi northeast of city of Grand Portage.

DRAINAGE AREA.--609 mi^2.

PERIOD OF RECORD.--June to October 1921, April to November 1922, March 1923 to current year. Published as "at International Bridge" April 1924 to September 1940; as "below International Bridge" October 1940 to September 1965. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 744:1927-28. WSP 804: 1934(M). WSP 974: Drainage area. WSP 1337:1924(M), 1925, 1926-28(M), 1931(M), 1938(M), 1941(M), 1945-46(M), 1947, 1948(M), 1950(M).

GAGE.--Water-stage recorder. Datum of gage is 787.58 ft above sea level. Prior to Sept. 30, 1940, nonrecording gage at International Bridge, 5.8 mi upstream at datum 102.24 ft higher. Oct. 1, 1940 to Dec. 31, 1975, at present site at datum 2.00 ft higher.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Satellite telemeter at station.

COOPERATION.--This station is one of the international gaging stations maintained by the United States under agreement with Canada.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 2,700 ft^3/s (revised) and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Oct 17	0900	*4,690	9.58	Apr 13	1730	(ice jam)	*9.61
Nov 11	--	a,e3,200	(unknown)	Apr 16	2200	3,870	8.93

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	43	406	977	e390	e237	e209	e400	1620	841	391	499	279
2	40	376	917	e380	e233	e209	e460	1520	831	383	477	268
3	39	345	852	e375	e231	e209	e520	1430	797	374	450	262
4	38	314	831	e365	e230	e209	e590	1350	747	409	431	264
5	45	295	907	e360	e228	e208	e690	1280	718	1580	414	276
6	175	287	1160	e350	e227	e207	e770	1280	703	2330	398	277
7	225	273	991	e345	e225	e207	901	2110	688	1820	404	282
8	233	262	825	e335	e224	e208	1120	2230	712	1220	409	377
9	194	258	e740	e325	e224	e209	1500	1870	705	1300	408	401
10	159	e1450	e720	e320	e223	e210	e1640	1610	666	1690	431	402
11	135	e3200	e650	e315	e223	e210	e1720	1430	647	1510	416	385
12	129	2120	e620	e305	e221	e210	e1890	1310	654	1230	451	374
13	126	1410	e590	e300	e220	e210	e2180	1220	642	1080	701	359
14	119	1190	e550	e295	e218	e210	2600	1140	606	1050	696	347
15	113	1090	e540	e290	e217	e210	3390	1070	572	1000	612	337
16	462	967	e524	e285	e216	e210	3740	1020	535	992	745	324
17	3560	847	e510	e283	e214	e210	3710	1000	503	962	741	306
18	4210	771	e505	e280	e214	e210	3200	1040	476	903	673	288
19	4320	1090	e500	e278	e214	e211	2750	1030	450	826	579	283
20	3130	1050	e490	e274	e213	e212	2530	1210	428	762	506	296
21	1920	930	e480	e270	e213	e213	2370	1590	409	717	458	297
22	1370	931	e470	e265	e212	e215	2310	1400	394	685	421	289
23	1110	955	e460	e262	e211	e218	2210	1440	401	675	395	279
24	927	974	e450	e260	e210	e219	2090	1570	443	670	380	267
25	788	944	e440	e257	e210	e223	2040	1450	445	654	363	257
26	695	958	e435	e253	e210	e228	2090	1310	411	628	355	277
27	622	881	e430	e250	e209	e240	2110	1170	407	595	330	363
28	557	821	e420	e247	e209	e265	2020	1060	421	602	313	408
29	509	797	e415	e245	---	e295	1890	962	422	587	299	393
30	471	908	e405	e240	---	e325	1740	884	407	562	287	372
31	434	---	e400	e240	---	e360	---	857	---	533	293	---
TOTAL	26898	27100	19204	9239	6136	6989	57171	41463	17081	28720	14335	9589
MEAN	868	903	619	298	219	225	1906	1338	569	926	462	320
MAX	4320	3200	1160	390	237	360	3740	2230	841	2330	745	408
MIN	38	258	400	240	209	207	400	857	394	374	287	257
AC-FT	53350	53750	38090	18330	12170	13860	113400	82240	33880	56970	28430	19020
CFSM	1.42	1.48	1.02	.49	.36	.37	3.13	2.20	.93	1.52	.76	.52
IN.	1.64	1.66	1.17	.56	.37	.43	3.49	2.53	1.04	1.75	.88	.59

a Daily-mean discharge, backwater from ice.
e Estimated

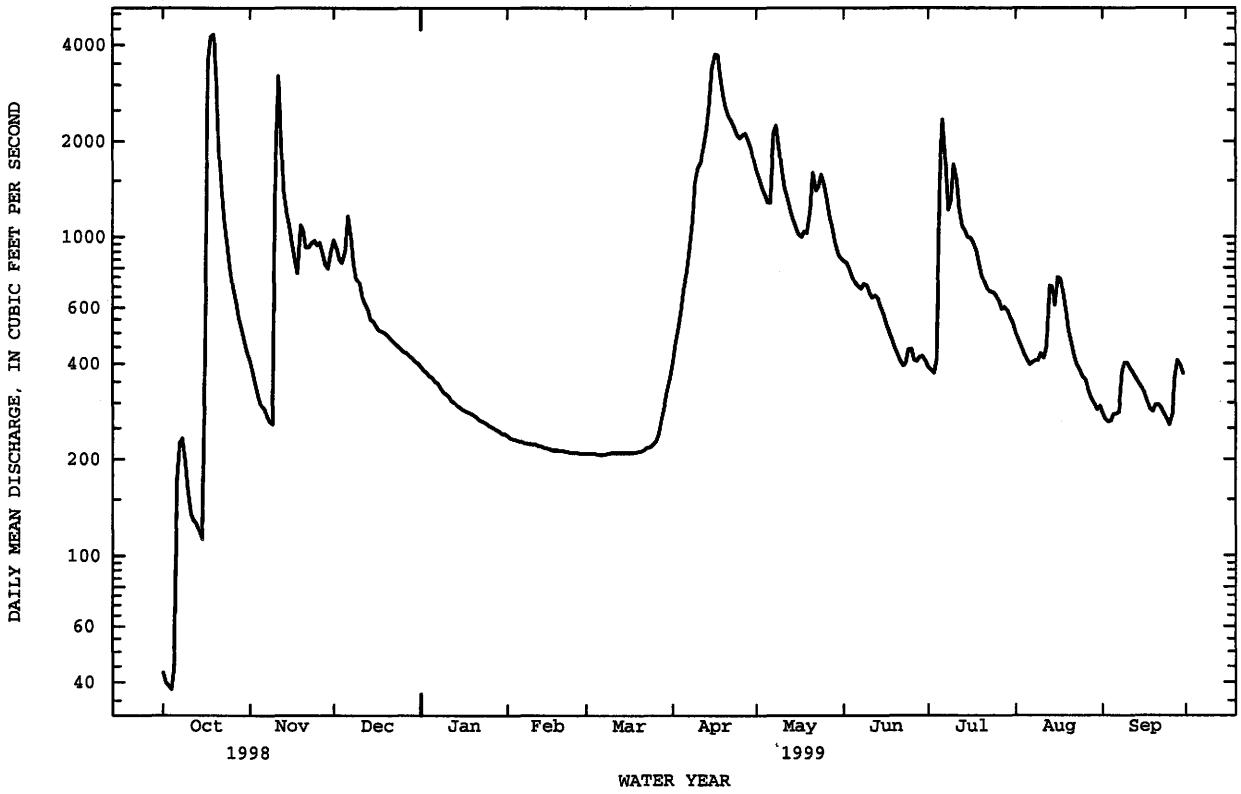
04010500 PIGEON RIVER AT MIDDLE FALLS, NEAR GRAND PORTAGE, MN--Continued
(International gaging station)

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1921 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	364	355	208	152	126	175	1196	1614	842	422	241	292
MAX	2095	1461	720	431	300	1169	2701	4016	2801	1127	1029	2985
(WY)	1978	1971	1978	1975	1969	1945	1976	1950	1947	1968	1950	1977
MIN	17.4	11.4	2.85	2.18	8.02	60.0	290	138	125	78.0	46.5	40.2
(WY)	1977	1977	1977	1977	1977	1941	1977	1977	1977	1958	1998	1976

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1921 - 1999	
ANNUAL TOTAL	142903		263925			
ANNUAL MEAN	392		723		502	
HIGHEST ANNUAL MEAN					840	1971
LOWEST ANNUAL MEAN					158	1958
HIGHEST DAILY MEAN	4320	Oct 19	4320	Oct 19	10700	May 5 1934
LOWEST DAILY MEAN	33	Sep 13	38	Oct 4	1.0[a]	Jan 15-21 1977
ANNUAL SEVEN-DAY MINIMUM	36	Sep 7	86	Oct 1	1.0	Jan 15 1977
INSTANTANEOUS PEAK FLOW			4690	Oct 17	11000	May 5 1934
INSTANTANEOUS PEAK STAGE			9.61[b]	Apr 13	7.60[c]	May 5 1934
INSTANTANEOUS LOW FLOW			36	Oct 5	1.0	Jan 15 1977
ANNUAL RUNOFF (AC-FT)	283400		523500		363600	
ANNUAL RUNOFF (CFSM)	.64		1.19		.82	
ANNUAL RUNOFF (INCHES)	8.73		16.12		11.20	
10 PERCENT EXCEEDS	1000		1600		1290	
50 PERCENT EXCEEDS	157		435		223	
90 PERCENT EXCEEDS	44		211		84	

a Minimum observed.
b Backwater from ice.
c Site and datum then in use.



475647089443301 CUFFS LAKE, EAST SIDE, NEAR GRAND PORTAGE, MN

LOCATION.--Lat 47°56'47", long 89°44'33", in NW¼NE¼NE¼ sec. 13, T.63N., R5E., Cook County. Hydrologic Unit 04010101, on east side of Cuffs Lake, 1.5 mi northwest of Lake Superior, 1.8 mi east of Mineral Center, and 3.0 mi southwest of Grand Portage.

PERIOD OF RECORD.-- June 1998 to current year.

GAGE.-- Water-stage recorder. Elevation of gage is 1,140 ft above sea level, from topographic map.

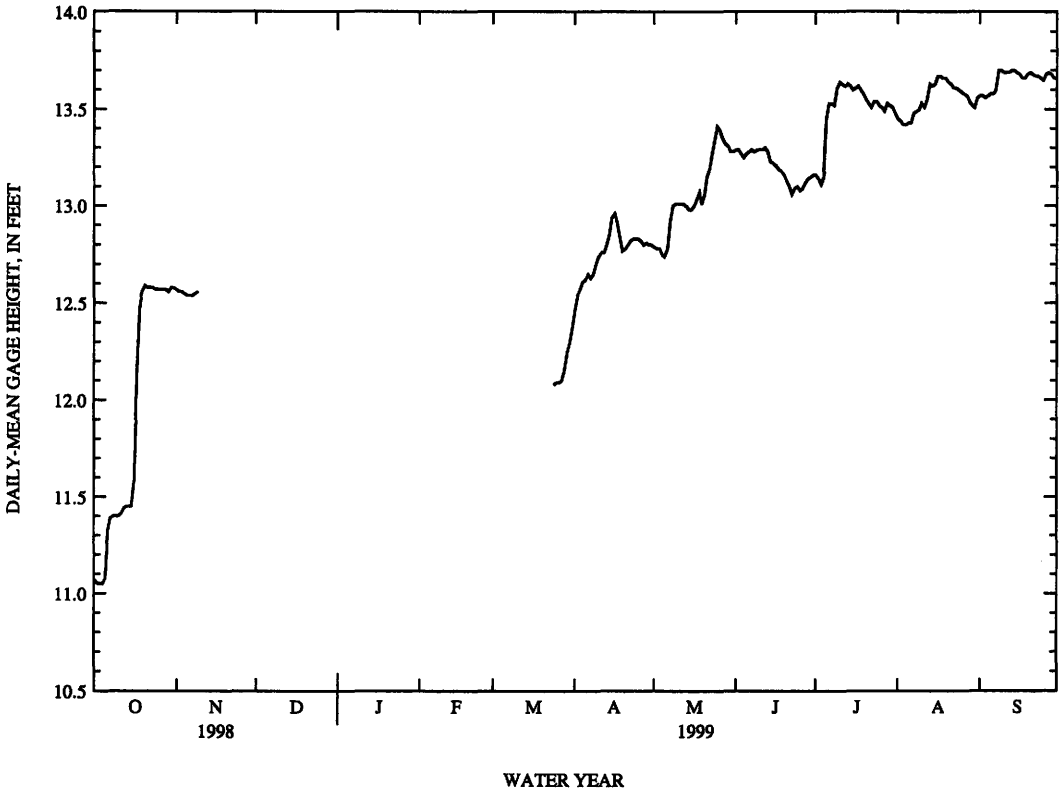
EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 13.71 ft., Sept. 13,14, 1999; maximum daily, 13.70 ft. Sept. 8,9,13,14, 1999; minimum gage height, 10.85 ft, Sept. 13, 1998; minimum daily, 10.87 ft., Sept. 13, 1998.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 13.71 ft., Sept. 13,14; maximum daily, 13.70 ft. Sept. 8,9,13,14; minimum gage height, 11.04 ft, Oct. 4,5; minimum daily, 11.05 ft.,Oct. 2-4.

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	11.07	12.57	---	---	---	---	12.47	12.79	13.29	13.16	13.45	13.57
2	11.05	12.56	---	---	---	---	12.54	12.78	13.29	13.14	13.44	13.57
3	11.05	12.56	---	---	---	---	12.57	12.78	13.27	13.11	13.42	13.56
4	11.05	12.55	---	---	---	---	12.61	12.75	13.25	13.15	13.42	13.57
5	11.08	12.54	---	---	---	---	12.62	12.74	13.27	13.45	13.43	13.58
6	11.32	12.54	---	---	---	---	12.65	12.78	13.28	13.53	13.43	13.58
7	11.39	12.54	---	---	---	---	12.63	12.92	13.29	13.53	13.48	13.60
8	11.40	12.55	---	---	---	---	12.65	13.00	13.28	13.52	13.49	13.70
9	11.40	12.56	---	---	---	---	12.70	13.01	13.29	13.61	13.50	13.70
10	11.40	---	---	---	---	---	12.74	13.01	13.29	13.64	13.53	13.69
11	11.41	---	---	---	---	---	12.76	13.01	13.29	13.63	13.51	13.69
12	11.44	---	---	---	---	---	12.76	13.01	13.30	13.62	13.55	13.69
13	11.45	---	---	---	---	---	12.80	13.00	13.28	13.63	13.63	13.70
14	11.45	---	---	---	---	---	12.85	12.98	13.23	13.62	13.62	13.70
15	11.45	---	---	---	---	---	12.94	12.98	13.22	13.60	13.63	13.69
16	11.59	---	---	---	---	---	12.96	13.00	13.21	13.61	13.67	13.68
17	12.13	---	---	---	---	---	12.91	13.03	13.19	13.62	13.67	13.66
18	12.47	---	---	---	---	---	12.84	13.07	13.18	13.60	13.66	13.66
19	12.56	---	---	---	---	---	12.77	13.01	13.16	13.58	13.66	13.68
20	12.59	---	---	---	---	---	12.78	13.06	13.13	13.55	13.64	13.69
21	12.58	---	---	---	---	---	12.80	13.16	13.10	13.53	13.63	13.68
22	12.58	---	---	---	---	---	12.82	13.19	13.06	13.51	13.61	13.67
23	12.58	---	---	---	---	---	12.83	13.26	13.09	13.54	13.61	13.67
24	12.57	---	---	---	---	12.08	12.83	13.34	13.10	13.54	13.60	13.66
25	12.57	---	---	---	---	12.09	12.83	13.41	13.08	13.52	13.59	13.65
26	12.57	---	---	---	---	12.09	12.82	13.39	13.09	13.51	13.58	13.68
27	12.57	---	---	---	---	12.10	12.80	13.35	13.12	13.49	13.57	13.69
28	12.57	---	---	---	---	12.15	12.81	13.32	13.14	13.53	13.54	13.68
29	12.56	---	---	---	---	12.24	12.80	13.31	13.15	13.52	13.52	13.66
30	12.58	---	---	---	---	12.30	12.80	13.28	13.16	13.51	13.51	13.66
31	12.58	---	---	---	---	12.38	---	13.28	---	13.48	13.56	---
MEAN	11.91	---	---	---	---	---	12.76	13.06	13.20	13.50	13.55	13.66
MAX	12.59	---	---	---	---	---	12.96	13.41	13.30	13.64	13.67	13.70
MIN	11.05	---	---	---	---	---	12.47	12.74	13.06	13.11	13.42	13.56

475647089443301 CUFFS LAKE, EAST SIDE, NEAR GRAND PORTAGE, MN--Continued



475807089483501 LOON LAKE, NORTHEAST SIDE, NEAR GRAND PORTAGE, MN

LOCATION.--Lat 47°58'07", long 89°48'35", NW¼NW¼SE¼ sec. 4, T.63N, R.5E., Cook County, Hydrologic Unit 04010101, on the north end of Loon Lake, 2.0 mi northwest of Mineral Center, 2.3 mi southeast of Canadian Border, and 5.9 mi west of Grand Portage.

PERIOD OF RECORD.--June 1998 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 1,600 ft above sea level (from topographic map).

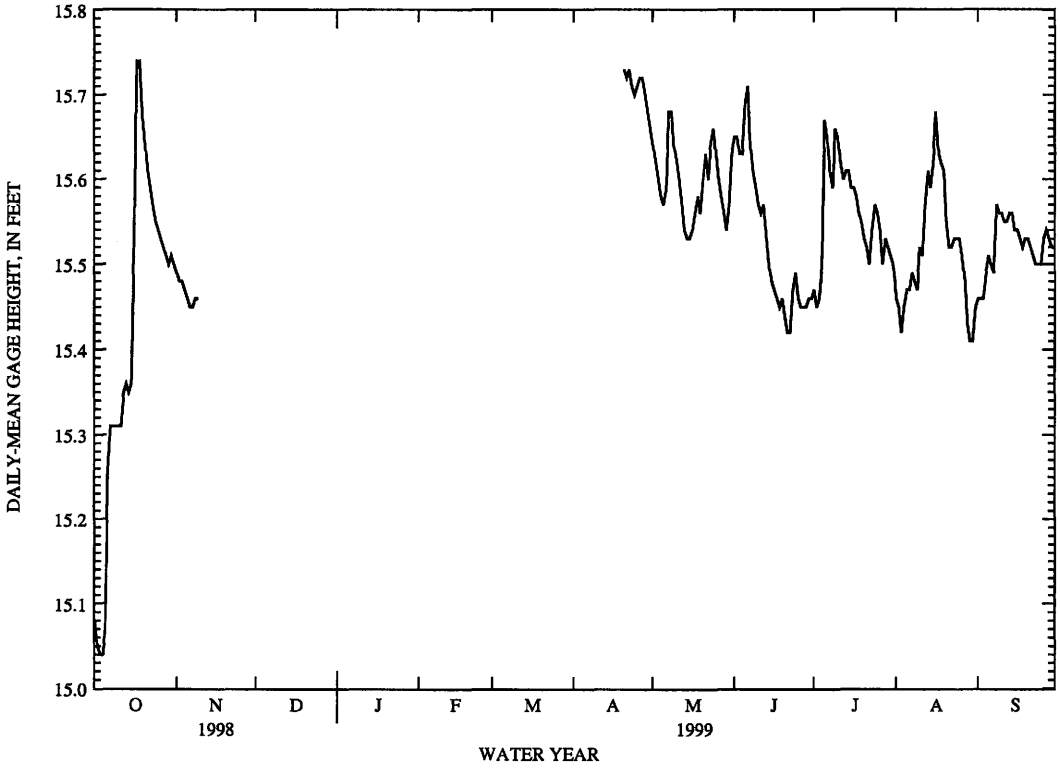
EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 15.78 ft., Oct.17, 1998; maximum daily, 15.74 ft. Oct. 17,18, 1998; minimum gage height, 14.90 ft, Sept. 17, 1998; minimum daily, 14.95 ft., Sept. 13, 1998.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 15.78 ft., Oct. 17; maximum daily, 15.74 ft. Oct. 17,18; minimum gage height, 15.02 ft, Oct. 5; minimum daily, 15.04 ft., Oct. 3,4.

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	15.08	15.49	---	---	---	---	---	15.64	15.65	15.47	15.46	15.46
2	15.05	15.48	---	---	---	---	---	15.62	15.65	15.45	15.45	15.46
3	15.04	15.48	---	---	---	---	---	15.60	15.63	15.46	15.42	15.46
4	15.04	15.47	---	---	---	---	---	15.58	15.63	15.50	15.45	15.49
5	15.07	15.46	---	---	---	---	---	15.57	15.69	15.67	15.47	15.51
6	15.26	15.45	---	---	---	---	---	15.59	15.71	15.65	15.47	15.50
7	15.31	15.45	---	---	---	---	---	15.68	15.64	15.61	15.49	15.49
8	15.31	15.46	---	---	---	---	---	15.68	15.61	15.59	15.48	15.57
9	15.31	15.46	---	---	---	---	---	15.64	15.59	15.66	15.47	15.56
10	15.31	---	---	---	---	---	---	15.62	15.57	15.65	15.52	15.56
11	15.31	---	---	---	---	---	---	15.60	15.56	15.62	15.51	15.55
12	15.35	---	---	---	---	---	---	15.57	15.57	15.60	15.57	15.55
13	15.36	---	---	---	---	---	---	15.54	15.53	15.61	15.61	15.56
14	15.35	---	---	---	---	---	---	15.53	15.50	15.61	15.59	15.56
15	15.36	---	---	---	---	---	---	15.53	15.48	15.59	15.62	15.54
16	15.48	---	---	---	---	---	---	15.54	15.47	15.59	15.68	15.54
17	15.74	---	---	---	---	---	---	15.56	15.46	15.58	15.63	15.53
18	15.74	---	---	---	---	---	---	15.58	15.45	15.56	15.62	15.52
19	15.68	---	---	---	---	---	---	15.56	15.46	15.55	15.61	15.53
20	15.64	---	---	---	---	---	15.73	15.60	15.44	15.53	15.55	15.53
21	15.61	---	---	---	---	---	15.72	15.63	15.42	15.52	15.52	15.52
22	15.59	---	---	---	---	---	15.73	15.60	15.42	15.50	15.52	15.51
23	15.57	---	---	---	---	---	15.71	15.64	15.47	15.54	15.53	15.50
24	15.55	---	---	---	---	---	15.70	15.66	15.49	15.57	15.53	15.50
25	15.54	---	---	---	---	---	15.71	15.63	15.46	15.56	15.53	15.50
26	15.53	---	---	---	---	---	15.72	15.60	15.45	15.54	15.51	15.53
27	15.52	---	---	---	---	---	15.72	15.58	15.45	15.50	15.48	15.54
28	15.51	---	---	---	---	---	15.70	15.56	15.45	15.53	15.43	15.53
29	15.50	---	---	---	---	---	15.68	15.54	15.46	15.52	15.41	15.52
30	15.51	---	---	---	---	---	15.66	15.57	15.46	15.51	15.41	15.52
31	15.50	---	---	---	---	---	---	15.63	---	15.50	15.45	---
MEAN	15.41	---	---	---	---	---	---	15.60	15.53	15.56	15.52	15.52
MAX	15.74	---	---	---	---	---	---	15.68	15.71	15.67	15.68	15.57
MIN	15.04	---	---	---	---	---	---	15.53	15.42	15.45	15.41	15.46

475807089483501 LOON LAKE, NORTHEAST SIDE, NEAR GRAND PORTAGE, MN--Continued



04015330 KNIFE RIVER NEAR TWO HARBORS, MN

LOCATION.--Lat 46°56'49", long 91°47'32", in SW¼NW¼ sec. 31, T.52 N., R.11 W., Lake County, Hydrologic Unit 04010102, on right bank 600 ft downstream from bridge on U.S. Highway 61, 0.5 mi upstream from bridge on County Highway 102, in town of Knife River, 0.8 mi upstream from Lake Superior, and 7.8 mi southwest of Two Harbors.

DRAINAGE AREA.--83.6 mi^2.

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1970-71, July 1974 to current year.

GAGE.--Water-stage recorder and crest-stage gage. Elevation of gage is 640 ft above sea level from topographic map.

REMARKS.--Records good except those for estimated daily discharges, which are poor. Flow regulated intermittantly by fish ladder operation just upstream of gage.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,800 ft^3/s (revised) and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Oct 17	0645	2,600	7.33	Jul 8	2030	1,830	6.19
Nov 10	2000	2,780	7.50	Aug 18	2045	1,880	6.25
Apr 7	2030	1,960	6.66	Sep 26	0745	2,640	7.09
Jul 5	0645	*9,100	*12.14				

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	12	62	122	e20	15	18	509	34	30	76	25	28
2	11	49	102	e20	16	17	379	31	37	61	21	24
3	9.2	41	90	e20	16	16	347	28	34	76	19	23
4	8.0	35	85	e20	16	16	1220	27	26	93	18	549
5	9.0	27	336	e19	16	16	908	58	26	4840	17	672
6	602	25	361	e19	16	15	472	321	39	1880	16	158
7	287	23	182	e19	15	14	1020	e558	33	657	14	81
8	155	21	107	e19	15	14	1260	244	27	786	14	98
9	104	20	76	e18	17	14	1020	139	21	1340	15	67
10	71	1240	71	e18	19	15	731	105	19	663	27	52
11	51	1270	60	e17	19	15	640	100	19	252	25	45
12	41	422	66	e16	19	14	578	e216	45	139	78	109
13	33	211	64	e16	18	14	484	134	32	88	491	106
14	26	140	70	15	17	15	476	97	21	65	153	71
15	23	117	58	15	18	16	505	77	16	52	86	56
16	194	102	52	15	17	18	560	66	15	208	258	45
17	1940	87	e48	16	17	e19	353	67	16	230	112	38
18	911	252	e44	16	17	e22	224	60	22	107	523	36
19	398	1010	e40	16	16	e27	162	50	21	68	791	127
20	199	333	e35	15	16	e30	135	45	24	51	238	114
21	131	152	e30	15	15	e48	118	46	20	41	106	72
22	99	150	e27	15	14	e56	103	41	101	35	65	54
23	80	320	e25	16	14	e68	87	e125	275	38	75	45
24	67	279	e24	16	14	e85	74	135	174	38	76	39
25	66	172	e23	15	14	e110	66	97	87	37	53	36
26	124	140	e22	15	15	155	61	74	54	251	40	1640
27	106	115	e22	15	15	328	55	52	41	107	33	858
28	82	102	e22	15	17	917	48	40	38	68	27	349
29	72	106	e21	16	---	909	42	31	44	47	23	160
30	85	131	e21	16	---	793	38	24	44	36	20	111
31	81	---	e21	15	---	622	---	23	---	30	26	---
TOTAL	6077.2	7154	2327	518	453	4436	12675	3145	1401	12460	3485	5863
MEAN	196	238	75.1	16.7	16.2	143	422	101	46.7	402	112	195
MAX	1940	1270	361	20	19	917	1260	558	275	4840	791	1640
MIN	8.0	20	21	15	14	14	38	23	15	30	14	23
AC-FT	12050	14190	4620	1030	899	8800	25140	6240	2780	24710	6910	11630
CFSM	2.29	2.79	.88	.20	.19	1.67	4.94	1.19	.55	4.70	1.31	2.28
IN.	2.64	3.11	1.01	.23	.20	1.93	5.51	1.37	.61	5.41	1.51	2.55

e Estimated

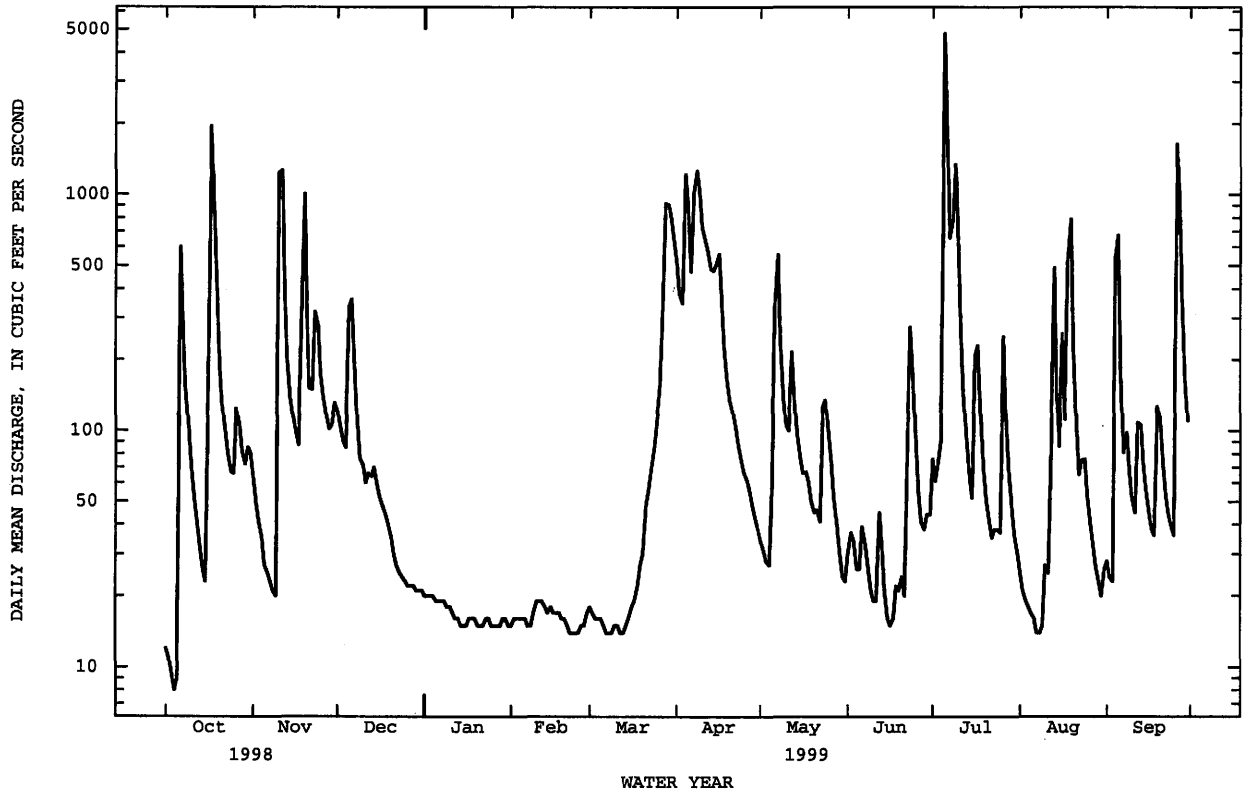
04015330 KNIFE RIVER NEAR TWO HARBORS, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1974 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	96.3	79.5	23.9	11.9	12.5	61.7	374	155	91.2	95.8	38.7	86.3
MAX	267	238	75.1	31.4	79.2	204	631	427	240	402	163	314
(WY)	1996	1999	1999	1975	1998	1998	1982	1979	1984	1999	1988	1977
MIN	3.06	1.58	.000	.000	.000	8.65	73.6	16.0	13.0	4.87	2.95	1.43
(WY)	1977	1977	1977	1977	1977	1980	1977	1976	1995	1988	1976	1976

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1974 - 1999	
ANNUAL TOTAL	36369.5		59994.2			
ANNUAL MEAN	99.6		164		94.4	
HIGHEST ANNUAL MEAN					164	1999
LOWEST ANNUAL MEAN					44.2	1977
HIGHEST DAILY MEAN	1940	Oct 17	4840	Jul 5	4840	Jul 5 1999
LOWEST DAILY MEAN	1.2	Sep 12	8.0	Oct 4	.00[a]	Dec 2 1976
ANNUAL SEVEN-DAY MINIMUM	1.4	Sep 6	14	Mar 7	.00	Dec 2 1976
INSTANTANEOUS PEAK FLOW			9100	Jul 5	9100	Jul 5 1999
INSTANTANEOUS PEAK STAGE			12.14	Jul 5	12.14	Jul 5 1999
INSTANTANEOUS LOW FLOW			3.0[b]	Jun 15	.00	Dec 2 1976
ANNUAL RUNOFF (AC-FT)	72140		119000		68400	
ANNUAL RUNOFF (CFSM)	1.16		1.92		1.10	
ANNUAL RUNOFF (INCHES)	15.81		26.07		14.99	
10 PERCENT EXCEEDS	257		479		235	
50 PERCENT EXCEEDS	23		48		23	
90 PERCENT EXCEEDS	4.9		15		5.0	

a Many days in 1977.
b Result of regulation.



04024000 ST. LOUIS RIVER AT SCANLON, MN

LOCATION.--Lat 46°42'12", long 92°25'07", in NW¼ sec. 30, T.49 N., R.16 W., Carlton County, Hydrologic Unit 04010201, on right bank 25 ft downstream from lower bridge on U.S. Highway 61 at Scanlon, 0.6 mi downstream from Minnesota Power Co. power plant, 3 mi upstream from Thomson Reservoir, and 3.2 mi upstream from Midway River.

DRAINAGE AREA.--3,430 mi^2 (approximately).

PERIOD OF RECORD.--January 1908 to current year. Monthly discharge only for some periods published in WSP 1307. Published as "near Thomson" 1908-50.

REVISED RECORDS.--WSP 1337: 1911-12.

GAGE.--Water-stage recorder. Datum of gage is 1,101.23 ft above sea level. Oct. 5, 1909 to Sept. 5, 1914, nonrecording gage 3 mi downstream and 50 ft below power plant at datum about 420 ft lower. Sept. 6, 1914 to Aug. 4, 1953, power plant record at Thomson hydroelectric plant.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Diurnal fluctuation caused by power plant upstream. Flow regulated by Whiteface Reservoir and Boulder, Island, Rice and Fish Lakes, combined capacity, 332,160 acre-ft; the water-discharge table shows the monthly change in contents (+).

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	872	3390	4130	e1700	e1190	1180	5540	2690	2810	1970	4370	2290
2	792	3070	4070	e1570	e1150	1220	5610	2430	2710	1960	3820	2100
3	863	2890	3850	e1620	e1170	1200	5470	2280	2510	2210	3510	1880
4	790	2590	3760	e1520	e1180	1160	6600	2140	2420	2170	2900	2190
5	742	2330	3850	e1520	e1120	1090	9640	2230	2160	2680	2520	2510
6	939	2050	4220	e1520	e1190	1040	10600	2720	2130	12400	2330	2910
7	917	1950	4480	e1270	e1220	1010	11300	3830	2270	21200	1970	3100
8	944	1790	4030	e1180	e1150	1330	12700	4730	2320	25300	1640	3080
9	985	1650	3400	e1180	e1200	1170	12000	4760	2300	27500	1820	2980
10	1020	2010	3380	e1170	e1120	1170	10900	4790	2110	28200	1740	3020
11	941	2510	3330	e1160	e1290	1110	9820	6550	2030	27700	1940	2950
12	930	2780	3270	e1140	e1240	1190	8990	9310	1920	25500	2330	3410
13	932	2570	3070	e1130	e1130	1160	8310	10700	1900	21800	5180	4340
14	810	2900	2860	e1300	e1170	1110	7620	10300	1590	17400	8040	4720
15	948	3040	3000	e1200	e1200	1150	7080	9270	1540	13900	7260	4930
16	1220	3000	2840	e1230	e1200	1130	6980	8260	1390	13800	6400	4680
17	2500	3160	2540	e1330	e1220	1250	6900	8840	1270	17100	5760	4270
18	4790	3130	2280	e1250	e1180	1330	6600	8400	1120	17000	5620	4040
19	5410	3380	2320	e1200	e1150	1310	6100	7320	1090	15000	6090	3810
20	5430	3170	e1800	e1300	e1120	1470	5840	6190	964	13200	6280	3440
21	5480	3000	e2000	e1270	1250	1490	5440	5570	1040	11300	6180	3150
22	5530	3140	e1400	e1250	e1180	1470	5120	5670	1090	9480	5560	2800
23	5170	3500	e1200	e1400	e1200	1550	4860	6290	1580	7970	5350	2500
24	4930	4100	e1600	e1270	e1120	1560	4470	6290	3230	6890	5230	2310
25	4710	4320	e1500	e1320	e1150	1700	4020	5860	3690	6120	4800	2260
26	4610	4190	e1700	e1280	1220	1780	3780	5360	3380	7120	4400	5400
27	4640	4050	e1900	e1260	e1160	1910	3490	4810	2880	9210	3990	11400
28	4390	3840	e1900	e1290	1270	3070	3250	4310	2650	7810	3420	12700
29	3990	3840	e1850	e1220	---	4160	2990	3770	2380	6750	2960	12300
30	3760	3950	e1200	e1160	---	4870	2810	3390	2080	5770	2540	11700
31	3600	---	e2200	e1130	---	5280	---	3080	---	5020	2280	---
TOTAL	83585	91290	84930	40340	33140	52620	204830	172140	62554	391430	128230	133170
MEAN	2696	3043	2740	1301	1184	1697	6828	5553	2085	12630	4136	4439
MAX	5530	4320	4480	1700	1290	5280	12700	10700	3690	28200	8040	12700
MIN	742	1650	1200	1130	1120	1010	2810	2140	964	1960	1640	1880
+	384	-3.66	-509	-632	-540	-278	1920	162	-38.5	43.1	-83.0	310
MEAN‡	3080	3039	2231	669	644	1419	8748	5715	2047	12670	4053	4749
CFSM‡	.90	.89	.65	.20	.19	.41	2.55	1.67	.60	3.69	1.18	1.38
IN‡	1.04	.99	.75	.23	.20	.47	2.85	1.93	.67	4.25	1.36	1.54

CAL YR 98 TOTAL 795660 MEAN 2180 MAX 9150 MIN 268 MEAN‡ 2200 CFSM‡ .64 IN‡ 8.71
WTR YR 99 TOTAL 1478259 MEAN 4050 MAX 28200 MIN 742 MEAN‡ 4111 CFSM‡ 1.20 IN‡ 16.28

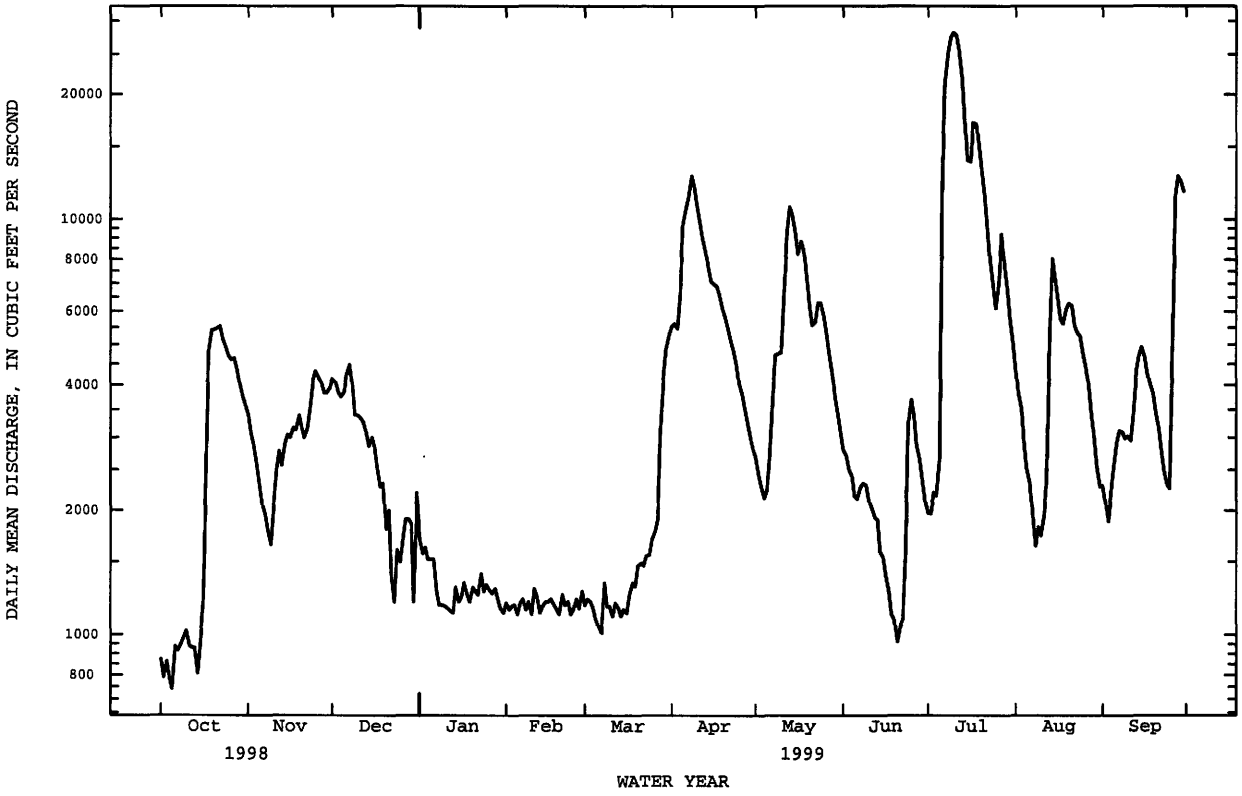
e Estimated.
+ Change in contents, equivalent in cubic feet per second, in Whiteface Reservoir, and Boulder, Island, Rice and Fish Lakes; records furnished by Minnesota Power Co.
‡ Adjusted for change in reservoir contents.

04024000 ST. LOUIS RIVER AT SCANLON, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1908 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	2026	1740	1289	1076	1060	1456	5671	5087	3560	2519	1681	1785
MAX	7508	8518	2993	2272	2200	6026	15230	22210	16480	12630	9197	7594
(WY)	1974	1972	1972	1966	1966	1945	1948	1950	1908	1999	1953	1928
MIN	407	473	282	265	249	301	667	593	458	199	377	402
(WY)	1935	1935	1911	1911	1924	1924	1977	1977	1988	1988	1977	1934

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1908 - 1999	
ANNUAL TOTAL	795660		1478259			
ANNUAL MEAN	2180		4050		2400	
HIGHEST ANNUAL MEAN					4276	1972
LOWEST ANNUAL MEAN					945	1924
HIGHEST DAILY MEAN	9150	Jun 13	28200	Jul 10	37900	May 9 1950
LOWEST DAILY MEAN	268	Sep 10	742	Oct 5	88	Aug 24 1977
ANNUAL SEVEN-DAY MINIMUM	315	Sep 7	845	Oct 1	134	Jul 26 1988
INSTANTANEOUS PEAK FLOW			28500	Jul 10	37900	May 9 1950
INSTANTANEOUS PEAK STAGE			12.45	Jul 10	15.80	May 9 1950
ANNUAL RUNOFF (AC-FT)	1578000		2932000		1739000	
ANNUAL RUNOFF (CFSM)	.64		1.18		.70	
ANNUAL RUNOFF (INCHES)	8.63		16.03		9.51	
10 PERCENT EXCEEDS	4670		8350		5350	
50 PERCENT EXCEEDS	1600		2800		1400	
90 PERCENT EXCEEDS	464		1150		646	



04024098 DEER CREEK NEAR HOLYOKE, MN

LOCATION.--Lat 46°31'30", long 92°23'20", in NE¼SE¼ sec. 29, T.47 N., R.16 W., Carlton County, Hydrologic Unit 04010301, on left bank 179 ft west of State Highway No. 23, 0.9 mi upstream from mouth and 4.0 mi north of Holyoke.

DRAINAGE AREA.--7.70 mi^2.

PERIOD OF RECORD.--October 1976 to current year.

GAGE.--Water-stage recorder and crest-stage gage. Datum of gage is 786.14 ft above sea level.

REMARKS.--Records good, except those for estimated daily discharges, which are poor.

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	1.8	2.5	4.4	e1.8	e1.8	e2.0	11	2.5	1.9	2.4	2.2	2.7
2	1.7	2.4	4.3	e1.7	e1.7	e1.9	8.2	2.1	2.4	2.4	1.9	2.6
3	1.7	2.5	4.2	e1.6	e1.6	e1.6	7.5	2.1	2.9	6.1	29	2.6
4	1.5	2.6	4.1	e1.5	e1.6	e1.4	84	2.2	1.9	4.6	8.2	5.1
5	1.7	2.6	14	e1.5	e1.5	1.2	35	6.3	15	3.3	3.9	3.8
6	2.7	2.6	10	e1.5	e1.5	1.0	45	21	7.7	2.8	3.0	3.1
7	2.1	2.9	6.3	e1.5	e1.4	.92	89	45	7.9	2.2	2.5	3.8
8	1.7	2.7	5.3	e1.5	e1.4	.89	41	21	6.7	215	2.4	6.5
9	1.7	2.7	4.7	e1.5	e1.3	1.0	22	10	3.5	96	2.6	3.8
10	2.1	23	4.5	e1.5	e1.3	1.0	13	6.5	2.7	24	3.2	3.5
11	1.6	14	4.5	e1.5	e1.2	1.1	13	6.3	2.7	9.7	2.7	2.8
12	1.7	5.1	4.4	e1.5	e1.2	1.1	12	14	3.7	5.5	63	3.6
13	1.8	4.2	4.3	e1.6	1.2	1.1	9.5	11	2.4	4.0	68	3.2
14	1.9	3.8	4.3	e1.6	1.3	1.3	8.1	6.4	1.8	3.4	15	2.8
15	2.0	3.6	4.3	e1.7	1.3	e1.6	13	4.9	1.8	2.9	6.7	3.4
16	3.0	3.5	4.0	e1.8	1.3	e2.0	17	4.2	2.0	76	8.8	2.6
17	7.1	3.5	3.9	e1.9	1.2	e2.2	11	4.3	1.8	16	4.2	2.3
18	3.5	4.2	4.2	e2.0	1.1	e2.1	7.9	3.7	1.7	5.7	43	2.3
19	2.6	e8.0	3.9	e2.1	1.0	e2.0	6.4	2.5	1.8	4.2	35	2.5
20	2.3	6.2	e4.0	e2.1	1.0	e1.9	5.5	2.1	1.7	3.2	10	2.3
21	2.2	5.0	e4.0	e2.1	1.0	e2.3	5.1	2.4	2.0	2.8	5.2	2.2
22	2.1	4.7	e3.7	e2.2	.96	e2.7	4.5	2.3	62	2.6	3.9	2.2
23	2.2	11	e3.4	e2.2	.99	e3.2	3.7	3.6	63	3.3	238	2.2
24	2.0	7.6	e3.2	e2.2	1.0	e3.9	3.3	2.8	15	2.8	35	2.0
25	2.3	6.2	e3.0	e2.1	.98	e4.6	3.2	2.2	5.1	114	13	1.9
26	2.5	5.5	e2.8	e2.1	1.1	e6.0	2.9	1.9	2.8	184	6.2	5.1
27	2.4	5.0	e2.6	e2.0	1.3	e10	2.6	1.9	2.2	15	4.5	3.9
28	2.5	4.8	e2.4	e2.0	e1.5	e53	2.6	1.7	2.4	4.8	3.6	2.8
29	2.5	4.6	e2.2	e1.9	---	26	2.2	2.8	2.9	3.0	3.0	2.7
30	2.5	4.5	e2.1	e1.9	---	18	2.2	1.6	2.4	2.5	2.8	2.4
31	2.6	---	e2.0	e1.8	---	15	---	1.5	---	3.1	3.0	---
TOTAL	72.0	161.5	135.0	55.9	35.73	174.01	491.4	202.8	233.8	827.3	633.5	92.7
MEAN	2.32	5.38	4.35	1.80	1.28	5.61	16.4	6.54	7.79	26.7	20.4	3.09
MAX	7.1	23	14	2.2	1.8	53	89	45	63	215	238	6.5
MIN	1.5	2.4	2.0	1.5	.96	.89	2.2	1.5	1.7	2.2	1.9	1.9
AC-FT	143	320	268	111	71	345	975	402	464	1640	1260	184
CFSM	.30	.70	.57	.23	.17	.73	2.13	.85	1.01	3.47	2.65	.40
IN.	.35	.78	.65	.27	.17	.84	2.37	.98	1.13	4.00	3.06	.45

e Estimated

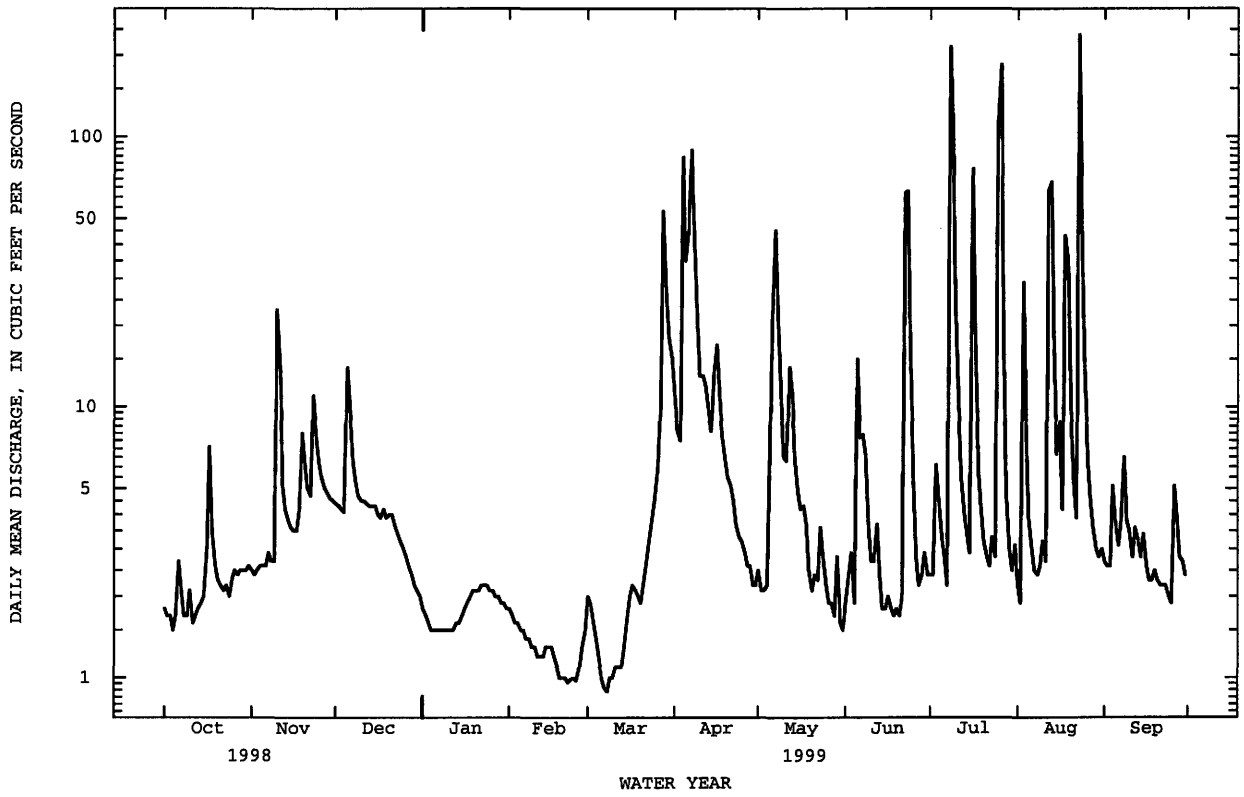
04024098 DEER CREEK NEAR HOLYOKE, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1976 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	6.36	4.58	2.46	1.89	2.56	8.41	23.4	10.0	7.73	7.35	5.23	7.20
MAX	21.8	12.2	4.35	2.92	9.29	21.5	90.8	24.3	31.4	26.7	36.9	30.4
(WY)	1983	1983	1999	1992	1998	1995	1986	1991	1993	1999	1986	1986
MIN	1.69	1.59	1.31	.97	1.06	2.34	4.11	2.15	1.39	1.50	.89	1.24
(WY)	1988	1977	1977	1979	1979	1986	1977	1980	1995	1988	1982	1993

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1976 - 1999	
ANNUAL TOTAL	1770.13		3115.64			
ANNUAL MEAN	4.85		8.54		7.28	
HIGHEST ANNUAL MEAN					19.3	1986
LOWEST ANNUAL MEAN					3.65	1980
HIGHEST DAILY MEAN	72	Feb 27	238	Aug 23	553	Sep 6 1990
LOWEST DAILY MEAN	.95	Sep 1	.89	Mar 8	.21	Jul 2 1976
ANNUAL SEVEN-DAY MINIMUM	1.0	Aug 31	.99	Feb 19	.47	Aug 10 1982
INSTANTANEOUS PEAK FLOW			791	Jul 8	2000[a]	Sep 3 1985
INSTANTANEOUS PEAK STAGE			19.93	Jul 8	32.76[b]	Sep 3 1985
INSTANTANEOUS LOW FLOW			.69	Mar 7	.10	Nov 13 1996
ANNUAL RUNOFF (AC-FT)	3510		6180		5270	
ANNUAL RUNOFF (CFSM)	.63		1.11		.95	
ANNUAL RUNOFF (INCHES)	8.55		15.05		12.85	
10 PERCENT EXCEEDS	9.4		14		14	
50 PERCENT EXCEEDS	2.5		2.7		2.5	
90 PERCENT EXCEEDS	1.4		1.5		1.5	

a From rating curve extended above 1000 ft^3/s on basis of flow-thru-culvert computations.
b From floodmark.



05030500 OTTER TAIL RIVER NEAR ELIZABETH, MN

LOCATION.--Lat 46°22'10", long 96°01'02", in SW¼SE¼ sec. 31, T.134 N., R.42 W.,Ottertail County, Hydrologic Unit 09020103, on right bank at County Highway 10, 2.5 miles below Taplin Gorge Dam, 5.0 miles above the Diversion Dam, 5.7 miles east of Elizabeth and 6.6 miles northeast of Fergus Falls.

DRAINAGE AREA.--1,230 mi^2 (approximately).

PERIOD OF RECORD.--May 1904 to September 1917, monthly discharge only, published as at German Church near Fergus Falls in WSP 1308. July 1992 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,250 ft above mean sea level, from topographic map. Nonrecording gage at same site Nov. 1913 to September 1917 at datum 1,265 ft from topographic map.

REMARKS.--Records good except those for estimated daily discharge, which are fair. Flow regulated by power plant upstream.

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	302	443	573	e460	e540	501	527	852	892	764	543	507
2	310	444	575	e455	e538	495	534	850	890	742	537	505
3	312	457	574	e450	e538	502	545	851	896	735	533	511
4	316	473	577	e450	e537	483	556	864	890	730	525	542
5	360	466	581	e450	e537	479	615	884	947	723	509	549
6	366	467	582	e448	e535	473	614	901	993	705	489	556
7	346	469	586	e447	e535	468	603	900	973	672	491	557
8	337	471	588	e446	e532	469	618	899	911	700	490	548
9	322	475	587	e445	e532	469	650	865	865	707	507	543
10	319	480	585	e443	e530	468	660	926	946	695	509	541
11	320	567	587	e441	e528	466	659	986	943	683	513	551
12	318	527	588	e440	e525	462	683	983	928	664	529	568
13	312	527	590	e440	e522	459	695	963	916	666	532	573
14	306	523	591	e440	e520	458	722	940	914	651	530	574
15	311	528	591	e440	e520	459	737	972	911	593	529	576
16	347	531	594	e443	e518	462	762	960	887	596	520	575
17	359	531	599	e450	e518	465	778	953	871	622	513	574
18	357	546	601	e460	e517	464	781	948	857	629	510	572
19	358	563	576	e475	e516	466	818	952	845	642	452	569
20	362	552	532	e490	e516	467	824	945	833	638	468	562
21	368	555	487	e500	e516	466	825	931	821	625	493	560
22	376	551	e400	e510	e515	466	826	935	813	618	489	562
23	392	556	e350	e520	e514	489	826	930	835	614	494	563
24	397	571	e380	e530	e514	465	829	929	823	607	491	564
25	394	583	e410	e535	e514	454	836	926	814	601	470	566
26	397	584	e440	e540	513	460	842	923	801	587	514	482
27	402	577	e445	e545	512	463	844	919	788	578	498	594
28	423	575	e450	e542	504	491	846	911	781	578	492	596
29	432	573	e455	e540	---	564	846	907	761	574	486	573
30	432	571	e460	e540	---	530	850	908	751	566	485	564
31	437	---	e465	e540	---	508	---	907	---	553	495	---
TOTAL	11090	15736	16399	14855	14656	14791	21751	28520	26096	20058	15636	16677
MEAN	358	525	529	479	523	477	725	920	870	647	504	556
MAX	437	584	601	545	540	564	850	986	993	764	543	596
MIN	302	443	350	440	504	454	527	850	751	553	452	482
AC-FT	22000	31210	32530	29460	29070	29340	43140	56570	51760	39790	31010	33080
CFSM	.29	.43	.43	.39	.43	.39	.59	.75	.71	.53	.41	.45
IN.	.34	.48	.50	.45	.44	.45	.66	.86	.79	.61	.47	.50

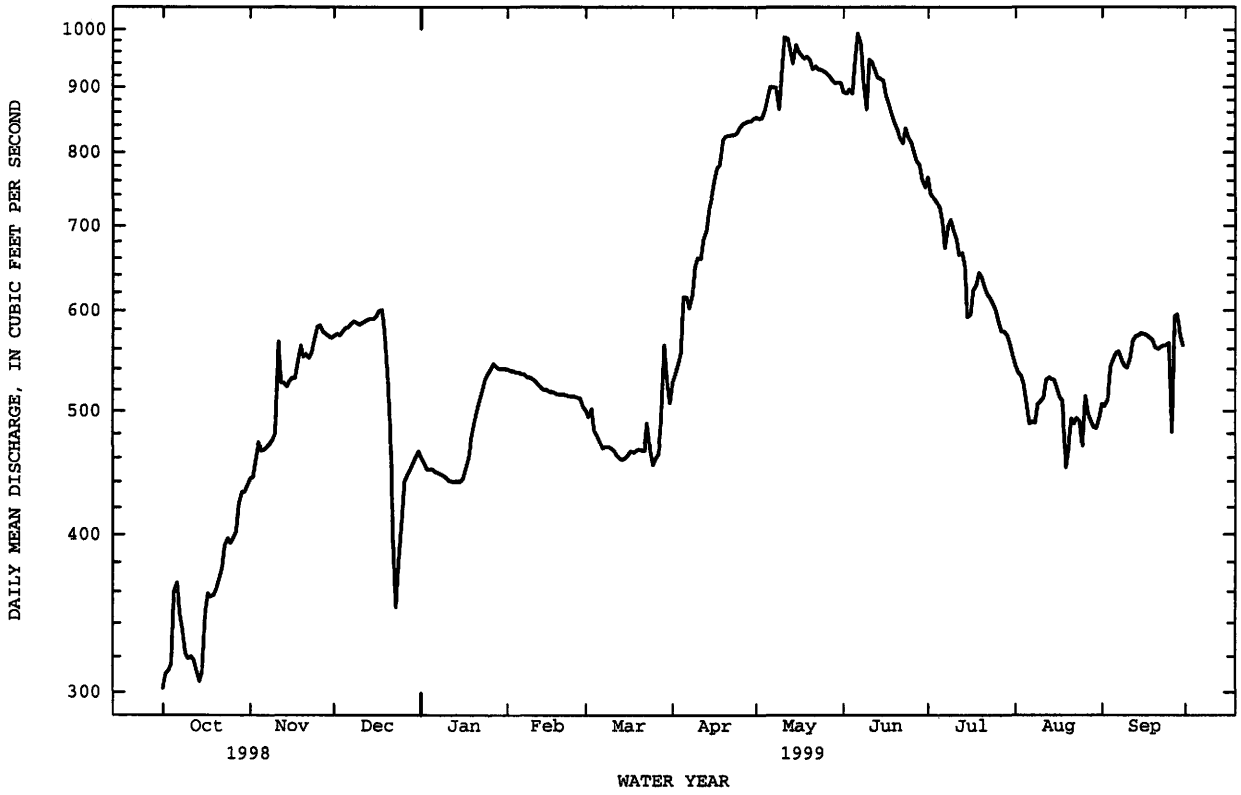
e Estimated

05030500 OTTER TAIL RIVER NEAR ELIZABETH, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1992 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	303	333	340	325	349	396	557	732	652	569	430	367
MAX	740	571	529	479	523	477	725	952	870	770	759	817
(WY)	1994	1994	1999	1999	1999	1999	1999	1997	1999	1998	1993	1993
MIN	112	143	141	181	209	314	357	453	454	358	218	134
(WY)	1997	1993	1993	1993	1993	1993	1993	1993	1995	1995	1996	1996

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1992 - 1999	
ANNUAL TOTAL	184831		216265			
ANNUAL MEAN	506		593		451	
HIGHEST ANNUAL MEAN					593	1999
LOWEST ANNUAL MEAN					349	1995
HIGHEST DAILY MEAN	968	Jul 17	993	Jun 6	993	Jun 6 1999
LOWEST DAILY MEAN	302	Oct 1	302	Oct 1	99	Oct 15 1996
ANNUAL SEVEN-DAY MINIMUM	315	Sep 28	315	Oct 9	101	Oct 10 1996
INSTANTANEOUS PEAK FLOW			1040	May 11	1040	May 11 1999
INSTANTANEOUS PEAK STAGE			9.11	May 11	9.11	May 11 1999
INSTANTANEOUS LOW FLOW			244	Oct 7	61	Aug 9 1996
ANNUAL RUNOFF (AC-FT)	366600		429000		326700	
ANNUAL RUNOFF (CFSM)	.41		.48		.37	
ANNUAL RUNOFF (INCHES)	5.59		6.54		4.98	
10 PERCENT EXCEEDS	672		894		754	
50 PERCENT EXCEEDS	506		541		400	
90 PERCENT EXCEEDS	350		440		189	



05046000 OTTER TAIL RIVER BELOW ORWELL DAM, NEAR FERGUS FALLS, MN

LOCATION.--Lat 46°12'35", long 96°11'05", in NE¼ sec. 34, T.132 N., R.44 W., Otter Tail County, Hydrologic Unit 09020103, on left bank 0.7 mi downstream from Orwell Dam on County Highway 15, 6.1 mi downstream from Dayton Hollow Dam, 8 mi southwest of Fergus Falls, and 11.1 mi downstream from Pelican River.

DRAINAGE AREA.--1,740 mi^2.

PERIOD OF RECORD.--October 1930 to current year. Prior to October 1952, published as Otter Tail River below Pelican River, near Fergus Falls. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WSP 785: 1934(M). WSP 1208: 1947(M). WSP 1308: 1931(M).

GAGE.--Water-stage recorder. Datum of gage is 1,029.65 ft above sea level, adjustment of 1912 (levels by U.S. Army Corps of Engineers). Oct. 11, 1930 to Nov. 17, 1933, at same site at datum 2.00 ft higher; Nov. 18, 1933 to Mar. 21, 1953, at site 6.1 mi upstream at datum 40.30 ft higher.

REMARKS.--Records good. Flow regulated at Orwell Lake (station 05045950) beginning Mar. 21, 1953 and power plant upstream.

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

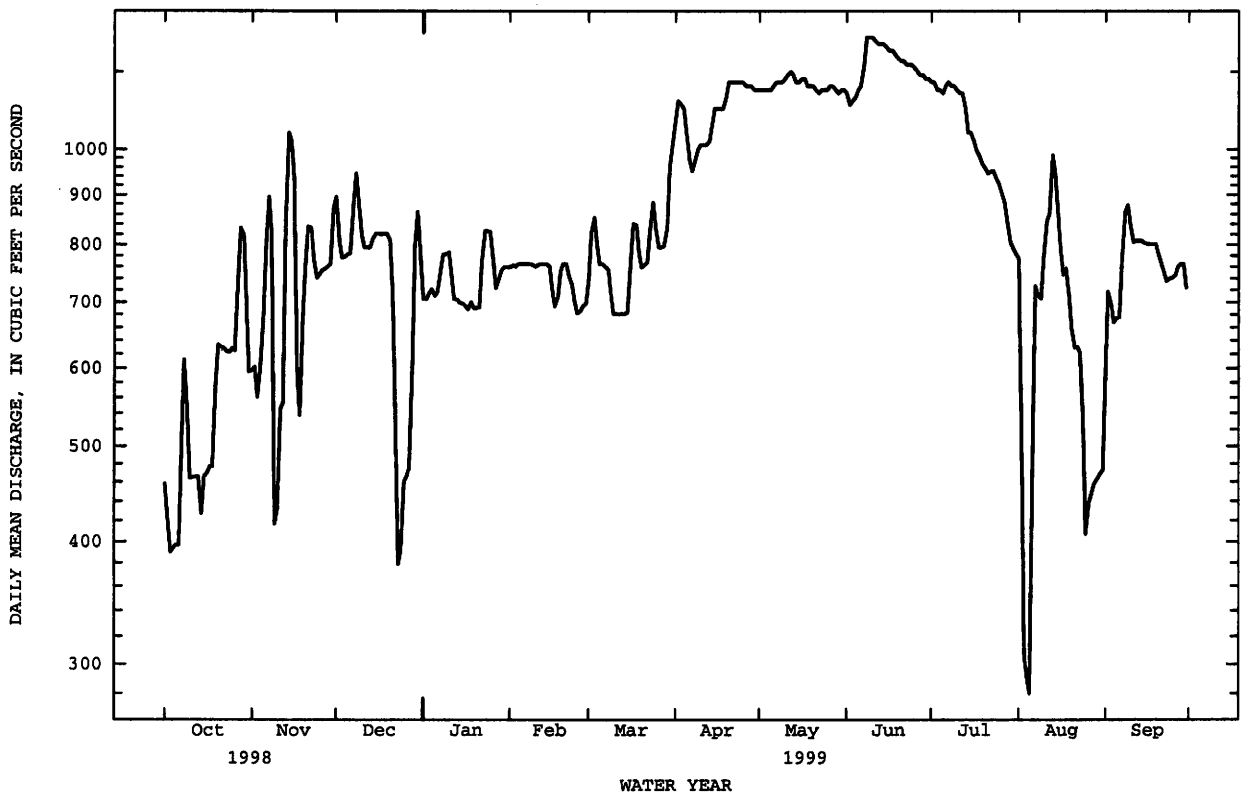
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	458	597	896	705	759	737	1070	1150	1140	1170	776	587
2	425	601	808	705	763	823	1120	1150	1110	1170	544	717
3	390	561	777	715	761	853	1110	1150	1120	1150	306	695
4	394	606	778	721	765	800	1100	1150	1130	1150	291	668
5	397	668	783	710	765	765	1040	1150	1150	1140	280	674
6	397	810	785	717	765	765	975	1160	1160	1160	500	676
7	502	896	881	753	765	760	951	1170	1220	1170	727	774
8	612	820	945	783	765	755	978	1170	1300	1160	709	865
9	541	417	883	783	764	713	1000	1170	1300	1160	706	878
10	464	431	818	786	760	681	1010	1180	1300	1150	778	839
11	465	546	796	746	764	681	1010	1190	1290	1140	847	805
12	466	553	796	705	765	681	1010	1200	1280	1140	861	808
13	466	849	796	704	765	681	1020	1190	1280	1100	987	808
14	427	1040	811	699	765	681	1060	1170	1280	1040	944	808
15	466	1020	821	698	760	683	1100	1170	1270	1040	869	804
16	470	936	821	693	721	768	1100	1180	1260	1020	786	802
17	477	596	820	688	693	840	1100	1180	1260	998	747	802
18	477	538	821	700	709	838	1100	1160	1250	984	757	802
19	578	682	821	690	752	785	1130	1160	1240	967	710	802
20	633	767	809	690	765	759	1170	1160	1230	958	659	784
21	630	835	719	691	765	764	1170	1150	1230	946	629	765
22	628	833	550	770	744	769	1170	1140	1220	950	630	750
23	624	774	379	827	729	826	1170	1150	1220	952	622	736
24	623	741	392	827	701	883	1170	1150	1220	934	533	740
25	628	747	460	825	682	833	1170	1150	1210	923	407	741
26	625	753	466	768	685	796	1160	1160	1200	901	438	746
27	741	757	475	723	693	796	1160	1160	1190	882	447	761
28	833	761	607	741	698	798	1160	1150	1190	845	457	765
29	818	765	802	755	---	833	1150	1140	1180	806	463	765
30	694	873	865	759	---	960	1150	1150	1180	795	468	725
31	595	---	771	759	---	1020	---	1150	---	783	473	---
TOTAL	16944	21773	22952	22836	20788	24327	32784	36010	36610	31684	19351	22892
MEAN	547	726	740	737	742	785	1093	1162	1220	1022	624	763
MAX	833	1040	945	827	765	1020	1170	1200	1300	1170	987	878
MIN	390	417	379	688	682	681	951	1140	1110	783	280	587
AC-FT	33610	43190	45530	45300	41230	48250	65030	71430	72620	62850	38380	45410
CFSM	.31	.42	.43	.42	.43	.45	.63	.67	.70	.59	.36	.44
IN.	.36	.47	.49	.49	.44	.52	.70	.77	.78	.68	.41	.49

05046000 OTTER TAIL RIVER BELOW ORWELL DAM, NEAR FERGUS FALLS, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	246	257	249	240	245	329	494	598	580	435	297	250
MAX	973	831	740	737	742	785	1199	1427	1425	1246	1080	1026
(WY)	1994	1986	1999	1999	1999	1999	1997	1986	1986	1953	1985	1993
MIN	9.15	8.42	8.10	15.1	10.8	23.5	39.5	14.1	14.2	12.8	11.5	7.99
(WY)	1977	1977	1977	1937	1935	1937	1934	1977	1934	1936	1934	1934

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1931 - 1999	
ANNUAL TOTAL	264265		308951			
ANNUAL MEAN	724		846		352	
HIGHEST ANNUAL MEAN					846	1999
LOWEST ANNUAL MEAN					20.4	1934
HIGHEST DAILY MEAN	1240	Jul 16	1300	Jun 8-10	1670	Jun 20 1953
LOWEST DAILY MEAN	69	Jun 22	280	Aug 5	1.6	Feb 7 1937
ANNUAL SEVEN-DAY MINIMUM	303	Sep 20	423	Oct 1	5.9	Sep 15 1934
INSTANTANEOUS PEAK FLOW			1310	Jun 7	1710	Jun 17 1953
INSTANTANEOUS PEAK STAGE			4.43	Jun 7	5.60	Jun 17 1953
INSTANTANEOUS LOW FLOW			215	Aug 3	.70	Aug 5 1970
ANNUAL RUNOFF (AC-FT)	524200		612800		255000	
ANNUAL RUNOFF (CFSM)	.42		.49		.20	
ANNUAL RUNOFF (INCHES)	5.65		6.61		2.75	
10 PERCENT EXCEEDS	1030		1170		776	
50 PERCENT EXCEEDS	727		796		278	
90 PERCENT EXCEEDS	462		540		35	



05050000 BOIS DE SIOUX RIVER NEAR WHITE ROCK, SD

LOCATION.--Lat 45°51'45", long 96°34'25", in SW¼SW¼ sec. 27, T.128 N., R.47 W., Roberts County, Hydrologic Unit 09020101, on Sisseton Indian Reservation, on left bank at Big Slough Outlet, 300 ft downstream from White Rock Dam, 4 mi south of White Rock, SD and 5 mi northwest of Wheaton.

DRAINAGE AREA.--1,160 mi^2 (approximately).

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

GAGE.--Water-stage recorder. Datum of gage is 960.00 ft, adjustment of 1912 (levels by U.S. Army Corps of Engineers). Prior to Jan. 14, 1943, nonrecording gage at same site at datum 0.11 ft lower. Jan. 15, 1943 to Sept. 30, 1963, water-stage recorder at same site at datum 0.11 ft lower.

REMARKS.--Records fair, except those for estimated daily discharge, which are poor. Flow regulated by Lake Traverse-Boise de Sioux Flood Control and Water Conservation project.

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	1.2	10	e200	e5.9	e5.0	e30	35	127	72	146	1.2	219
2	1.2	9.0	341	e5.8	e5.0	e205	37	128	141	144	.85	142
3	1.1	8.2	509	e5.8	e5.0	e275	38	128	162	141	.76	131
4	1.5	7.8	522	e5.7	e5.0	e410	58	123	263	139	4.4	117
5	6.8	7.3	524	e5.6	e5.0	e410	48	124	415	139	7.8	124
6	7.0	7.1	520	e5.6	e5.0	e500	46	131	546	138	7.4	119
7	6.3	6.7	508	e5.5	e5.1	e500	47	132	427	66	5.1	182
8	5.3	6.7	559	e5.5	e5.1	e500	42	142	133	26	6.6	269
9	4.5	6.8	628	e5.4	e5.2	e500	39	136	216	51	7.6	273
10	3.8	24	567	e5.4	e5.3	e500	34	148	602	23	6.4	278
11	3.7	27	377	e5.3	e5.3	e500	39	242	734	13	6.5	278
12	4.3	5.7	323	e5.3	e5.4	e500	154	295	726	78	14	287
13	4.0	e5.7	317	e5.3	e5.5	e500	281	291	712	193	208	287
14	3.7	e5.6	258	e5.2	e5.7	e500	280	386	699	271	78	285
15	4.3	e5.6	132	e5.2	e5.8	e500	281	490	686	270	30	280
16	29	e5.5	13	e5.1	e6.0	517	e280	492	572	276	187	274
17	49	e5.5	13	e5.1	e6.1	524	e240	488	418	276	423	274
18	55	e5.4	12	e5.0	e6.3	460	e215	486	414	277	519	263
19	32	e5.4	e11	e5.0	e6.4	363	e195	450	410	280	524	251
20	21	e5.3	e10	e5.0	e6.5	320	175	382	404	190	531	198
21	16	e5.3	e9.5	e5.0	e6.7	312	164	273	397	29	515	133
22	14	e5.3	e9.0	e5.0	e6.9	289	161	159	400	2.6	500	107
23	13	e8.3	e8.5	e5.0	e7.1	218	163	155	369	2.9	451	71
24	11	e17	e8.0	e5.0	e7.3	182	164	152	258	3.1	404	39
25	11	25	e7.5	e4.9	e7.7	138	165	148	147	2.7	393	7.1
26	10	23	e7.2	e4.9	e8.3	79	164	146	146	102	349	10
27	9.6	21	e6.8	e5.0	e10	32	166	64	146	158	241	11
28	9.0	19	e6.6	e5.0	e16	48	166	15	147	102	159	9.7
29	10	19	e6.3	e5.0	---	58	165	14	146	100	156	12
30	12	e110	e6.1	e5.0	---	45	151	14	147	42	212	9.2
31	12	---	e6.0	e5.0	---	38	---	13	---	1.3	294	---
TOTAL	372.3	423.2	6425.5	162.5	179.7	9953	4193	6474	11055	3682.6	6242.61	4940.0
MEAN	12.0	14.1	207	5.24	6.42	321	140	209	368	119	201	165
MAX	55	110	628	5.9	16	524	281	492	734	280	531	287
MIN	1.1	5.3	6.0	4.9	5.0	30	34	13	72	1.3	.76	7.1
AC-FT	738	839	12740	322	356	19740	8320	12840	21930	7300	12380	9800
CFSM	.01	.01	.18	.00	.01	.28	.12	.18	.32	.10	.17	.14
IN.	.01	.01	.21	.01	.01	.32	.13	.21	.35	.12	.20	.16

e Estimated

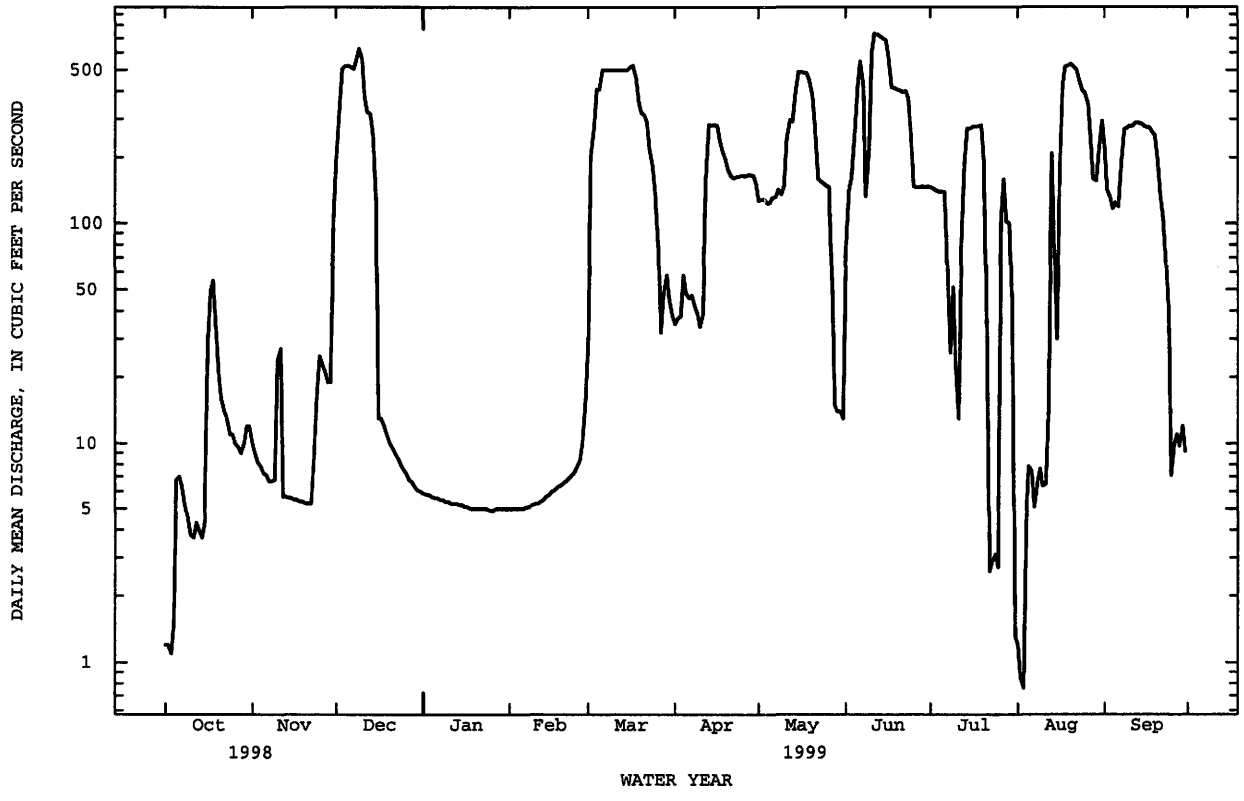
05050000 BOIS DE SIOUX RIVER NEAR WHITE ROCK, SD--Continued

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

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	29.8	16.7	8.85	3.43	7.50	60.5	306	304	248	161	72.3	36.9
MAX	535	307	207	42.4	148	628	3814	1445	1103	1035	1182	1062
(WY)	1994	1996	1999	1997	1997	1996	1997	1997	1986	1962	1993	1993
MIN	.000	.000	.000	.000	.000	.000	.000	.23	.010	.000	.000	.000
(WY)	1942	1942	1942	1942	1942	1942	1942	1977	1977	1961	1970	1960

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1942 - 1999	
ANNUAL TOTAL	49887.90		54103.41			
ANNUAL MEAN	137		148		105[a]	
HIGHEST ANNUAL MEAN					536	1997
LOWEST ANNUAL MEAN					.38	1977
HIGHEST DAILY MEAN	1040	Mar 7	734	Jun 11	7710	Apr 16 1997
LOWEST DAILY MEAN	.40	Sep 16	.76	Aug 3	.00[b]	Oct 1 1941
ANNUAL SEVEN-DAY MINIMUM	.44	Jan 11	3.4	Jul 31	.00	Oct 1 1941
INSTANTANEOUS PEAK FLOW			737	Jun 11	8750[c]	Apr 20 1997
INSTANTANEOUS PEAK STAGE			8.83	Jun 11	16.90[c]	Apr 20 1997
INSTANTANEOUS LOW FLOW			.25	Aug 3	.00	Oct 1 1941
ANNUAL RUNOFF (AC-FT)	98950		107300		75950	
ANNUAL RUNOFF (CFSM)	.12		.13		.090	
ANNUAL RUNOFF (INCHES)	1.60		1.74		1.23	
10 PERCENT EXCEEDS	387		487		343	
50 PERCENT EXCEEDS	17		49		3.0	
90 PERCENT EXCEEDS	.64		5.0		.00	

a Median of annual mean discharges is 60.4 ft^3/s.
b Many days, several years.
c Estimated, from observed readings made under non-ideal conditions. Some evidence that peak occurred Apr. 16 at 7930 ft^3/s.



05051300 BOIS DE SIOUX RIVER NEAR DORAN, MN

LOCATION.--Lat 46°09'08", long 96°34'44", in NE¼ NE¼ sec. 21, T.131 N., R.47 W., Wilken County, MN, Hydrologic Unit 09020101, on right bank, 10 ft downstream from bridge on County Highway 6, 3 miles downstream from Rabbit River, 4.3 mi southwest of Doran.

DRAINAGE AREA.--1,880 mi^2 (approximately).

PERIOD OF RECORD.--October 12, 1989 to current year.

GAGE.--Water-stage recorder. Datum of gage is 943.90 ft above mean sea level (elevation data obtained from Wilkin County Highway Engineer).

REMARKS.--Records fair except for estimated daily discharges, which are poor. Flow regulated by Lake Traverse-Boise de Sioux Flood Control and Water Conservation project near White Rock, S.D.

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	1.6	61	257	e6.1	e5.2	e19	151	141	295	180	19	304
2	1.4	64	336	e6.0	e5.2	e23	121	123	289	203	10	199
3	1.3	64	451	e6.0	e5.2	e215	119	122	268	247	8.8	172
4	1.5	67	526	e5.9	e5.2	e215	257	125	228	205	11	194
5	2.0	68	534	e5.8	e5.2	e430	403	129	677	178	15	270
6	1.9	69	542	e5.8	e5.2	e430	274	129	1860	168	19	296
7	2.1	70	534	e5.8	e5.3	e520	195	136	2520	162	28	253
8	3.1	73	529	e5.7	e5.3	e530	163	151	1850	127	33	307
9	3.5	76	594	e5.6	e5.4	e540	129	163	874	152	153	335
10	3.8	81	622	e5.6	e5.5	e540	104	180	624	204	208	330
11	4.9	74	506	e5.5	e5.6	e540	87	241	855	140	95	330
12	10	80	353	e5.5	e5.7	e540	86	398	879	80	468	340
13	17	76	306	e5.4	e5.7	e540	212	394	836	103	1910	340
14	26	73	295	e5.4	e5.8	e540	292	363	804	230	1960	335
15	37	79	219	e5.4	e6.0	e540	290	485	778	272	1400	330
16	50	82	138	e5.3	e6.1	e540	282	517	743	264	802	320
17	72	81	e13	e5.3	e6.3	e820	227	506	542	264	591	311
18	270	82	e12	e5.3	e6.5	e890	190	496	453	273	666	303
19	302	79	e11	e5.2	e6.6	e700	184	490	436	273	651	286
20	177	85	e10	e5.2	e6.8	e550	181	423	435	268	627	276
21	100	101	e9.5	e5.2	e7.0	e410	177	373	456	166	607	197
22	69	89	e9.0	e5.2	e7.1	e380	175	224	639	59	578	157
23	52	83	e8.5	e5.2	e7.4	e320	170	155	742	20	566	120
24	33	82	e8.0	e5.1	e7.7	262	170	150	706	13	479	93
25	22	85	e7.6	e5.1	e8.1	234	171	144	493	11	447	67
26	24	91	e7.2	e5.1	e8.8	180	169	137	287	11	426	35
27	38	103	e6.9	e5.1	e11	146	169	128	213	83	348	30
28	50	113	e6.7	e5.1	e16	211	168	71	192	141	222	34
29	54	125	e6.5	e5.2	---	747	164	25	185	108	174	40
30	54	139	e6.3	e5.2	---	563	161	17	186	105	177	44
31	56	---	e6.2	e5.2	---	245	---	109	---	63	266	---
TOTAL	1540.1	2495	6870.4	168.5	186.9	13360	5641	7245	20345	4773	13964.8	6648
MEAN	49.7	83.2	222	5.44	6.67	431	188	234	678	154	450	222
MAX	302	139	622	6.1	16	890	403	517	2520	273	1960	340
MIN	1.3	61	6.2	5.1	5.2	19	86	17	185	11	8.8	30
AC-FT	3050	4950	13630	334	371	26500	11190	14370	40350	9470	27700	13190
CFSM	.03	.04	.12	.00	.00	.23	.10	.12	.36	.08	.24	.12
IN.	.03	.05	.14	.00	.00	.26	.11	.14	.40	.09	.28	.13

e Estimated

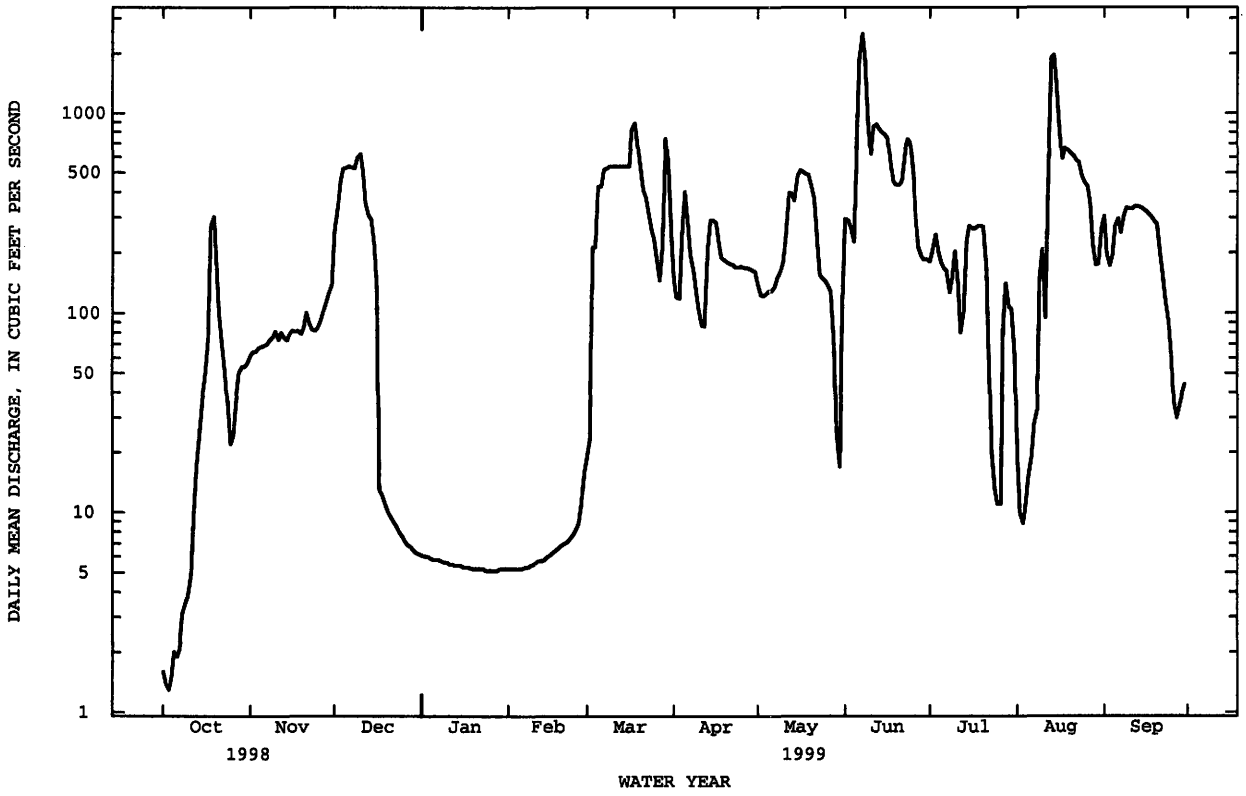
05051300 BOIS DE SIOUX RIVER NEAR DORAN, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1990 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	114	60.5	29.5	7.91	35.0	493	1251	694	425	429	235	191
MAX	592	465	222	43.9	155	1757	5936	1893	749	1477	1486	1244
(WY)	1994	1996	1999	1997	1998	1995	1997	1997	1995	1993	1993	1993
MIN	.026	1.97	.65	.077	.000	25.5	12.6	11.8	12.6	4.37	.000	.000
(WY)	1991	1991	1991	1991	1990	1990	1990	1990	1990	1990	1990	1990

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1990 - 1999	
ANNUAL TOTAL	84829.25		83237.7			
ANNUAL MEAN	232		228		331	
HIGHEST ANNUAL MEAN					754	1997
LOWEST ANNUAL MEAN					8.77	1990
HIGHEST DAILY MEAN	2540	Jun 28	2520	Jun 7	11500	Apr 16 1997
LOWEST DAILY MEAN	.01	Sep 23	1.3	Oct 3	.00[a]	Jan 7 1990
ANNUAL SEVEN-DAY MINIMUM	.01	Sep 23	1.7	Oct 1	.00	Jan 7 1990
INSTANTANEOUS PEAK FLOW			2580	Jun 7	12300	Apr 16 1997
INSTANTANEOUS PEAK STAGE			18.05	Jun 7	24.42	Apr 16 1997
INSTANTANEOUS LOW FLOW			1.2	Oct 3	.00	Jan 7 1990
ANNUAL RUNOFF (AC-FT)	168300		165100		239800	
ANNUAL RUNOFF (CFSM)	.12		.12		.18	
ANNUAL RUNOFF (INCHES)	1.68		1.65		2.39	
10 PERCENT EXCEEDS	622		541		1150	
50 PERCENT EXCEEDS	74		140		14	
90 PERCENT EXCEEDS	.28		5.4		.38	

a Many days, several years; result of regulation.



WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1994-95, 1997 to current year.

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

DATE	TIME	DIS-CHARGE, IN CUBIC FEET PER SECOND (00060)	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	OXYGEN, DIS-SOLVED (MG/L) (00300)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	PH WATER WHOLE LAB (STAND-ARD UNITS) (00403)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM) (90095)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)
OCT											
27...	0900	38	--	--	--	8.4	7.8	8.1	1120	1110	8.00
DEC											
15...	0830	219	--	740	102	14.0	8.4	8.4	1320	1280	-2.00
MAR											
30...	0830	--	607	730	86	10.5	7.8	7.2	801	813	11.0
APR											
27...	0845	169	--	740	84	8.6	8.3	8.1	1160	1160	13.0
JUN											
02...	0845	289	--	740	71	7.1	7.7	7.1	733	737	13.5
29...	0815	185	--	734	80	7.1	8.3	8.3	1120	1127	19.0
JUL											
21...	0915	166	--	729	55	4.2	7.9	7.6	1220	1216	25.5
AUG											
24...	0800	479	--	736	59	5.0	7.7	8.0	1040	1024	19.5
SEP											
22...	0840	157	--	736	105	10.4	8.0	--	--	1240	17.0

DATE	TEMPER-ATURE WATER (DEG C) (00010)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	SODIUM AD-SORP-TION RATIO (00931)	SODIUM PERCENT (00932)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	ANC UNFLTRD TIT 4.5 LAB (MG/L AS CACO3) (90410)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)
OCT											
27...	10.8	550	110	67	12	.7	13	39	250	15	370
DEC											
15...	.9	610	120	76	10	.8	14	48	250	20	480
MAR											
30...	4.8	390	85	44	8	.6	13	27	140	3.8	260
APR											
27...	12.3	550	110	70	9	.7	13	39	220	18	430
JUN											
02...	13.8	350	74	41	7	.6	14	27	120	6.4	260
29...	19.2	570	110	69	9	.7	12	36	230	15	380
JUL											
21...	26.1	600	120	75	11	.8	13	42	240	17	430
AUG											
24...	21.8	520	100	64	11	.7	12	34	200	15	350
SEP											
22...	14.1	--	--	--	--	--	--	--	--	--	--

DATE	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITRO-GEN, TOTAL (MG/L AS N) (00600)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)
OCT											
27...	.87	.14	.40	.73	1.3	.19	.31	78.0	760	4100	4300
DEC											
15...	.94	.01	.18	.93	1.1	.28	.30	532	900	K13	91
MAR											
30...	1.3	.21	4.6	1.1	5.9	.34	.36	839	512	K40	2800
APR											
27...	.89	.01	.02	.88	.91	.02	.06	366	803	K18	K13
JUN											
02...	.97	.16	1.4	.81	2.3	.20	.43	382	489	210	210
29...	.97	<.01	.08	--	1.0	.23	.33	381	762	115	177
JUL											
21...	1.6	.56	.30	1.1	1.9	.29	.38	376	840	32	--
AUG											
24...	1.1	.20	.06	.94	1.2	.31	.39	904	699	55	K108
SEP											
22...	.51	<.01	.06	--	.57	.11	.14	--	--	--	--

05051300 BOIS DE SIOUX RIVER NEAR DORAN, MN--Continued

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

DATE	CHLOR-A PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70954)	ALUMI-NUM, TOTAL RECOVER -ABLE (UG/L) (01104)	ANTI-MONY, TOTAL (UG/L AS SB) (01097)	ARSENIC TOTAL (UG/L AS AS) (01002)	BARIUM, TOTAL RECOVER -ABLE (UG/L) (01009)	BERYL-LIUM TOTAL RECOVER -ABLE (UG/L) (00998)	BORON, TOTAL RECOVER -ABLE (UG/L) (00999)	CADMIUM TOTAL RECOVER -ABLE (UG/L) (01113)	CHRO-MIUM, TOTAL RECOVER -ABLE (UG/L) (01118)	COPPER, TOTAL RECOVER -ABLE (UG/L) (01119)
OCT											
27...	<3.0	<1.0	560	<1	6	74	<1	140	<1	<1	2
DEC											
15...	<3.0	<1.0	260	<1	7	68	<1	220	<1	<1	1
MAR											
30...	<3.0	<1.0	1600	<1	5	70	<1	93	<1	2	4
APR											
27...	<3.0	<1.0	320	<1	3	64	<1	190	<1	<1	2
JUN											
02...	<3.0	--	6000	<1	6	95	<1	160	<1	8	6
29...	57	<1.0	2200	<1	7	92	<1	180	<1	3	6
JUL											
21...	16	6.0	1600	<1	11	94	<1	240	<1	2	3
AUG											
24...	65	<10	1400	<1	11	95	<1	200	<1	2	2
SEP											
22...	24	<4.0	1600	<1	9	100	3	110	1	3	3

DATE	IRON, TOTAL RECOV-ERABLE (UG/L AS FE) (01045)	LEAD, TOTAL RECOVER -ABLE (UG/L) (01114)	MANGAN-ESE TOTAL RECOVER - ABLE (UG/L) (01123)	NICKEL, TOTAL RECOVER -ABLE (UG/L) (01074)	SELE-NIUM, TOTAL (UG/L AS SE) (01147)	SILVER, TOTAL RECOVER -ABLE (UG/L) (01079)	THAL-LIUM, TOTAL RECOV-ERABLE (UG/L AS TL) (01128)	ZINC, TOTAL RECOVER -ABLE (UG/L) (01094)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
OCT											
27...	760	<1	130	6	<1	<1	<1	4	68	7.0	97
DEC											
15...	360	<1	35	5	1	<1	<1	4	15	8.9	97
MAR											
30...	2200	<1	160	6	<1	<1	<1	16	65	107	99
APR											
27...	340	<1	100	6	<1	<1	<1	12	15	6.8	97
JUN											
02...	7000	3	280	11	<1	<1	<1	23	227	177	99
29...	3000	2	330	10	<1	<1	<1	14	132	66	98
JUL											
21...	2100	1	240	8	1	<1	<1	15	86	39	98
AUG											
24...	2000	<1	240	7	1	<1	<1	12	100	129	98
SEP											
22...	2300	1	130	8	--	1	<1	12	--	--	--

05051500 RED RIVER OF THE NORTH AT WAHPETON, ND

LOCATION.--Lat 46°15'55", long 96°35'40", in NE¼ sec.8, T.132 N., R.47 W., Richland County, Hydrologic Unit 09020104, on left bank in Wahpeton, 800 ft downstream from confluence of Bois de Sioux and Otter Tail Rivers, and at mile 548.6.

DRAINAGE AREA.--4,010 mi^2 (approximately).

PERIOD OF RECORD.--April to October 1942, March 1943 to current year. Gage-height records collected in this vicinity since 1917 are contained in reports of the National Weather Service.

GAGE.--Water-stage recorder and concrete and wooden dam. Datum of gage is 942.97 ft above sea level. Prior to Aug. 6, 1943, National Weather Service non-recording gage 800 ft upstream, converted to present datum. Aug. 6, 1943, to Oct. 27, 1950, nonrecording gage at present site and datum.

REMARKS.--Records fair. Flow regulated by Orwell Reservoir, capacity, 14,100 acre-ft at elevation 1,070 ft above adjustment of 1912; Lake Traverse, capacity, 137,000 acre-ft, available for flood control; numerous other controlled lakes and ponds and several powerplants.

EXTREMES OUTSIDE PERIOD OF RECORD.--A stage of 17.0 ft, discharge, 10,500 ft^3/s, occurred in the spring of 1897.

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	516	726	1100	e540	e750	e740	1340	1330	1450	1490	815	776
2	510	708	1290	e520	e720	e760	1300	1300	1470	1520	789	834
3	485	722	1290	e500	e700	e780	1330	1290	1440	1580	574	922
4	459	704	1390	e500	e670	e800	1510	1300	1380	1530	330	1140
5	476	706	1420	e500	e660	e840	1710	1320	1820	1470	293	1200
6	461	756	1420	e490	e660	e900	1570	1320	3130	1430	279	1150
7	463	865	1410	e490	e650	e1000	1370	1330	4090	1410	442	1080
8	552	957	1440	e500	e640	e1150	1250	1350	3880	1460	697	1120
9	679	945	1560	e500	e620	e1300	1200	1380	2880	1450	779	1290
10	635	611	1600	e500	e620	e1400	1190	1430	2180	1470	939	1310
11	553	537	1480	e500	e620	e1500	1170	1490	2240	1430	900	1320
12	543	e500	1280	e500	e600	e1400	1160	1630	2310	1340	1160	1390
13	544	e520	1190	e510	e600	e1300	1220	1690	2260	1300	2560	1350
14	544	e580	1170	e520	e600	1350	1350	1640	2210	1410	3160	1320
15	529	e640	1140	e540	e600	1380	1380	1680	2170	1430	2940	1290
16	589	e620	1080	e560	e600	1500	1420	1760	2130	1420	2180	1250
17	687	e560	e920	e600	e600	1810	1400	1760	1990	1370	1600	1220
18	806	e520	e800	e630	e600	1910	1340	1740	1830	1380	1500	1200
19	899	e480	e710	e660	e600	1900	1320	1710	1790	1380	1510	1170
20	890	e450	e600	e680	e600	1840	1330	1650	1780	1340	1440	1150
21	858	e500	e520	e700	e590	1600	1360	1580	1780	1240	1350	1080
22	809	e600	e500	e740	e590	1470	1380	1470	1940	1090	1280	973
23	776	e700	e500	e760	e600	1370	1380	1330	2150	1000	1370	925
24	755	e760	e500	e800	e620	1260	1370	1310	2180	985	1260	860
25	740	e820	e500	e810	e640	1240	1370	1300	1980	962	1060	843
26	737	887	e510	e820	e660	1170	1360	1300	1700	943	876	825
27	732	909	e520	e840	e700	1100	1370	1290	1550	960	827	797
28	796	929	e520	e830	e740	1230	1360	1260	1520	1080	734	798
29	916	951	e540	e820	---	1890	1350	1180	1510	996	648	815
30	923	984	e540	e810	---	1810	1340	1170	1500	932	659	824
31	852	---	e540	e800	---	1440	---	1290	---	892	696	---
TOTAL	20714	21147	29980	19470	17850	41140	40500	44580	62240	39690	35647	32222
MEAN	668	705	967	628	638	1327	1350	1438	2075	1280	1150	1074
MAX	923	984	1600	840	750	1910	1710	1760	4090	1580	3160	1390
MIN	459	450	500	490	590	740	1160	1170	1380	892	279	776
AC-FT	41090	41950	59470	38620	35410	81600	80330	88420	123500	78730	70710	63910

e Estimated

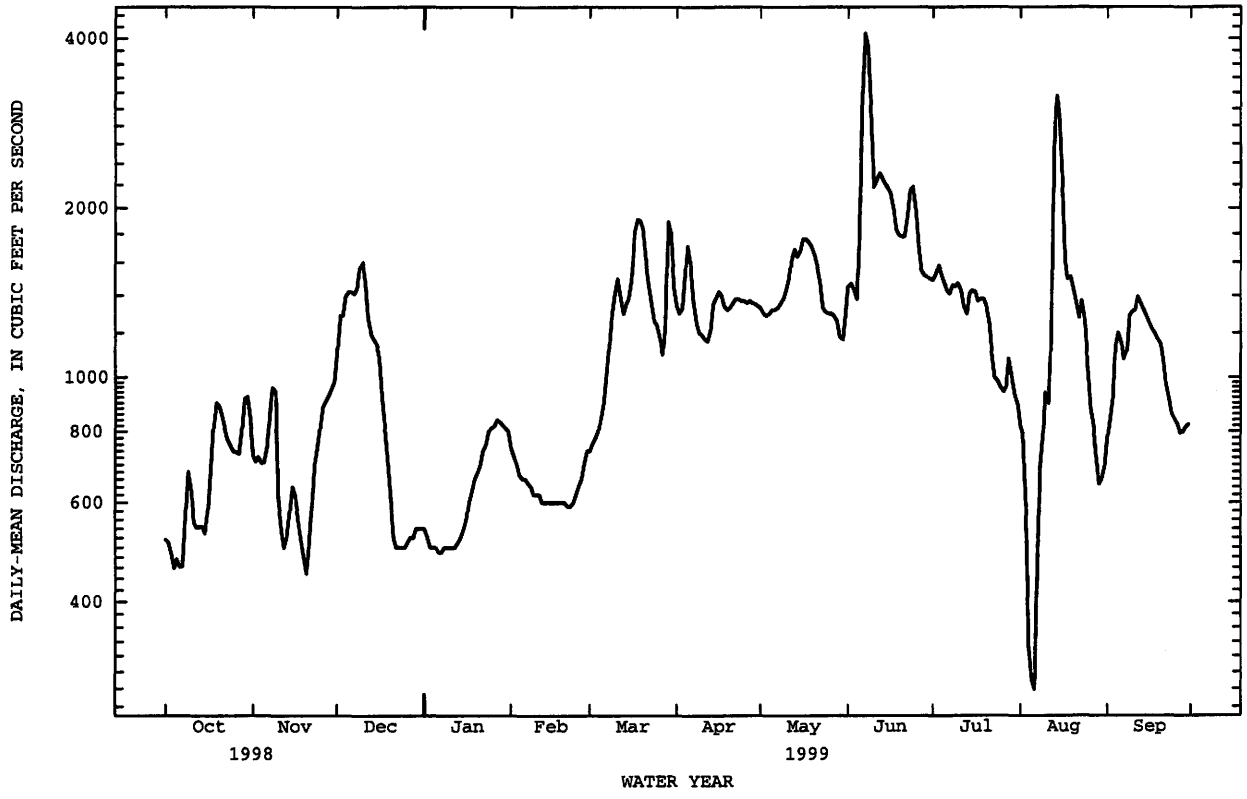
05051500 RED RIVER OF THE NORTH AT WAHPETON, ND--Continued

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

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	339	318	293	278	300	693	1418	1124	1074	802	443	350
MAX	1599	952	967	678	868	2629	8717	3344	2675	2787	2496	2148
(WY)	1994	1987	1999	1986	1998	1995	1997	1997	1962	1993	1993	1993
MIN	5.72	7.40	6.60	8.81	18.0	84.3	138	22.5	90.0	65.6	53.5	2.18
(WY)	1977	1977	1977	1977	1977	1977	1977	1977	1977	1977	1977	1976

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1942 - 1999	
ANNUAL TOTAL	357039		405180			
ANNUAL MEAN	978		1110		616	
HIGHEST ANNUAL MEAN					1600	1997
LOWEST ANNUAL MEAN					54.0	1977
HIGHEST DAILY MEAN	4170	Jun 29	4090	Jun 7	12700	Apr 15 1997
LOWEST DAILY MEAN	175	Sep 23	279	Aug 6	1.7	Aug 28 1976
ANNUAL SEVEN-DAY MINIMUM	350	Sep 21	481	Oct 1	1.7	Aug 28 1976
INSTANTANEOUS PEAK FLOW			4220	Jun 7	12800	Apr 15 1997
INSTANTANEOUS PEAK STAGE			11.02	Jun 7	19.42a	Apr 6 1997
INSTANTANEOUS LOW FLOW					1.7	Aug 28 1976
ANNUAL RUNOFF (AC-FT)	708200		803700		446400	
10 PERCENT EXCEEDS	1590		1700		1460	
50 PERCENT EXCEEDS	887		1080		382	
90 PERCENT EXCEEDS	450		520		108	

a Backwater from ice; from floodmark.



WATER-QUALITY RECORDS

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

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

DATE	TIME	DIS-CHARGE, IN CUBIC FEET PER SECOND (00060)	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SAMPLE LOC-ATION, CROSS SECTION (FT FM R BK) (72103)	OXYGEN, DIS-SOLVED (MG/L) (00300)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	PH WATER WHOLE LAB (STAND-ARD UNITS) (00403)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM) (90095)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)
OCT												
05...	1555	--	463	--	--	--	--	--	406	13.0	11.0	--
DEC												
11...	0925	--	1490	--	--	--	--	--	813	4.5	.5	--
JAN												
26...	0910	--	824	--	--	--	--	--	123	-10.0	.5	--
FEB												
09...	1310	620	--	30.0	13.2	7.6	--	--	431	--	.0	--
09...	1315	--	--	70.0	13.0	7.7	--	--	432	--	.0	--
09...	1320	--	--	100.0	13.0	7.7	--	--	430	--	.0	--
MAR												
16...	1635	--	1530	--	--	--	--	--	829	2.0	2.0	--
27...	0900	--	1130	--	--	8.0	--	513	561	4.5	4.0	260
MAY												
04...	1645	--	1330	--	--	--	--	--	490	22.0	16.0	--
JUN												
10...	0840	--	2100	--	--	--	--	--	497	21.0	22.0	--
JUL												
15...	1400	--	1410	--	--	8.0	8.0	560	558	27.0	26.0	270
SEP												
02...	1605	--	843	--	--	--	--	--	588	16.0	21.0	--

DATE	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	SODIUM AD-SORP-TION RATIO (00931)	SODIUM PERCENT (00932)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	ANC UNFLTRD TIT 4.5 LAB (MG/L AS CACO3) (90410)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)
OCT											
05...	--	--	--	--	--	--	--	--	--	--	--
DEC											
11...	--	--	--	--	--	--	--	--	--	--	--
JAN											
26...	--	--	--	--	--	--	--	--	--	--	--
FEB											
09...	--	--	--	--	--	--	--	--	--	--	--
09...	--	--	--	--	--	--	--	--	--	--	--
09...	--	--	--	--	--	--	--	--	--	--	--
MAR											
16...	--	--	--	--	--	--	--	--	--	--	--
27...	51	33	4.6	.4	11	15	196	14	.10	83	1200
MAY											
04...	--	--	--	--	--	--	--	--	--	--	--
JUN											
10...	--	--	--	--	--	--	--	--	--	--	--
JUL											
15...	50	35	3.8	.4	11	15	213	11	.20	93	1320
SEP											
02...	--	--	--	--	--	--	--	--	--	--	--

05051500 RED RIVER OF THE NORTH AT WAHPETON, ND--Continued

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

DATE	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	LITHIUM DIS-SOLVED (UG/L AS LI) (01130)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO) (01060)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)	STRON-TIUM, DIS-SOLVED (UG/L AS SR) (01080)
OCT											
05...	--	--	--	--	--	--	--	--	--	--	--
DEC											
11...	--	--	--	--	--	--	--	--	--	--	--
JAN											
26...	--	--	--	--	--	--	--	--	--	--	--
FEB											
09...	--	--	--	--	--	--	--	--	--	--	--
09...	--	--	--	--	--	--	--	--	--	--	--
09...	--	--	--	--	--	--	--	--	--	--	--
MAR											
16...	--	--	--	--	--	--	--	--	--	--	--
27...	392	319	2	40	<1.0	20	30	<.1	<1.0	<1	240
MAY											
04...	--	--	--	--	--	--	--	--	--	--	--
JUN											
10...	--	--	--	--	--	--	--	--	--	--	--
JUL											
15...	348	336	5	60	1.0	20	10	<.1	1.0	<1	250
SEP											
02...	--	--	--	--	--	--	--	--	--	--	--

05051522 RED RIVER OF THE NORTH AT HICKSON, ND

LOCATION.--Lat 46°39'35", long 96 47'44", in SW¼ sec. 19, T.137 N., R.48 W., Clay County, MN, Hydrologic Unit 09020104, on right bank 60 ft downstream from bridge on township road, and 1 mi southeast of Hickson, ND.

DRAINAGE AREA.--4,300 mi^2 (approximately).

PERIOD OF RECORD.--October 1975 to current year.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 877.06 ft above sea level.

REMARKS.--Records good except those for periods of estimated daily discharges, which are fair. Flow regulated by Orwell Reservoir, capacity, 14,100 acre-ft at 1,070 ft above sea level, adjustment of 1912; Lake Traverse, capacity, 137,000 acre-ft, available for flood control, numerous other controlled lakes and ponds, and several power plants.

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	500	933	978	e560	e760	e750	1650	1360	1350	1460	903	655
2	507	810	1040	e560	e720	e780	1480	1340	1530	1450	837	711
3	505	726	1220	e540	e720	e800	1430	1320	1620	1440	786	793
4	501	705	1260	e540	e700	e810	1540	1330	1610	1480	708	923
5	480	713	1320	e520	e680	e840	1710	1340	1560	1480	481	1230
6	476	688	1370	e500	e680	e900	1710	1350	1800	1420	351	1460
7	464	707	1370	e500	e660	e1000	1590	1370	2550	1370	310	1390
8	455	799	1360	e500	e660	e1100	1490	1410	3210	1360	321	1260
9	464	922	1360	e500	e640	e1200	1400	1410	3610	1390	576	1160
10	585	976	1440	e500	e620	e1350	1320	1580	3630	1380	730	1250
11	671	851	1500	e520	e620	e1500	1260	1690	3110	1390	863	1290
12	610	530	1420	e520	e620	e1500	1230	1680	2520	1380	927	1290
13	549	491	1310	e520	e620	e1450	1210	1750	2340	1330	1030	1310
14	526	e530	1180	e540	e620	e1400	1230	1830	2290	1290	1720	1290
15	528	e580	e1100	e530	e600	e1400	1330	1810	2230	1310	2450	1260
16	547	e640	e1000	e540	e600	e1500	1380	1770	2170	1350	2820	1230
17	752	e680	e900	e540	e600	e1800	1390	1810	2110	1350	2670	1190
18	886	e650	e800	e560	e600	e2200	1400	1830	2020	1330	1990	1150
19	853	e600	e660	e600	e600	e2500	1390	1820	1850	1330	1500	1110
20	930	e520	e560	e640	e620	e2700	1370	1790	1750	1330	1420	1080
21	938	e470	e520	e670	e620	e2600	1370	1740	1710	1310	1380	1050
22	920	e490	e515	e700	e620	e2400	1380	1670	1700	1270	1320	1010
23	863	e600	e510	e720	e620	e2100	1390	1580	1890	1180	1270	936
24	810	e680	e510	e760	e620	e1900	1390	1430	2230	1070	1270	889
25	777	e750	e515	e800	e640	e1800	1380	1360	2440	1030	1250	841
26	753	e800	e520	e810	e660	1450	1380	1340	2370	1010	1130	821
27	746	e830	e520	e840	e700	1350	1380	1330	2040	967	937	805
28	755	e860	e520	e840	e720	1430	1380	1310	1710	962	839	778
29	784	916	e520	e840	---	1720	1380	1290	1540	1040	758	760
30	904	950	e540	e830	---	2130	1370	1230	1480	1020	673	766
31	957	---	e560	e800	---	2100	---	1190	---	948	643	---
TOTAL	20996	21397	28898	19340	18140	48460	42310	47060	63970	39427	34863	31688
MEAN	677	713	932	624	648	1563	1410	1518	2132	1272	1125	1056
MAX	957	976	1500	840	760	2700	1710	1830	3630	1480	2820	1460
MIN	455	470	510	500	600	750	1210	1190	1350	948	310	655
AC-FT	41650	42440	57320	38360	35980	96120	83920	93340	126900	78200	69150	62850

e Estimated

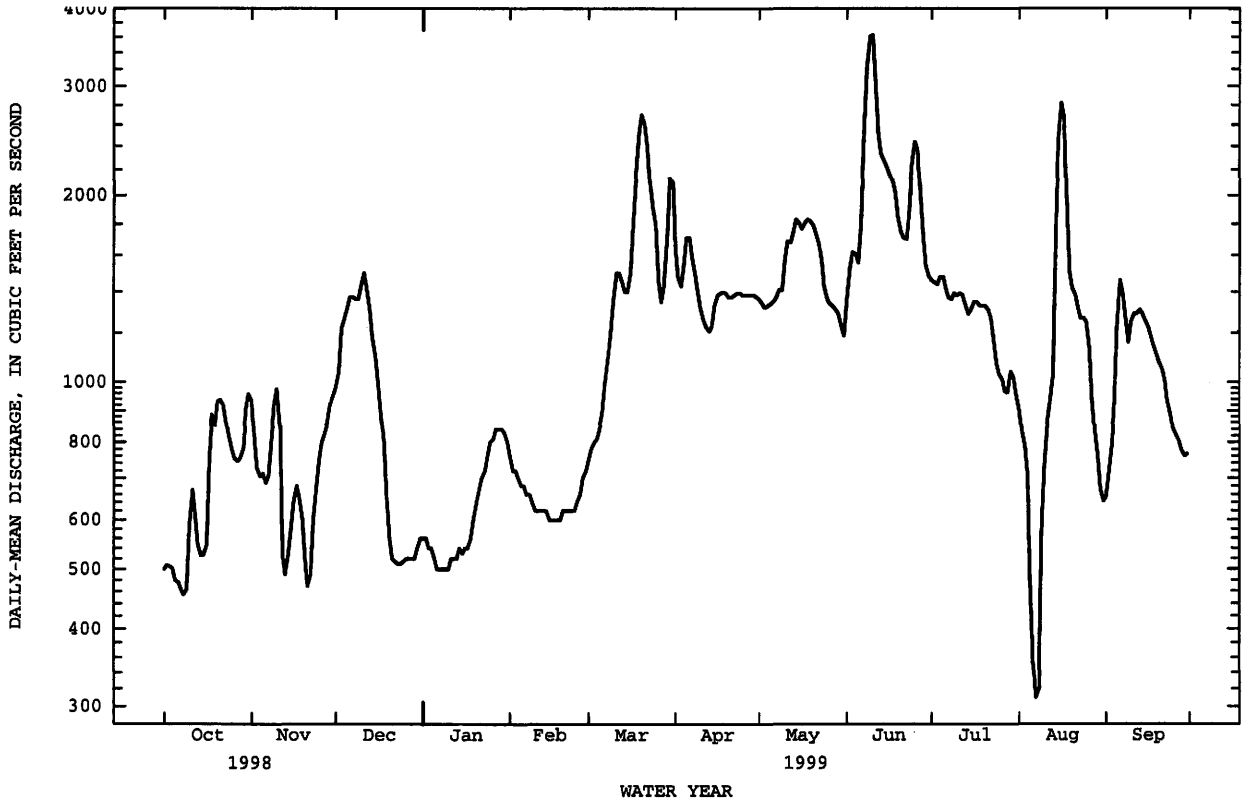
05051522 RED RIVER OF THE NORTH AT HICKSON, ND--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1975 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	417	354	326	307	379	988	2141	1305	1085	906	556	465
MAX	1558	900	932	747	1058	2687	9864	3925	2485	2674	2674	2135
(WY)	1994	1987	1999	1986	1998	1995	1997	1997	1986	1993	1993	1993
MIN	2.02	.000	.000	4.95	14.0	75.9	165	22.0	86.4	73.4	35.6	12.6
(WY)	1977	1977	1977	1977	1977	1977	1977	1977	1977	1977	1977	1976

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1975 - 1999	
ANNUAL TOTAL	405542		416549			
ANNUAL MEAN	1111		1141		769	
HIGHEST ANNUAL MEAN					1729	1997
LOWEST ANNUAL MEAN					53.1	1977
HIGHEST DAILY MEAN	4540	Feb 28	3630	Jun 10	13100	Apr 15 1997
LOWEST DAILY MEAN	196	Sep 25	310	Aug 7	.00	Oct 26 1976
ANNUAL SEVEN-DAY MINIMUM	362	Sep 23	478	Oct 3	.00	Oct 26 1976
INSTANTANEOUS PEAK FLOW			3700a	Jun 9	13300	Apr 14 1997
INSTANTANEOUS PEAK STAGE			19.24b	Mar 22	37.60	Apr 16 1997
ANNUAL RUNOFF (AC-FT)	804400		826200		557300	
10 PERCENT EXCEEDS	2170		1800		1810	
50 PERCENT EXCEEDS	906		1040		430	
90 PERCENT EXCEEDS	486		527		91	

a Gage height, 18.52 ft.
b Backwater from ice.



05051522 RED RIVER OF THE NORTH AT HICKSON, ND--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water year 1976 to current year.

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

DATE	TIME	DIS-CHARGE, IN CUBIC FEET PER SECOND (00060)	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	OXYGEN, DIS-SOLVED (MG/L) (00300)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	PH WATER WHOLE LAB (STAND-ARD UNITS) (00403)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM) (90095)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)
OCT												
02...	1040	--	500	--	--	--	--	--	--	451	8.0	12.5
27...	1600	746	--	--	--	10.8	8.3	8.4	469	461	11.1	10.9
DEC												
10...	1255	--	1420	--	--	--	--	--	--	--	4.5	-1.0
16...	0845	1000	--	730	99	13.6	8.3	8.0	706	683	.0	.8
JAN												
25...	1410	--	775	--	--	--	--	--	--	493	-12.0	5.0
FEB												
11...	0815	620	--	735	90	12.7	7.7	7.8	523	477	-6.0	.0
MAR												
25...	1400	1800	--	--	--	--	--	7.8	609	611	6.5	2.0
30...	1510	--	2120	730	95	11.6	8.0	--	545	559	17.0	4.8
APR												
27...	1515	1380	--	740	95	9.8	8.4	--	565	554	19.0	12.9
28...	1615	--	1420	--	--	--	--	--	--	560	17.5	12.0
JUN												
02...	1630	--	1580	740	86	7.9	7.9	7.5	443	448	23.5	17.7
29...	1440	--	1550	734	85	7.1	7.8	7.8	562	558	23.0	22.1
JUL												
22...	0845	--	1540	740	78	6.2	8.3	7.7	660	665	23.5	25.5
AUG												
24...	1500	--	1290	739	88	7.1	8.0	8.2	666	655	30.0	24.3
SEP												
22...	1455	--	990	735	116	11.1	8.1	8.4	407	652	29.0	15.8

DATE	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	SODIUM AD-SORP-TION RATIO (00931)	SODIUM PERCENT (00932)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	ANC UNFLTRD TIT 4.5 LAB (MG/L AS CACO3) (90410)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)
OCT												
02...	--	--	--	--	--	--	--	--	--	--	--	--
27...	200	37	26	4	.3	8	8.8	200	12	--	42	.28
DEC												
10...	--	--	--	--	--	--	--	--	--	--	--	--
16...	320	61	40	5	.5	11	19	220	14	--	150	.56
JAN												
25...	--	--	--	--	--	--	--	--	--	--	--	--
FEB												
11...	230	43	30	4	.5	13	16	230	18	--	23	.58
MAR												
25...	280	56	35	5.3	.5	12	19	196	15	.10	130	--
30...	250	52	29	5	.3	9	12	170	4.6	--	100	.72
APR												
27...	270	52	33	5	.4	11	15	210	17	--	85	.44
28...	--	--	--	--	--	--	--	--	--	--	--	--
JUN												
02...	270	55	31	6	.2	7	8.9	180	9.4	--	44	.52
29...	280	57	33	5	.4	11	16	210	17	--	75	.49
JUL												
22...	320	62	41	14	.5	12	22	230	20	--	110	.78
AUG												
24...	350	69	42	7	.4	10	18	180	12	--	160	.56
SEP												
22...	220	40	29	4	.2	6	6.8	190	9.2	--	18	.50

05051522 RED RIVER OF THE NORTH AT HICKSON, ND--Continued

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

DATE	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITRO-GEN, TOTAL (MG/L AS N) (00600)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	CHLOR-A PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70953)
OCT												
02...	--	--	--	--	--	--	--	--	--	--	--	--
27...	.01	.05	.27	.33	.10	.11	500	--	248	K12	520	<3.0
DEC												
10...	--	--	--	--	--	--	--	--	--	--	--	--
16...	<.01	.10	--	.66	.30	.33	1140	--	421	50	K12	<3.0
JAN												
25...	--	--	--	--	--	--	--	--	--	--	--	--
FEB												
11...	.12	.18	.46	.76	.07	.24	454	--	271	K19	110	<3.0
MAR												
25...	--	--	--	--	--	--	2080	427	378	--	--	--
30...	.15	2.3	.57	3.0	.13	.29	1770	--	309	<20	2000	<3.0
APR												
27...	<.01	<.02	--	--	.07	.15	1240	--	333	<4.0	K32	<3.0
28...	--	--	--	--	--	--	--	--	--	--	--	--
JUN												
02...	.05	.40	.47	.92	<.01	.20	1130	--	265	K270	410	<3.0
29...	.01	.19	.47	.68	.13	.26	1380	--	330	96	88	<3.0
JUL												
22...	.03	.40	.75	1.2	.12	.23	1700	--	408	42	70	34
AUG												
24...	<.01	.05	--	.61	.12	.25	1440	--	413	44	58	39
SEP												
22...	<.01	<.02	--	--	<.01	.03	584	--	219	K303	82	<12

DATE	CHLOR-B PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70954)	ALUMI-NUM, TOTAL RECOVER-ABLE (UG/L) (01104)	ANTI-MONY, TOTAL (UG/L AS SB) (01097)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	ARSENIC TOTAL (UG/L AS AS) (01002)	BARIUM, TOTAL RECOVER-ABLE (UG/L) (01009)	BERYL-LIUM TOTAL RECOVER-ABLE (UG/L) (00998)	BORON, TOTAL RECOVER-ABLE (UG/L) (00999)	CADMIUM TOTAL RECOVER-ABLE (UG/L) (01113)	CHRO-MIUM, TOTAL RECOVER-ABLE (UG/L) (01118)	COPPER, TOTAL RECOVER-ABLE (UG/L) (01119)	IRON, DIS-SOLVED (UG/L AS FE) (01046)
OCT												
02...	--	--	--	--	--	--	--	--	--	--	--	--
27...	<1.0	530	<1	--	3	81	<1	110	<1	<1	1	--
DEC												
10...	--	--	--	--	--	--	--	--	--	--	--	--
16...	<1.0	430	<1	--	3	74	<1	120	<1	<1	2	--
JAN												
25...	--	--	--	--	--	--	--	--	--	--	--	--
FEB												
11...	<1.0	170	<1	--	1	93	<1	84	<1	<1	<1	--
MAR												
25...	--	--	--	3	--	--	--	--	--	--	--	30
30...	<1.0	8700	<1	--	6	150	<1	120	<1	12	10	--
APR												
27...	<1.0	2000	<1	--	2	98	<1	98	<1	3	4	--
28...	--	--	--	--	--	--	--	--	--	--	--	--
JUN												
02...	--	8900	<1	--	5	160	<1	130	<1	11	8	--
29...	--	3300	<1	--	5	120	<1	86	<1	5	6	--
JUL												
22...	<1.0	3100	<1	--	7	140	<1	140	<1	5	5	--
AUG												
24...	<7.0	2500	<1	--	7	120	<1	130	<1	4	5	--
SEP												
22...	<4.0	370	<1	--	5	80	1	75	<1	<1	1	--

05051522 RED RIVER OF THE NORTH AT HICKSON, ND--Continued

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

DATE	IRON, TOTAL RECOV-ERABLE (UG/L AS FE) (01045)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	LEAD, TOTAL RECOVER -ABLE (UG/L) (01114)	LITHIUM DIS-SOLVED (UG/L AS LI) (01130)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MANGAN-ESE TOTAL RECOVER - ABLE (UG/L) (01123)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO) (01060)	NICKEL, TOTAL RECOVER -ABLE (UG/L) (01074)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)	SELE-NIUM, TOTAL (UG/L AS SE) (01147)	SILVER, TOTAL RECOVER -ABLE (UG/L) (01079)
OCT												
02...	--	--	--	--	--	--	--	--	--	--	--	--
27...	710	--	<1	--	--	37	--	--	3	--	<1	<1
DEC												
10...	--	--	--	--	--	--	--	--	--	--	--	--
16...	660	--	<1	--	--	43	--	--	3	--	<1	<1
JAN												
25...	--	--	--	--	--	--	--	--	--	--	--	--
FEB												
11...	350	--	<1	--	--	21	--	--	2	--	<1	<4
MAR												
25...	--	<1.0	--	30	20	--	<.1	1.0	--	<1	--	--
30...	12000	--	4	--	--	360	--	--	12	--	<1	<1
APR												
27...	2500	--	<1	--	--	140	--	--	6	--	<1	<1
28...	--	--	--	--	--	--	--	--	--	--	--	--
JUN												
02...	10000	--	4	--	--	370	--	--	11	--	<1	<1
29...	4600	--	2	--	--	240	--	--	8	--	<1	<1
JUL												
22...	4400	--	3	--	--	240	--	--	9	--	3	<1
AUG												
24...	3500	--	1	--	--	200	--	--	8	--	<1	<1
SEP												
22...	510	--	<1	--	--	34	--	--	3	--	9	<1

DATE	STRON-TIUM, DIS-SOLVED (UG/L AS SR) (01080)	THAL-LIUM, TOTAL RECOV-ERABLE (UG/L AS TL) (01128)	ZINC, TOTAL RECOVER -ABLE (UG/L) (01094)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .002 MM (70337)	SED. SUSP. FALL DIAM. % FINER THAN .004 MM (70338)	SED. SUSP. FALL DIAM. % FINER THAN .008 MM (70339)	SED. SUSP. FALL DIAM. % FINER THAN .016 MM (70340)	SED. SUSP. FALL DIAM. % FINER THAN .031 MM (70341)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
OCT											
02...	--	--	--	--	--	--	--	--	--	--	--
27...	--	<1	6	32	64	--	--	--	--	--	99
DEC											
10...	--	--	--	--	--	--	--	--	--	--	--
16...	--	<1	6	33	89	--	--	--	--	--	99
JAN											
25...	--	--	--	--	--	--	--	--	--	--	--
FEB											
11...	--	<1	6	11	18	--	--	--	--	--	97
MAR											
25...	270	--	--	--	--	--	--	--	--	--	--
30...	--	<1	43	379	2170	60	71	86	92	96	99
APR											
27...	--	<1	20	118	440	--	--	--	--	--	98
28...	--	--	--	--	--	--	--	--	--	--	--
JUN											
02...	--	<1	30	352	1500	69	74	--	89	--	98
29...	--	<1	16	181	757	--	--	--	--	--	98
JUL											
22...	--	<1	18	214	890	--	--	--	--	--	97
AUG											
24...	--	<1	17	148	515	--	--	--	--	--	98
SEP											
22...	--	<1	15	112	299	--	--	--	--	--	99

Boat measuring equipment, circa 1935-38.

05054000 RED RIVER OF THE NORTH AT FARGO, ND

LOCATION.--Lat 46°51'40", long 96°47'00", in NW¼NE¼ sec.18, T.139 N., R.48 W., Cass County, Hydrologic Unit 09020104, at waterplant on 4th St. S. in Fargo, 25 mi upstream from mouth of Sheyenne River, and at mile 453.

DRAINAGE AREA.--6,800 mi^2 (approximately).

PERIOD OF RECORD.--May 1901 to current year. Published as "at Moorhead, MN.", 1901. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WSP 1308: 1902-4, 1906-7, 1910-14, 1916, 1918, 1924. WSP 1388: 1905-6, 1917-20(M), 1935(M), 1938-39(M), 1943.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 861.8 ft above sea level. Oct. 1, 1960, to Sept. 30, 1962, water-stage recorder at present site at datum 5.6 ft higher. See WSP 1728 or 1913 for history of changes prior to Oct. 1, 1960.

REMARKS.--Records good except for estimated daily discharges, which are poor. Flow regulated by Orwell Reservoir, capacity 14,100 acre-ft at 1,070 ft above sea level, adjustment of 1912; Lake Traverse, capacity 137,000 acre-ft, available for flood control, other controlled lakes and ponds, and several powerplants. Some small diversions for municipal supply. Figures of daily discharge do not include diversions to cities of Fargo and Moorhead, MN from the Sheyenne River.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 7, 1897, reached a stage of 39.1 ft present datum, discharge, 25,000 ft^3/s at site 1.5 mi downstream.

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	553	1180	1670	e648	e771	e930	3780	1770	1670	1860	1240	967
2	556	1110	1680	e626	e769	e990	2960	1750	1760	1830	1170	918
3	561	993	1740	e626	e750	e1040	2610	1740	1870	1810	1090	1470
4	586	923	1800	e604	e731	e1070	3430	1790	1930	1900	1010	1740
5	589	928	1800	e583	e733	e1110	4000	1810	1970	1920	813	1940
6	549	925	1790	e582	e714	e1190	3950	1790	1960	1840	547	2300
7	541	913	1800	e582	e711	e1270	3700	1950	2490	1740	436	2690
8	510	955	1780	e581	e685	e1360	3060	2060	3280	1720	382	2750
9	498	1070	1770	e580	e663	e1490	2490	2040	3810	1690	509	2600
10	548	1190	1790	e599	e661	e1640	2220	3110	4090	1690	783	2370
11	779	1170	e2090	e597	e661	e1640	2070	3270	3860	1680	944	2200
12	756	922	e2190	e595	e660	e1600	1960	2860	3210	1720	1270	2020
13	693	643	e1910	e612	e660	e1590	1900	2740	2770	1710	1270	1910
14	652	e650	1670	e602	e640	e1500	1860	2800	2640	1620	1650	1930
15	659	e710	e1500	e610	e641	e1500	1880	2720	2560	1590	2570	2010
16	678	e800	e1350	e606	e641	e1800	1960	2600	e2500	1650	3370	2000
17	1410	e780	e1200	e625	e642	e2200	1980	2550	2420	1680	3510	1910
18	2620	e760	e1000	e663	e643	e2800	1980	2550	2400	1650	2980	1810
19	2170	e700	e900	e702	e665	e3500	1960	2540	2280	1610	2220	1740
20	1590	e630	e800	e733	e667	e4000	1910	2510	2170	1600	1860	1700
21	1410	e600	e700	e780	e669	e4800	1870	2450	2100	1580	1740	1670
22	1320	e600	e600	e800	e671	e4800	1850	2390	2100	1550	1640	1650
23	1250	e700	e580	e838	e671	e4600	1850	2300	2170	1480	e1600	1580
24	1160	e800	e580	e872	e691	e4000	1840	2160	2490	1370	e1550	1500
25	1100	e940	e600	e868	e715	e3500	1830	2020	2970	1340	e1500	1430
26	1070	e1100	e619	e898	e786	e2700	1810	1960	3160	1280	1410	1370
27	1030	1190	e618	e898	e810	2290	1800	1940	2820	1240	1260	1310
28	1010	1280	e616	e896	e870	2810	1800	1890	2420	1200	1120	1260
29	1060	1410	e635	e885	---	4010	1790	1860	2090	1220	1020	1200
30	1100	1590	e653	e855	---	4210	1780	1790	1940	1320	931	1170
31	1170	---	e650	e814	---	4270	---	1680	---	1320	832	---
TOTAL	30178	28162	39081	21760	19591	76210	69880	69390	75900	49410	44227	53115
MEAN	973	939	1261	702	700	2458	2329	2238	2530	1594	1427	1770
MAX	2620	1590	2190	898	870	4800	4000	3270	4090	1920	3510	2750
MIN	498	600	580	580	640	930	1780	1680	1670	1200	382	918
AC-FT	59860	55860	77520	43160	38860	151200	138600	137600	150500	98000	87720	105400
+	1230	1170	1200	1360	1110	1150	1080	1360	1440	1550	1510	1300
*	61090	57030	78720	44520	39970	152400	139700	139000	151900	99550	89230	106700

e Estimated
+ Diversions, in acre-feet, to cities of Fargo and Moorhead.
* Adjusted for diversions to cities of Fargo and Moorhead.

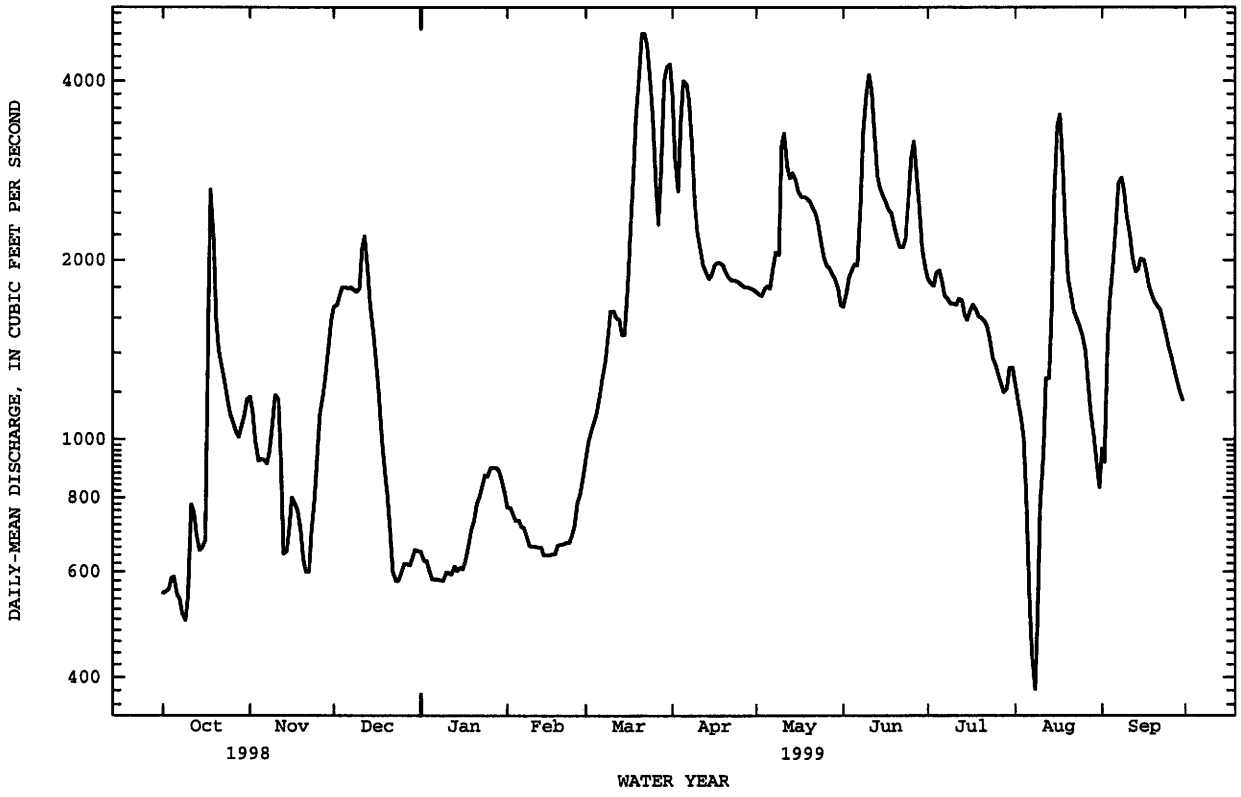
05054000 RED RIVER OF THE NORTH AT FARGO, ND--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1901 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	325	283	241	218	230	768	1940	1130	1066	899	435	336
MAX	1741	942	1261	740	1353	4722	17920	5365	5122	5692	3293	2280
(WY)	1994	1907	1999	1986	1998	1995	1997	1997	1962	1962	1993	1993
MIN	.000	.000	.000	.000	.18	26.8	102	8.12	2.87	.000	.000	.000
(WY)	1935	1937	1938	1933	1933	1937	1934	1934	1936	1934	1932	1934

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1901 - 1999	
ANNUAL TOTAL	695725		576904			
ANNUAL MEAN	1906		1581		657	
HIGHEST ANNUAL MEAN					2619	1997
LOWEST ANNUAL MEAN					17.5	1934
HIGHEST DAILY MEAN	8590	May 19	4800	Mar 21	27800	Apr 17 1997
LOWEST DAILY MEAN	289	Sep 25	382	Aug 8	.00	Jul 25 1932
ANNUAL SEVEN-DAY MINIMUM	438	Sep 23	546	Oct 4	.00	Jul 25 1932
INSTANTANEOUS PEAK FLOW			4900a	Mar 22	28000	Apr 17 1997
INSTANTANEOUS PEAK STAGE			20.81b	Mar 22	39.72	Apr 18 1997
ANNUAL RUNOFF (AC-FT)	1380000(*1475000)		1144000(*1160000)		476100	
10 PERCENT EXCEEDS	4100		2740		1470	
50 PERCENT EXCEEDS	1350		1500		318	
90 PERCENT EXCEEDS	530		623		40	

a Approximately.
b Backwater from ice.
* Adjusted for diversions to cities of Fargo and Moorhead.



05054000 RED RIVER OF THE NORTH AT FARGO, ND--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water year 1956 to current year.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: September 1998 to September 1999.

SPECIFIC CONDUCTANCE: September 1998 to September 1999.

INSTRUMENTATION.--Water-quality sensors since September 1998.

REMARKS.--Records good.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum recorded, 28.3°C, July 24, 1999; Minimum recorded, 0.0°C on many days.

SPECIFIC CONDUCTANCE: Maximum recorded, 1,200 microsiemens/cm, Aug. 29, 1999; minimum recorded, 353 microsiemens/cm, Oct. 19, 1998.

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

DATE	TIME	DIS-CHARGE, IN CUBIC FEET PER SECOND (00060)	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	PH WATER WHOLE LAB (STAND-ARD UNITS) (00403)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM) (90095)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)
OCT											
09...	0930	498	--	--	--	--	521	--	11.7	--	--
27...	1515	1030	--	--	--	--	682	--	11.0	--	--
DEC											
08...	1200	1780	--	--	--	--	880	--	.9	--	--
JAN											
11...	1500	597	--	--	--	--	694	--	.3	--	--
29...	1420	--	839	--	--	--	594	-4.0	.5	--	--
MAR											
02...	1100	990	--	--	--	--	601	--	.1	--	--
24...	1320	--	4030	7.8	--	539	547	.5	.0	240	50
APR											
15...	1000	1880	--	--	--	--	779	--	9.9	--	--
28...	0840	--	1850	--	--	--	753	14.5	11.0	--	--
MAY											
07...	0800	1950	--	--	--	--	645	--	16.3	--	--
26...	0800	1960	--	--	--	--	834	--	16.9	--	--
JUN											
08...	0940	--	3280	--	--	--	639	28.0	23.0	--	--
09...	0700	3810	--	--	--	--	628	--	23.4	--	--
JUL											
02...	0800	1830	--	--	--	--	560	--	21.2	--	--
13...	1125	--	1710	7.9	8.0	664	663	27.0	26.5	290	52
15...	0900	1590	--	--	--	--	680	--	26.2	--	--
AUG											
20...	1100	1860	--	--	--	--	574	--	22.6	--	--
SEP											
07...	1330	--	2720	--	--	--	656	23.0	18.0	--	--
15...	1400	2010	--	--	--	--	682	--	15.3	--	--

05054000 RED RIVER OF THE NORTH AT FARGO, ND--Continued

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

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	SODIUM AD-SORP-TION RATIO (00931)	SODIUM PERCENT (00932)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	ANC UNFLTRD TIT 4.5 LAB (MG/L AS CACO3) (90410)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)
OCT											
09...	--	--	--	--	--	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--	--	--	--
DEC											
08...	--	--	--	--	--	--	--	--	--	--	--
JAN											
11...	--	--	--	--	--	--	--	--	--	--	--
29...	--	--	--	--	--	--	--	--	--	--	--
MAR											
02...	--	--	--	--	--	--	--	--	--	--	--
24...	29	6.5	.6	15	20	158	13	.10	120	3860	355
APR											
15...	--	--	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--	--	--
MAY											
07...	--	--	--	--	--	--	--	--	--	--	--
26...	--	--	--	--	--	--	--	--	--	--	--
JUN											
08...	--	--	--	--	--	--	--	--	--	--	--
09...	--	--	--	--	--	--	--	--	--	--	--
JUL											
02...	--	--	--	--	--	--	--	--	--	--	--
13...	39	12	.7	17	28	235	19	.20	110	1920	415
15...	--	--	--	--	--	--	--	--	--	--	--
AUG											
20...	--	--	--	--	--	--	--	--	--	--	--
SEP											
07...	--	--	--	--	--	--	--	--	--	--	--
15...	--	--	--	--	--	--	--	--	--	--	--

DATE	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	LITHIUM DIS-SOLVED (UG/L AS LI) (01130)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO) (01060)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)	STRON-TIUM, DIS-SOLVED (UG/L AS SR) (01080)
OCT										
09...	--	--	--	--	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--	--	--
DEC										
08...	--	--	--	--	--	--	--	--	--	--
JAN										
11...	--	--	--	--	--	--	--	--	--	--
29...	--	--	--	--	--	--	--	--	--	--
MAR										
02...	--	--	--	--	--	--	--	--	--	--
24...	334	2	70	3.0	30	70	<.1	<1.0	<1	250
APR										
15...	--	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--	--
MAY										
07...	--	--	--	--	--	--	--	--	--	--
26...	--	--	--	--	--	--	--	--	--	--
JUN										
08...	--	--	--	--	--	--	--	--	--	--
09...	--	--	--	--	--	--	--	--	--	--
JUL										
02...	--	--	--	--	--	--	--	--	--	--
13...	401	5	60	1.0	30	<10	<.1	1.0	<1	290
15...	--	--	--	--	--	--	--	--	--	--
AUG										
20...	--	--	--	--	--	--	--	--	--	--
SEP										
07...	--	--	--	--	--	--	--	--	--	--
15...	--	--	--	--	--	--	--	--	--	--

05054000 RED RIVER OF THE NORTH AT FARGO, ND--Continued

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

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	15.9	15.2	15.6	---	---	---	2.0	1.6	1.8	.3	.3	.3
2	15.5	14.7	15.0	---	---	---	2.1	1.6	1.9	.3	.3	.3
3	14.7	14.0	14.2	---	---	---	2.3	1.9	2.1	.3	.3	.3
4	14.0	13.2	13.7	---	---	---	2.3	1.9	2.1	.3	.3	.3
5	13.2	12.9	13.1	---	---	---	2.0	1.7	1.9	.3	.3	.3
6	12.9	12.3	12.7	---	---	---	1.7	1.4	1.5	.3	.3	.3
7	12.5	11.9	12.2	---	---	---	1.4	1.1	1.2	.3	.3	.3
8	12.3	11.7	12.0	---	---	---	1.2	.8	1.0	.3	.3	.3
9	12.6	11.7	12.1	---	---	---	.9	.5	.7	.3	.3	.3
10	12.6	12.1	12.3	---	---	---	.5	.3	.3	.3	.3	.3
11	12.7	12.3	12.5	---	---	---	.4	.2	.3	.3	.3	.3
12	12.5	11.6	12.0	---	---	---	.4	.2	.3	.3	.3	.3
13	11.6	10.8	11.1	---	---	---	.4	.2	.3	.3	.3	.3
14	10.8	10.3	10.5	---	---	---	.6	.3	.5	.3	.2	.3
15	10.5	10.1	10.3	---	---	---	.6	.5	.6	.2	.2	.2
16	10.5	10.2	10.4	---	---	---	.7	.5	.6	.2	.2	.2
17	10.3	9.2	9.9	---	---	---	.5	.3	.4	.2	.2	.2
18	9.2	8.0	8.5	---	---	---	.3	.3	.3	.2	.2	.2
19	8.0	7.3	7.6	---	---	---	.3	.3	.3	.2	.2	.2
20	8.4	7.7	8.0	---	---	---	.3	.3	.3	.2	.1	.2
21	8.9	8.3	8.6	.7	.5	.6	.3	.3	.3	.1	.1	.1
22	9.4	8.6	9.0	.8	.6	.7	.3	.3	.3	.1	.1	.1
23	9.6	9.0	9.3	.8	.6	.7	.3	.3	.3	.1	.1	.1
24	10.0	9.4	9.7	.8	.5	.6	.3	.3	.3	.1	.1	.1
25	10.3	10.0	10.2	.8	.6	.7	.3	.3	.3	.1	.1	.1
26	10.7	10.3	10.6	.7	.4	.5	.3	.3	.3	.1	.0	.1
27	---	---	---	.7	.4	.6	.3	.3	.3	.0	.0	.0
28	---	---	---	1.4	.5	.8	.3	.3	.3	.0	.0	.0
29	---	---	---	2.0	1.4	1.7	.3	.3	.3	.0	.0	.0
30	---	---	---	2.1	1.9	2.0	.3	.3	.3	.0	.0	.0
31	---	---	---	---	---	---	.3	.3	.3	.0	.0	.0
MONTH	---	---	---	---	---	---	2.3	.2	.7	.3	.0	.2

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.0	.0	.0	.1	.0	.0	6.9	6.2	6.7	15.9	14.4	15.1
2	.0	.0	.0	.1	.0	.0	6.4	6.1	6.3	16.6	15.4	16.0
3	.0	.0	.0	.1	.0	.0	6.1	5.8	5.9	16.9	16.2	16.5
4	.0	.0	.0	.1	.0	.1	5.8	4.8	5.2	17.5	16.7	17.1
5	.0	.0	.0	.1	.1	.1	5.5	4.9	5.2	17.5	17.3	17.4
6	.0	.0	.0	.1	.1	.1	6.3	5.5	5.8	17.4	17.2	17.3
7	.0	.0	.0	.2	.1	.2	7.8	6.1	6.8	17.2	15.0	16.0
8	.1	.0	.0	.2	.2	.2	8.6	7.4	8.0	15.0	13.6	14.0
9	.0	.0	.0	.2	.2	.2	9.6	8.4	8.9	13.9	13.3	13.6
10	.0	.0	.0	.3	.2	.3	9.6	9.1	9.4	13.3	11.2	11.9
11	.0	.0	.0	.3	.3	.3	9.7	9.0	9.3	12.6	11.5	11.9
12	.0	.0	.0	.3	.3	.3	9.7	9.1	9.5	13.2	12.5	12.8
13	.0	.0	.0	.4	.3	.3	10.3	9.4	9.8	13.5	12.9	13.2
14	.0	.0	.0	.4	.4	.4	10.5	10.1	10.3	13.9	13.1	13.4
15	.0	.0	.0	.4	.4	.4	10.1	9.5	9.8	14.7	13.5	14.0
16	.0	.0	.0	.5	.4	.4	9.5	8.5	9.0	15.5	14.2	14.8
17	.0	.0	.0	.5	.5	.5	8.5	7.6	7.9	16.0	15.0	15.5
18	.0	.0	.0	.5	.5	.5	7.6	7.0	7.3	16.7	15.3	15.9
19	.0	.0	.0	.6	.5	.5	7.3	6.7	7.0	17.2	16.1	16.6
20	.0	.0	.0	.7	.6	.6	7.5	6.9	7.2	18.0	16.7	17.3
21	.0	.0	.0	.8	.6	.6	8.6	7.5	7.9	18.6	17.3	17.9
22	.0	.0	.0	.8	.5	.7	9.6	8.5	8.9	19.1	18.0	18.5
23	.0	.0	.0	1.0	.6	.8	10.6	9.4	9.9	18.7	17.8	18.1
24	.0	.0	.0	1.0	.3	.7	11.5	10.3	10.8	17.9	17.3	17.6
25	.0	.0	.0	1.0	.3	.6	12.2	11.0	11.6	18.0	16.7	17.4
26	.1	.0	.0	3.1	.3	1.4	12.7	12.0	12.3	18.2	17.1	17.7
27	.1	.0	.0	3.6	3.0	3.3	12.8	12.4	12.6	18.7	17.6	18.2
28	.0	.0	.0	4.3	3.4	3.8	13.6	12.5	13.0	19.7	18.2	18.9
29	---	---	---	5.3	4.1	4.7	14.2	13.1	13.7	21.1	19.5	20.2
30	---	---	---	6.2	5.3	5.7	15.0	13.7	14.3	21.2	20.7	21.0
31	---	---	---	7.2	6.0	6.6	---	---	---	20.7	19.2	19.9
MONTH	.1	.0	.0	7.2	.0	1.1	15.0	4.8	9.0	21.2	11.2	16.3

05054000 RED RIVER OF THE NORTH AT FARGO, ND--Continued

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

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	19.2	18.8	19.1	22.0	21.2	21.6	26.5	25.4	26.0	23.1	21.2	22.3
2	19.2	18.4	18.8	22.6	21.5	21.9	26.2	25.0	25.5	21.2	20.6	20.8
3	18.9	18.1	18.5	24.0	22.2	22.9	25.8	24.8	25.2	20.8	18.0	18.9
4	19.3	17.7	18.4	24.0	23.0	23.6	25.2	24.6	24.9	18.4	17.9	18.2
5	21.2	19.3	20.1	24.7	23.7	24.2	25.3	24.6	24.9	18.1	17.6	17.9
6	22.3	20.8	21.5	25.2	23.9	24.6	25.8	24.6	25.1	18.5	17.4	17.9
7	23.4	21.9	22.5	25.5	24.5	25.0	25.5	24.4	25.0	18.9	18.4	18.6
8	23.8	23.0	23.4	25.4	24.5	24.8	24.9	23.9	24.4	18.8	17.9	18.3
9	23.9	23.4	23.6	24.5	23.7	24.0	24.7	23.6	24.2	17.9	17.3	17.5
10	23.6	23.1	23.3	23.8	23.0	23.5	24.6	23.7	24.2	17.7	17.2	17.4
11	23.5	22.8	23.1	24.2	23.3	23.8	24.7	23.9	24.3	17.5	16.6	17.1
12	23.6	23.0	23.3	24.7	23.6	24.1	24.4	22.2	23.5	16.6	16.2	16.3
13	23.3	22.7	23.1	25.5	24.1	24.8	22.8	21.8	22.2	16.2	15.6	15.8
14	22.7	22.1	22.4	26.5	25.3	25.8	23.1	21.9	22.6	15.6	15.1	15.3
15	22.3	21.7	22.0	26.7	26.3	26.5	22.9	22.3	22.5	15.2	14.7	15.0
16	21.8	21.1	21.5	26.4	26.0	26.2	22.4	21.5	21.8	15.2	14.4	14.8
17	21.5	20.6	21.0	26.0	25.5	25.8	22.0	21.3	21.6	15.6	14.7	15.1
18	21.3	20.6	20.9	25.6	25.1	25.3	22.3	21.9	22.0	16.1	15.3	15.7
19	20.7	20.1	20.5	25.2	24.7	25.0	23.0	21.9	22.3	16.2	15.8	16.0
20	21.1	19.9	20.4	25.4	24.7	25.1	22.9	22.3	22.6	16.1	15.7	15.9
21	21.1	20.5	20.8	25.9	24.8	25.3	23.1	22.4	22.7	15.9	15.2	15.5
22	21.5	20.6	21.1	26.6	25.3	25.9	23.5	22.7	23.1	16.1	15.3	15.7
23	22.6	21.2	21.9	27.4	26.1	26.7	23.4	22.8	23.1	16.1	15.3	15.7
24	23.4	21.9	22.6	28.3	26.9	27.6	23.6	22.7	23.1	15.8	15.1	15.5
25	24.1	23.1	23.6	28.1	27.5	27.8	24.3	23.1	23.6	15.9	15.1	15.5
26	24.2	23.7	24.0	27.7	26.7	27.2	24.8	24.1	24.6	15.9	15.2	15.5
27	24.0	23.5	23.8	27.5	26.4	27.1	25.3	24.0	24.7	15.5	14.7	15.1
28	23.5	22.9	23.2	27.7	26.2	26.9	25.2	24.5	24.9	15.0	14.3	14.6
29	22.9	22.2	22.5	28.1	26.6	27.4	25.1	24.0	24.3	14.5	13.8	14.1
30	22.3	21.6	22.0	28.1	27.3	27.7	24.0	22.5	23.3	14.0	13.0	13.5
31	---	---	---	27.6	26.2	26.7	23.2	22.3	22.7	---	---	---
MONTH	24.2	17.7	21.8	28.3	21.2	25.3	26.5	21.3	23.7	23.1	13.0	16.5

05054000 RED RIVER OF THE NORTH AT FARGO, ND--Continued

SPECIFIC CONDUCTANCE (MICROSIEMENS/CM AT 25 DEG.C), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	802	591	709	---	---	---	645	634	640	913	784	854
2	591	541	554	---	---	---	664	638	655	784	724	753
3	542	536	539	---	---	---	681	664	673	729	692	713
4	537	510	528	---	---	---	700	678	685	692	670	676
5	516	493	504	---	---	---	779	700	719	676	671	673
6	519	510	514	---	---	---	829	779	811	697	676	682
7	522	512	517	---	---	---	871	783	820	729	697	715
8	525	520	522	---	---	---	910	867	886	732	718	725
9	524	520	522	---	---	---	911	902	906	736	716	726
10	523	521	522	---	---	---	915	902	908	736	708	725
11	524	486	514	---	---	---	916	885	901	712	680	696
12	518	473	498	---	---	---	887	840	857	688	670	676
13	541	514	528	---	---	---	916	852	883	672	652	663
14	565	538	554	---	---	---	967	916	945	652	638	645
15	584	564	573	---	---	---	970	964	968	656	638	647
16	572	544	556	---	---	---	964	911	936	655	648	654
17	544	483	512	---	---	---	911	891	898	660	644	649
18	562	406	521	---	---	---	898	879	885	666	653	660
19	406	353	370	---	---	---	926	896	912	658	641	650
20	514	396	456	---	---	---	988	922	943	642	635	639
21	578	514	549	560	528	542	981	966	969	647	628	636
22	621	578	593	632	555	597	982	969	976	628	611	619
23	816	621	735	704	632	677	982	957	972	611	606	608
24	834	722	795	713	655	683	957	868	912	680	600	619
25	722	660	683	698	558	617	868	790	826	681	604	630
26	669	655	660	558	545	549	942	793	831	648	604	625
27	---	---	---	622	555	588	1010	823	917	628	612	616
28	---	---	---	635	621	631	823	805	812	613	577	591
29	---	---	---	673	635	660	821	804	813	597	578	585
30	---	---	---	666	625	640	841	810	824	597	589	593
31	---	---	---	---	---	---	906	841	872	600	597	599
MONTH	---	---	---	---	---	---	1010	634	857	913	577	663

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	628	600	610	719	584	675	---	---	---	697	659	674
2	631	619	627	602	558	587	---	---	---	665	658	661
3	619	607	613	---	---	---	---	---	---	664	660	663
4	612	596	602	---	---	---	---	---	---	668	634	654
5	601	595	598	---	---	---	---	---	---	663	644	652
6	611	590	595	---	---	---	---	---	---	678	646	658
7	607	593	599	---	---	---	---	---	---	652	618	637
8	637	599	611	---	---	---	---	---	---	664	641	651
9	637	606	620	---	---	---	---	---	---	740	664	700
10	650	605	626	---	---	---	---	---	---	740	606	671
11	649	597	619	---	---	---	---	---	---	646	588	621
12	639	589	614	---	---	---	---	---	---	748	646	698
13	614	590	604	---	---	---	---	---	---	814	748	783
14	615	609	611	---	---	---	---	---	---	829	810	818
15	616	597	604	---	---	---	---	---	---	817	794	805
16	617	604	611	---	---	---	761	745	754	828	815	821
17	676	617	647	---	---	---	818	742	778	837	815	827
18	661	613	631	---	---	---	822	781	805	855	804	819
19	613	582	590	---	---	---	781	757	768	856	817	828
20	646	588	623	---	---	---	764	755	757	847	829	837
21	699	602	635	---	---	---	758	734	747	843	841	842
22	684	638	654	---	---	---	734	719	728	857	843	852
23	701	643	669	---	---	---	719	706	713	863	856	860
24	673	651	664	---	---	---	711	687	697	856	848	850
25	717	642	677	---	---	---	707	684	689	860	846	850
26	729	629	674	---	---	---	712	704	707	846	802	826
27	660	616	636	---	---	---	713	703	707	802	783	789
28	695	657	668	---	---	---	708	703	706	788	780	784
29	---	---	---	---	---	---	708	666	676	780	767	772
30	---	---	---	---	---	---	700	666	696	772	755	761
31	---	---	---	---	---	---	---	---	---	772	745	754
MONTH	729	582	626	---	---	---	---	---	---	863	588	755

05054000 RED RIVER OF THE NORTH AT FARGO, ND--Continued

SPECIFIC CONDUCTANCE (MICROSIEMENS/CM AT 25 DEG.C), WATER YEAR OCTOBER 1998 TO SEPTEMBER

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	771	726	754	604	575	586	---	---	---	1150	1120	1130
2	726	642	696	575	559	563	---	---	---	1120	1080	1100
3	642	578	607	589	567	582	---	---	---	1080	1050	1070
4	701	570	622	593	551	580	---	---	---	1050	994	1020
5	801	701	742	602	587	594	---	---	---	994	920	957
6	744	606	640	598	588	593	---	---	---	920	782	867
7	638	617	626	611	597	605	---	---	---	782	659	687
8	701	613	650	612	599	605	---	---	---	674	625	648
9	677	602	626	602	577	588	---	---	---	635	625	630
10	602	538	566	577	569	572	---	---	---	646	633	639
11	538	521	527	651	575	640	---	---	---	644	638	641
12	559	530	548	642	605	618	---	---	---	651	644	648
13	562	557	559	675	618	648	---	---	---	660	651	655
14	700	562	627	689	675	683	---	---	---	677	660	671
15	719	700	712	688	657	675	---	---	---	716	677	686
16	702	681	688	657	620	636	---	---	---	726	705	717
17	710	684	697	620	581	595	---	---	---	724	693	712
18	732	710	722	608	581	591	---	---	---	714	687	694
19	743	732	736	646	608	631	---	---	---	743	714	731
20	748	725	742	651	641	645	---	---	---	768	743	756
21	725	689	703	754	645	698	645	589	612	777	768	773
22	691	644	678	909	754	841	780	645	718	788	776	779
23	675	638	658	925	669	820	893	780	835	783	780	781
24	703	647	664	689	650	658	990	893	944	793	783	788
25	758	687	733	665	618	653	1090	990	1040	802	793	795
26	687	581	624	661	595	625	1150	1090	1140	797	772	785
27	685	635	659	598	547	579	1180	1150	1170	772	769	770
28	635	611	619	---	---	---	1190	1180	1190	774	755	767
29	633	598	614	---	---	---	1200	1180	1190	771	746	758
30	613	583	597	---	---	---	1180	1170	1170	747	724	737
31	---	---	---	---	---	---	1170	1150	1160	---	---	---
MONTH	801	521	655	---	---	---	---	---	---	1150	625	780

05061000 BUFFALO RIVER NEAR HAWLEY, MN

LOCATION.--Lat 46°51'00", long 96°19'45", in NW¼SE¼ sec. 14, T.139 N., R.45 W., Clay County, Hydrologic Unit 09020106, near left downstream end of bridge on farm lane, 2 mi southwest of Hawley.

DRAINAGE AREA.--325 mi^2.

PERIOD OF RECORD.--March 1945 to current year, WY 1981 (annual maximum only), March 1982 to September 1985 (no winter records).

REVISED RECORDS.--WSP 1308: 1945-46(M), 1948(M).

GAGE.--Water-stage recorder. Datum of gage is 1,111.91 ft above sea level. Prior to Jan. 29, 1953, nonrecording gage at bridge 1,800 ft upstream at datum 3.17 ft lower.

REMARKS.--Records good except those for estimated daily discharges, which are poor.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage known, about 11.3 ft, present datum, spring of 1921, from information by local resident.

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	51	162	294	e70	e65	98	526	146	199	135	80	83
2	50	151	275	e70	e65	111	510	138	191	127	76	97
3	49	144	260	e70	e65	e107	490	132	181	122	74	206
4	50	137	246	e70	e65	e103	488	139	171	219	74	386
5	62	128	225	e70	e64	e100	473	147	188	416	72	522
6	79	122	197	e70	e64	e98	459	179	260	508	70	529
7	84	116	171	e70	e64	e96	446	228	305	479	65	433
8	81	111	e152	e70	e64	e94	429	307	299	412	60	329
9	82	108	e138	e70	64	92	419	311	299	347	68	268
10	84	111	e126	e70	e64	91	401	e400	315	296	73	224
11	81	84	e117	e70	e64	94	370	e520	332	253	85	208
12	79	65	e120	e70	e65	97	338	660	318	216	124	207
13	79	e66	e123	e69	e65	95	312	718	285	187	182	208
14	75	e67	e120	e69	e65	98	293	779	244	165	166	196
15	81	e68	e112	e69	e66	116	278	781	211	149	137	185
16	97	e69	e105	e69	e67	155	268	727	189	141	118	169
17	189	e71	e96	e69	e67	202	254	683	182	133	104	153
18	269	e74	e90	e69	e66	218	242	634	169	125	96	138
19	272	e75	e86	e68	e66	217	235	557	157	119	90	126
20	250	e76	e82	e68	e66	293	230	479	149	112	83	115
21	241	e90	e80	e68	e65	353	226	409	141	105	79	106
22	239	e105	e78	e68	e65	334	220	368	134	100	81	100
23	210	e123	e77	e67	e64	361	210	341	168	98	128	99
24	186	148	e75	e67	e67	360	200	314	215	92	129	94
25	177	172	e74	e67	e68	307	192	293	171	97	108	86
26	197	184	e73	e67	e74	254	190	277	170	134	95	93
27	193	209	e72	e66	e81	267	186	261	157	123	85	96
28	189	225	e72	e66	e89	378	177	244	150	105	78	96
29	194	244	e71	e66	---	496	167	228	147	96	72	98
30	192	272	e70	e66	---	571	154	215	144	89	70	99
31	178	---	e70	e66	---	572	---	209	---	84	70	---
TOTAL	4340	3777	3947	2124	1874	6828	9383	11824	6241	5784	2892	5749
MEAN	140	126	127	68.5	66.9	220	313	381	208	187	93.3	192
MAX	272	272	294	70	89	572	526	781	332	508	182	529
MIN	49	65	70	66	64	91	154	132	134	84	60	83
AC-FT	8610	7490	7830	4210	3720	13540	18610	23450	12380	11470	5740	11400
CFSM	.43	.39	.39	.21	.21	.68	.96	1.17	.64	.57	.29	.59
IN.	.50	.43	.45	.24	.21	.78	1.07	1.35	.71	.66	.33	.66

e Estimated

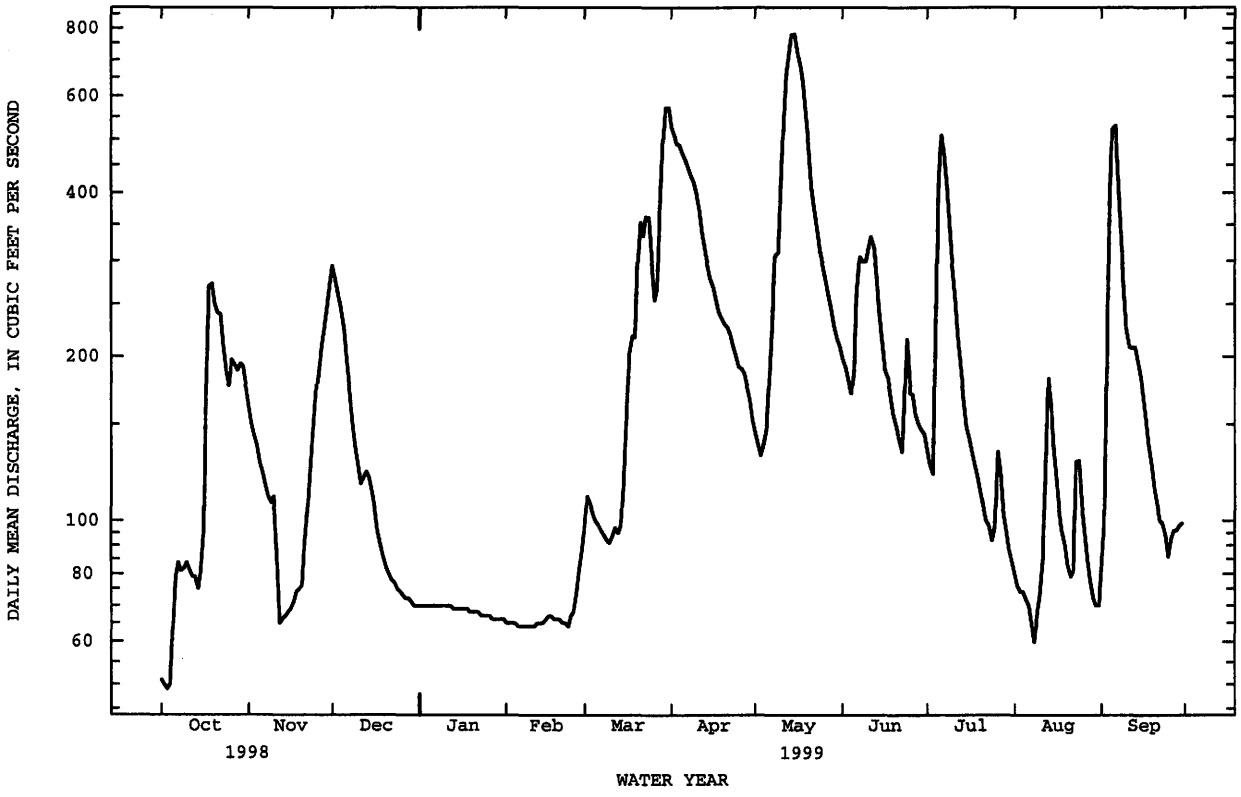
05061000 BUFFALO RIVER NEAR HAWLEY, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1945 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	42.1	39.5	28.2	22.7	25.7	91.2	268	139	107	109	53.2	41.4
MAX	151	176	127	68.5	170	434	1036	383	530	784	472	192
(WY)	1974	1972	1999	1999	1998	1966	1997	1998	1962	1993	1955	1999
MIN	11.6	12.2	10.6	9.94	9.88	15.0	33.3	21.5	12.7	10.1	5.87	8.52
(WY)	1979	1977	1977	1962	1949	1969	1981	1977	1977	1976	1976	1976

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1945 - 1999	
ANNUAL TOTAL	72970		64763			
ANNUAL MEAN	200		177		81.0	
HIGHEST ANNUAL MEAN					188	1998
LOWEST ANNUAL MEAN					16.7	1977
HIGHEST DAILY MEAN	1420	May 17	781	May 15	2360[a]	Apr 6 1997
LOWEST DAILY MEAN	41	Sep 22	49	Oct 3	3.2	Aug 25 1976
ANNUAL SEVEN-DAY MINIMUM	42	Sep 18	61	Oct 1	4.3	Aug 22 1976
INSTANTANEOUS PEAK FLOW			799	May 14	2360	Apr 6 1997
INSTANTANEOUS PEAK STAGE			8.74	May 14	10.77[b]	Apr 6 1997
INSTANTANEOUS LOW FLOW			46	Oct 3	2.8	Aug 26 1977
ANNUAL RUNOFF (AC-FT)	144700		128500		58710	
ANNUAL RUNOFF (CFSM)	.62		.55		.25	
ANNUAL RUNOFF (INCHES)	8.35		7.41		3.39	
10 PERCENT EXCEEDS	513		364		192	
50 PERCENT EXCEEDS	120		126		34	
90 PERCENT EXCEEDS	50		67		14	

a Estimated, backwater from ice.
b Backwater from ice.



05061500 SOUTH BRANCH BUFFALO RIVER AT SABIN, MN

LOCATION--Lat 46°46'20", long 96°37'40", in SW¼ SW¼ sec. 9, T.138 N., R.47 W., Clay County, Hydrologic Unit 09020106, on left bank, on downstream side of County Road 67 bridge, 0.3 mi downstream from Stony Creek and 1 mi east of Sabin.

DRAINAGE AREA.--454 mi^2.

PERIOD OF RECORD.--March 1945 to current year. Water year 1981, annual maximum only. March 1982 to September 1985, no winter records.

REVISED RECORDS.--WSP 1308: 1949(M). WRIR 97-4249: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 902.39 ft above sea level (levels by Soil Conservation Service). Prior to April 17, 1948, nonrecording gage at site 1 mi downstream at different datum. Aug. 17, 1948 to Oct. 4, 1989, nonrecording gage at present site and datum.

REMARKS.--Records fair except those for estimated daily discharges, which are poor.

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	28	86	210	e11	e13	e140	679	69	36	62	3.2	27
2	26	82	184	e10	e13	e151	574	62	41	55	3.1	31
3	25	75	165	e9.6	e13	e154	541	57	43	54	3.1	61
4	23	70	148	e9.1	e14	e149	624	55	41	58	2.6	120
5	28	64	133	e8.8	e14	e122	705	67	39	98	2.3	210
6	30	61	e122	e8.5	e14	e114	648	85	52	93	1.9	341
7	38	58	e110	e8.3	e14	e100	487	126	137	67	1.7	515
8	50	55	e99	e8.1	e14	e84	358	195	177	54	1.6	637
9	51	54	e89	e8.0	e14	e71	300	263	174	46	2.0	641
10	44	e56	e80	e7.9	e15	e62	261	334	144	46	3.0	572
11	40	e55	73	e7.9	e15	e59	226	483	126	44	10	448
12	39	e54	67	e7.8	e16	e58	200	663	110	38	29	329
13	39	e54	e61	e7.8	e16	e59	182	641	86	31	40	243
14	50	e58	e57	e7.9	e17	e64	167	535	65	26	64	204
15	51	e63	e55	e7.9	e17	e73	156	403	51	e21	75	182
16	57	e63	e52	e8.0	e18	e90	148	320	41	e17	71	162
17	176	e61	e46	e8.0	e18	e112	139	270	34	e15	56	138
18	294	e60	e42	e8.1	e19	e140	131	233	29	e13	42	112
19	326	e59	e37	e8.1	e20	e155	123	200	25	e12	33	93
20	328	e58	e33	e8.2	e21	e170	117	168	23	e10	26	76
21	305	e58	e28	e8.4	e21	e173	111	138	22	e9.0	21	63
22	255	e59	e25	e8.9	e22	e170	107	117	23	e8.3	16	53
23	195	e71	e24	e9.3	e23	e166	104	99	33	e7.5	14	46
24	153	e90	e22	e9.7	e24	e164	98	86	106	7.3	22	39
25	127	e113	e20	e10	e26	e162	93	76	161	11	41	36
26	111	149	e17	e10	e40	e165	88	68	168	15	41	36
27	100	198	e16	e11	e65	184	82	58	155	24	40	38
28	94	223	e16	e11	e115	356	78	50	117	17	35	42
29	88	229	e15	e12	---	785	79	44	88	10	33	44
30	84	232	e13	e12	---	1030	76	38	71	7.6	29	41
31	85	---	e11	e12	---	885	---	34	---	4.7	26	---
TOTAL	3340	2668	2070	283.3	651	6367	7682	6037	2418	981.4	788.5	5580
MEAN	108	88.9	66.8	9.14	23.2	205	256	195	80.6	31.7	25.4	186
MAX	328	232	210	12	115	1030	705	663	177	98	75	641
MIN	23	54	11	7.8	13	58	76	34	22	4.7	1.6	27
AC-FT	6620	5290	4110	562	1290	12630	15240	11970	4800	1950	1560	11070
CFSM	.24	.20	.15	.02	.05	.45	.56	.43	.18	.07	.06	.41
IN.	.27	.22	.17	.02	.05	.52	.63	.49	.20	.08	.06	.46

e Estimated

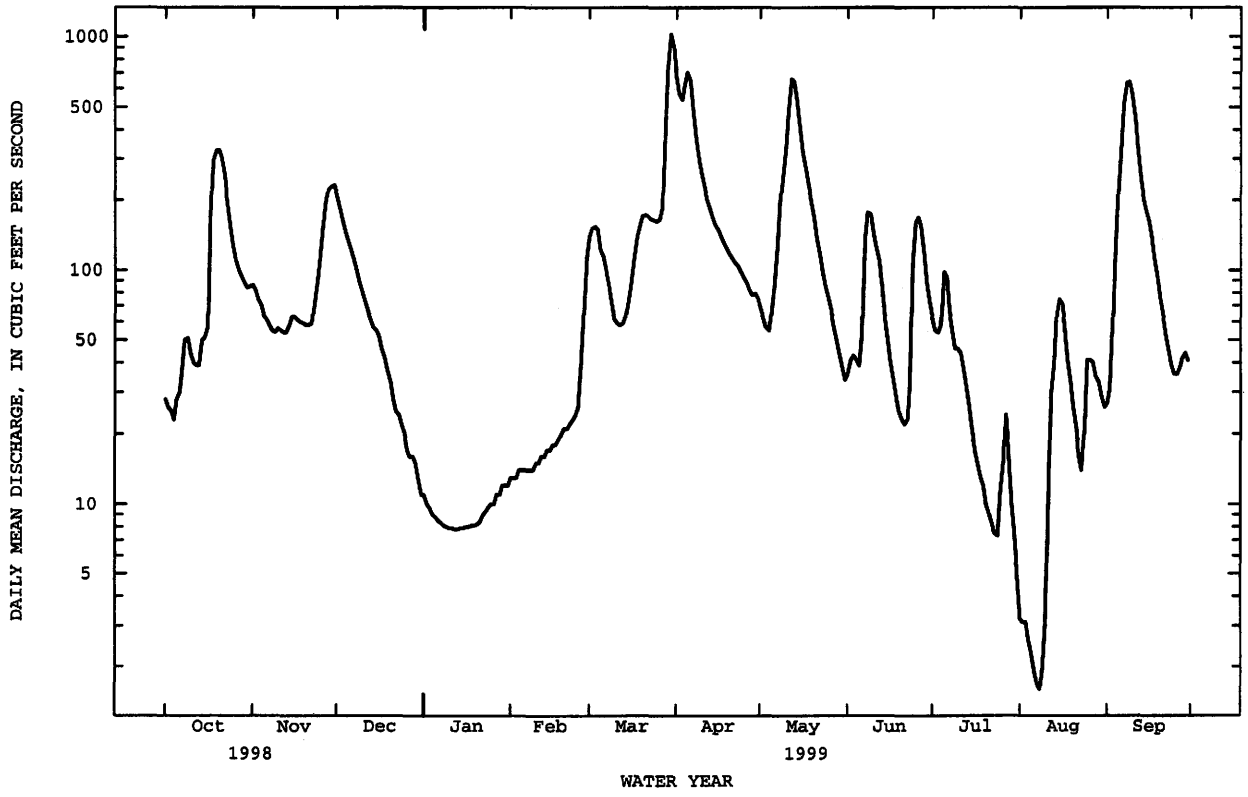
05061500 SOUTH BRANCH BUFFALO RIVER AT SABIN, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1945 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	18.0	17.1	6.81	2.05	6.19	109	280	92.1	94.3	84.5	12.0	16.8
MAX	108	88.9	66.8	13.1	205	581	1683	580	1068	1112	152	186
(WY)	1999	1999	1999	1978	1998	1966	1997	1962	1962	1975	1993	1999
MIN	.023	2.05	.006	.000	.000	.000	27.9	8.28	1.30	.000	.000	.000
(WY)	1977	1977	1961	1946	1946	1951	1973	1980	1976	1988	1976	1976

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1945 - 1999	
ANNUAL TOTAL	70982.3		38866.2			
ANNUAL MEAN	194		106		62.3[a]	
HIGHEST ANNUAL MEAN					198	1962
LOWEST ANNUAL MEAN					12.2	1977
HIGHEST DAILY MEAN	2880	May 17	1030	Mar 30	8200	Jul 1 1975
LOWEST DAILY MEAN	2.6	Aug 17	1.6	Aug 8	.00[b]	Dec 13 1945
ANNUAL SEVEN-DAY MINIMUM	3.1	Aug 15	2.2	Aug 4	.00	Dec 13 1945
INSTANTANEOUS PEAK FLOW			1070	Mar 30	8500	Jul 2 1975
INSTANTANEOUS PEAK STAGE			12.88	Mar 30	19.90	Jul 2 1975
INSTANTANEOUS LOW FLOW			1.3	Aug 8		
ANNUAL RUNOFF (AC-FT)	140800		77090		45110	
ANNUAL RUNOFF (CFSM)	.43		.23		.14	
ANNUAL RUNOFF (INCHES)	5.82		3.18		1.86	
10 PERCENT EXCEEDS	502		237		114	
50 PERCENT EXCEEDS	63		57		7.9	
90 PERCENT EXCEEDS	9.3		9.5		.04	

a Median of annual mean discharges is 48.2 ft^3/s.
b Many days, most years.



05062000 BUFFALO RIVER NEAR DILWORTH, MN

LOCATION--Lat 46°57'40", long 96°39'40", in SW¼ SE¼ sec. 6, T.140 N., R.47 W., Clay County, Hydrologic Unit 09020106, on left bank, at County Road 94 bridge, 4.5 mi southeast of Kragnes, 6.5 mi northeast of Dilworth, and 9 mi downstream from South Branch.

DRAINAGE AREA.--975 mi^2.

PERIOD OF RECORD.--March 1931 to current year. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WSP 1308: 1931(M).

GAGE.--Water-stage recorder. Datum of gage is 878.31 ft above sea level (levels by U.S. Army Corps of Engineers). Prior to April 5, 1937, nonrecording gage at same site and datum.

REMARKS.--Records good except those for estimated daily discharges, which are poor.

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	e91	286	551	e81	e79	e180	1580	248	259	242	96	113
2	e90	275	556	e79	e79	e200	1630	233	249	219	89	138
3	e90	263	532	e76	e80	e213	1550	219	242	201	84	254
4	e90	251	491	e74	e80	e220	1520	211	237	270	79	640
5	e105	235	451	e73	e80	e218	1490	228	239	398	76	897
6	e130	e225	408	e72	e81	e216	1440	284	261	499	73	952
7	e140	216	369	e71	e82	e213	1410	344	287	574	70	967
8	e145	207	e335	e71	e82	e210	1320	442	355	603	67	996
9	e146	201	e310	e70	e83	e204	1160	516	415	589	62	1020
10	e147	200	e290	e70	e84	e202	978	837	437	528	63	1030
11	e147	195	e265	e70	e85	e198	836	1100	427	451	71	985
12	e145	181	e245	e70	e86	e197	729	1090	420	382	92	909
13	e143	e175	e230	e69	e86	e200	641	1140	408	322	207	794
14	e142	e188	e215	e69	e87	e205	570	1220	377	273	281	661
15	e155	e200	e200	e70	e88	e235	516	1280	328	236	269	537
16	e210	e195	e190	e70	e88	e290	478	1290	287	211	244	455
17	e370	e190	e175	e71	e89	e360	453	1240	252	193	220	401
18	e540	e185	e165	e72	e91	e420	429	1150	232	178	196	355
19	e600	e180	e155	e72	e92	e480	409	1020	216	165	170	309
20	607	e180	e145	e73	e93	e530	390	895	202	154	147	272
21	604	e180	e135	e73	e94	e590	377	767	193	142	127	240
22	579	e200	e128	e74	e95	e640	368	646	187	131	113	216
23	535	e250	e120	e74	e96	e680	355	546	185	123	159	198
24	461	300	e115	e75	e98	e700	337	474	191	115	250	188
25	381	324	e109	e75	e102	e630	320	424	249	111	226	179
26	333	365	e103	e76	e110	e570	306	388	313	119	197	166
27	317	386	e97	e76	e128	591	294	358	339	140	177	159
28	309	432	e93	e76	e150	670	286	333	317	160	155	161
29	298	487	e89	e77	---	1050	274	310	291	144	135	165
30	298	529	e86	e77	---	1250	262	288	271	123	118	172
31	297	---	e84	e78	---	1440	---	270	---	107	110	---
TOTAL	8645	7681	7437	2274	2568	14002	22708	19791	8666	8103	4423	14529
MEAN	279	256	240	73.4	91.7	452	757	638	289	261	143	484
MAX	607	529	556	81	150	1440	1630	1290	437	603	281	1030
MIN	90	175	84	69	79	180	262	211	185	107	62	113
AC-FT	17150	15240	14750	4510	5090	27770	45040	39260	17190	16070	8770	28820
CFSM	.29	.26	.25	.08	.09	.46	.78	.65	.30	.27	.15	.50
IN.	.33	.29	.28	.09	.10	.53	.87	.76	.33	.31	.17	.55

e Estimated

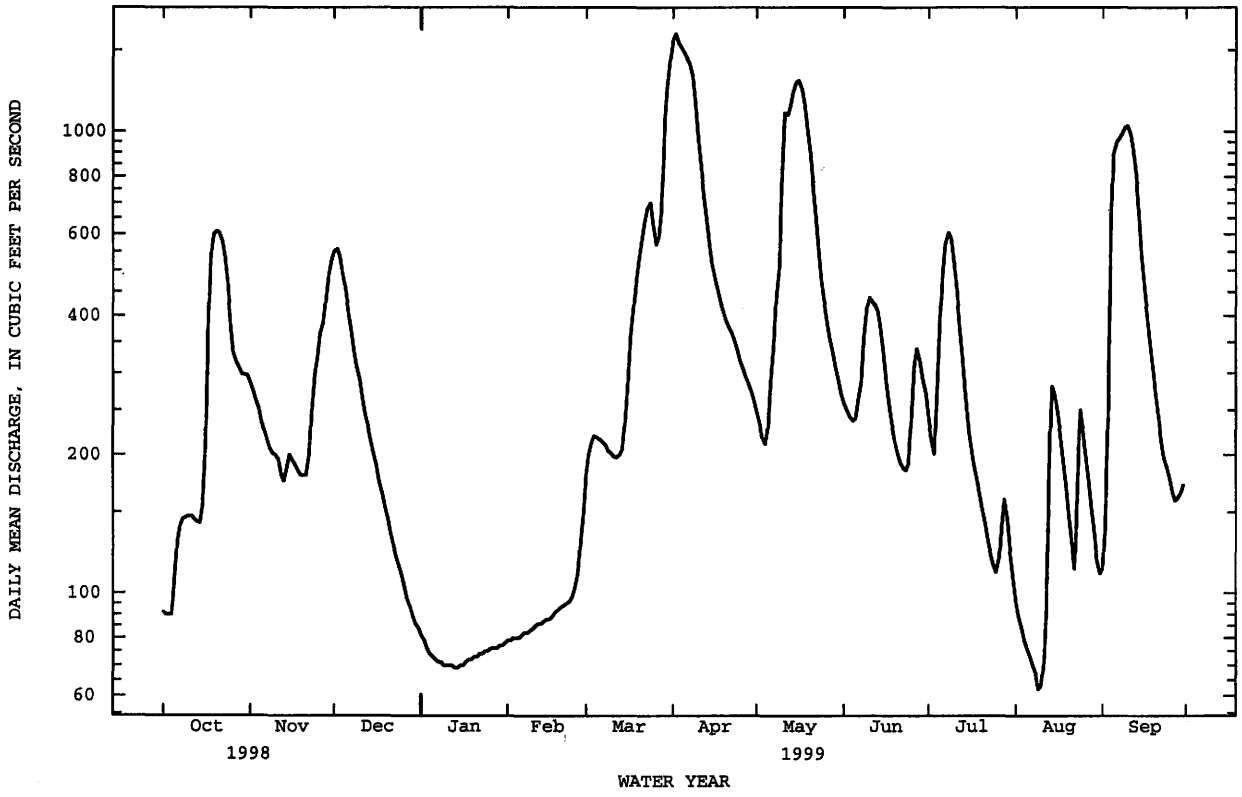
05062000 BUFFALO RIVER NEAR DILWORTH, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	59.2	55.8	35.2	22.0	25.3	194	587	247	206	207	73.7	60.4
MAX	279	305	240	85.7	285	1308	3412	1144	2138	2814	910	517
(WY)	1999	1972	1999	1998	1998	1966	1997	1998	1962	1975	1993	1944
MIN	5.48	8.74	4.75	.87	.76	2.26	33.5	27.2	15.1	2.23	.000	.79
(WY)	1940	1937	1938	1940	1940	1940	1931	1931	1934	1936	1936	1936

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1931 - 1999	
ANNUAL TOTAL	182547		120827			
ANNUAL MEAN	500		331		149	
HIGHEST ANNUAL MEAN					477	1998
LOWEST ANNUAL MEAN					25.6	1934
HIGHEST DAILY MEAN	4680	May 19	1630	Apr 2	13500	Jul 2 1975
LOWEST DAILY MEAN	47	Sep 12	62	Aug 9	.00[a]	Jul 22 1936
ANNUAL SEVEN-DAY MINIMUM	50	Sep 20	69	Aug 5	.00	Jul 28 1936
INSTANTANEOUS PEAK FLOW			1640	Apr 2	13600	Jul 2 1975
INSTANTANEOUS PEAK STAGE			14.90	Apr 2	27.10	Jul 2 1975
INSTANTANEOUS LOW FLOW			61	Aug 9		
ANNUAL RUNOFF (AC-FT)	362100		239700		108200	
ANNUAL RUNOFF (CFSM)	.51		.34		.15	
ANNUAL RUNOFF (INCHES)	6.96		4.61		2.08	
10 PERCENT EXCEEDS	1180		712		320	
50 PERCENT EXCEEDS	235		219		38	
90 PERCENT EXCEEDS	76		79		9.6	

a Occurred many days in 1936.



05062500 WILD RICE RIVER AT TWIN VALLEY, MN

LOCATION.--Lat 47°16'00", long 96°14'40", in NW¼NE¼ sec. 27, T.144 N., R.44, Norman County, Hydrologic Unit 09020108, on left bank, 100 ft upstream from County Highway 29 bridge, 0.8 mi northeast of Twin Valley, and 2 mi upstream from small tributary.

DRAINAGE AREA.--934 mi^2.

PERIOD OF RECORD.--June 1909 to September 1917, July 1930 to September 1983, October 1989 to current year. Monthly discharge only for some periods, published in WSP 1308. October 1983 to September 1989, annual maximums only.

REVISED RECORDS.--WSP 955: 1941. WSP 1308: 1915(M), 1917(M).

GAGE.--Water-stage recorder. Datum of gage is 1,008.16 ft above sea level (U.S. Army Corps of Engineers bench mark). June 1909 to September 1917, nonrecording gage at site 0.2 mi downstream at different datum. July 23, 1930 to Nov. 24, 1934, nonrecording gage at highway bridge 100 ft downstream from present site at present datum. Nov. 25, 1934 to Aug. 2, 1950, water-stage recorder 80 ft upstream from present site at present datum.

REMARKS.--Records good except those for estimated daily discharges, which are poor. Flow slightly regulated by Rice Lake and many other small lakes above 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	44	208	e320	e140	e130	e135	1620	616	599	438	384	366
2	41	207	e340	e140	e130	e135	1630	584	578	421	362	427
3	41	193	e340	e140	e125	e135	1630	548	556	419	376	720
4	41	186	e330	e140	e125	e130	1630	515	534	738	489	e1300
5	51	180	e320	e140	e120	e130	1700	501	685	1200	497	e2000
6	71	174	e310	e135	e120	e125	1750	521	871	1050	428	2050
7	79	169	e300	e135	e125	e125	1750	664	897	931	386	1810
8	87	167	e270	e135	e130	e125	1720	916	824	952	359	1530
9	84	167	e250	e135	e135	e120	1660	904	812	1310	359	1250
10	84	168	e230	e135	e140	e120	1600	1470	1000	1260	487	1000
11	81	174	e230	e140	e135	e120	1500	2090	1030	1090	613	880
12	83	166	e220	e140	e130	e120	1410	2160	1050	933	597	860
13	92	145	e220	e140	e125	e130	1340	2320	991	856	858	854
14	98	e140	e210	e140	e130	e140	1290	2410	877	799	1020	848
15	96	e135	e210	e140	e135	e160	1240	2210	789	718	990	832
16	97	e135	e200	e145	e135	e180	1180	2030	731	694	827	805
17	111	e135	e180	e145	e130	e200	1130	1860	691	709	697	757
18	180	e135	e170	e145	e130	e250	1090	1670	653	648	613	708
19	253	e135	e150	e145	e125	e350	1060	1530	623	583	556	657
20	254	e130	e145	e145	e125	e700	1020	1390	592	538	508	613
21	235	e135	e140	e145	e120	e900	996	1240	556	501	468	578
22	214	e150	e135	e140	e120	e950	963	1110	525	473	435	544
23	202	e170	e135	e140	e120	e930	913	1030	510	454	416	518
24	200	e190	e135	e135	e120	e850	866	968	530	447	440	495
25	203	e220	e135	e135	e120	e800	820	911	533	421	492	476
26	209	e250	e135	e135	e125	e760	786	861	511	441	472	476
27	229	e280	e135	e135	e125	e740	756	811	494	539	442	487
28	232	e290	e135	e130	e135	1020	718	756	478	521	415	504
29	227	e300	e135	e130	---	1200	678	701	454	495	386	476
30	218	e310	e140	e130	---	1450	644	652	446	450	366	443
31	207	---	e140	e130	---	1580	---	621	---	413	362	---
TOTAL	4344	5544	6445	4285	3565	14810	37090	36570	20420	21442	16100	25264
MEAN	140	185	208	138	127	478	1236	1180	681	692	519	842
MAX	254	310	340	145	140	1580	1750	2410	1050	1310	1020	2050
MIN	41	130	135	130	120	120	644	501	446	413	359	366
AC-FT	8620	11000	12780	8500	7070	29380	73570	72540	40500	42530	31930	50110
CFSM	.15	.20	.22	.15	.14	.51	1.32	1.26	.73	.74	.56	.90
IN.	.17	.22	.26	.17	.14	.59	1.48	1.46	.81	.85	.64	1.01

e Estimated

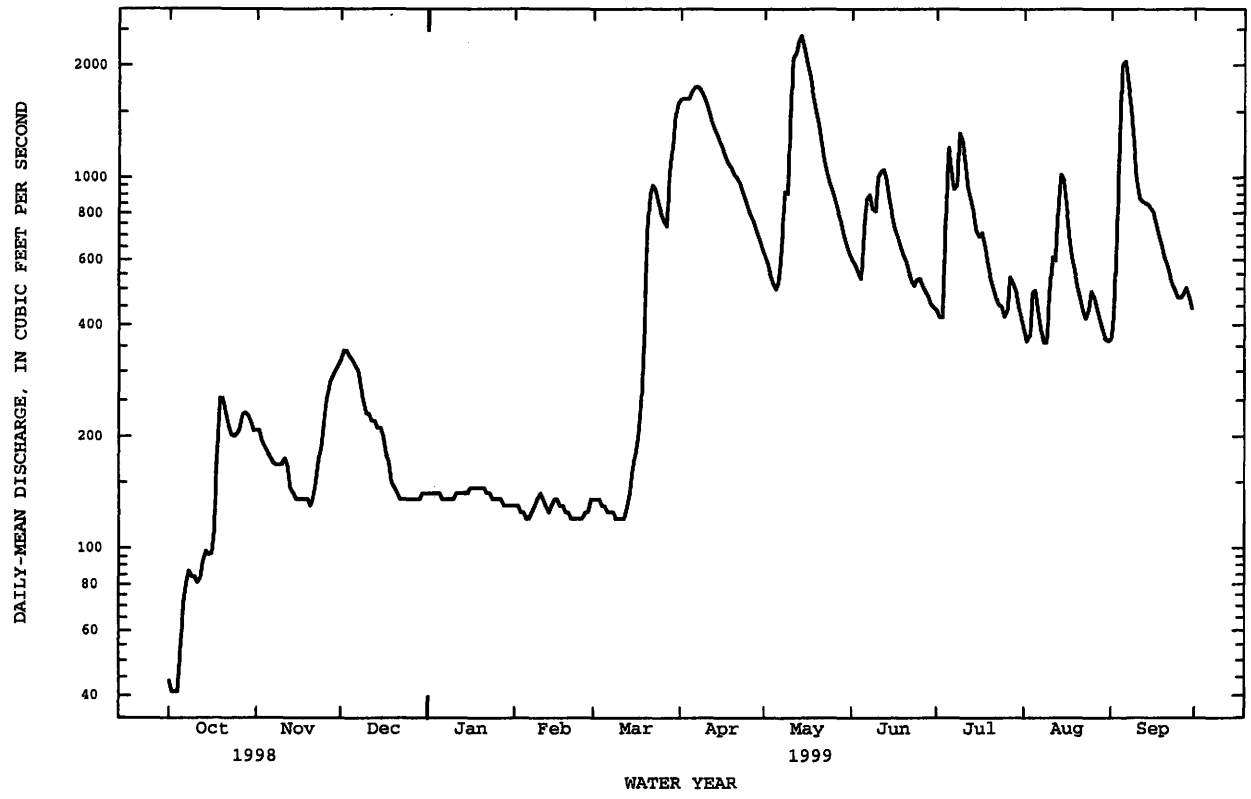
05062500 WILD RICE RIVER AT TWIN VALLEY, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	92.8	84.6	57.8	44.4	44.6	149	614	444	322	261	115	96.7
MAX	614	488	208	138	336	828	2471	2259	1560	1926	1024	842
(WY)	1974	1972	1999	1999	1998	1995	1997	1950	1943	1909	1993	1999
MIN	6.10	9.31	6.00	4.00	4.00	12.8	73.8	30.9	26.4	8.04	3.02	2.96
(WY)	1933	1933	1933	1933	1933	1940	1931	1977	1977	1934	1932	1936

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1909 - 1999	
ANNUAL TOTAL	137699		195879			
ANNUAL MEAN	377		537		191[a]	
HIGHEST ANNUAL MEAN					537	1999
LOWEST ANNUAL MEAN					22.7	1977
HIGHEST DAILY MEAN	3020	Jun 21	2410	May 14	9100	Jul 22 1909
LOWEST DAILY MEAN	41	Oct 2	41	Oct 2-4	1.1	Aug 13 1932
ANNUAL SEVEN-DAY MINIMUM	42	Sep 28	53	Oct 1	1.3	Aug 11 1932
INSTANTANEOUS PEAK FLOW			2480	May 14	10000[b]	Apr 6 1997
INSTANTANEOUS PEAK STAGE			9.32	May 14	20.00[c]	Jul 22 1909
INSTANTANEOUS LOW FLOW			40	Oct 4	.50	Nov 4 1939
ANNUAL RUNOFF (AC-FT)	273100		388500		138300	
ANNUAL RUNOFF (CFSM)	.40		.57		.20	
ANNUAL RUNOFF (INCHES)	5.48		7.80		2.78	
10 PERCENT EXCEEDS	857		1240		500	
50 PERCENT EXCEEDS	227		416		70	
90 PERCENT EXCEEDS	81		125		16	

a Median of annual mean discharges is 170 ft^3/s.
b Gage-height 15.91 ft.
c Approximately, site and datum then in use. Equivalent stage at present site is approximately 16.0 ft.



05064000 WILD RICE RIVER AT HENDRUM, MN

LOCATION.--Lat 47°16'05", long 96°47'50", in SE¼SE¼ sec. 19, T.144 N., R.48 W., Norman County, Hydrologic Unit 09020108, on right bank, 30 ft downstream from County Highway 25 bridge, 0.5 mi east of Hendrum and 4 mi upstream from mouth.

DRAINAGE AREA.--1,560 mi^2.

PERIOD OF RECORD.--March 1944 to September 1984 and May 1985 to current year. Operated as a high-flow partial-record station October 1984 to April 1985.

REVISED RECORDS.--WSP 1728: 1958.

GAGE.--Water-stage recorder. Datum of gage is 836.75 ft above sea level (levels by U.S. Army Corps of Engineers). Prior to July 18, 1989, nonrecording gage at same site and datum.

REMARKS.--Records good except those for estimated daily discharges, which are poor. Large part of high flow diverted into Marsh River Basin at overflow section 3.5 mi east of Ada. Another diversion into the Marsh River basin formed in 1947, 1.5 mi southeast of Ada and diverted water at all stages 1947-51, after which it was closed except for a small regulated flow diverted for abatement of contamination from Ada sewage plant effluent. Amount of diversion not known.

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	68	358	e520	e155	e140	e145	3700	898	781	618	534	470
2	68	349	e525	e155	e140	e144	3560	856	746	596	492	533
3	67	343	e520	e155	e140	e142	3440	825	719	569	465	912
4	67	319	e500	e155	e135	e141	3460	769	691	622	458	1430
5	73	307	e450	e155	e135	e140	3550	745	781	1520	543	2350
6	82	300	e420	e155	e137	e138	3380	737	1130	2300	612	2950
7	99	293	e350	e150	e140	e137	3070	823	1360	2040	545	3320
8	120	288	e300	e150	e143	e136	2750	1030	1310	1550	490	3410
9	130	285	e260	e150	e147	e135	2450	1420	1180	1410	458	3210
10	131	304	e245	e150	e149	e132	2310	1680	1130	1800	447	2610
11	134	253	e230	e150	e147	e131	2180	3010	1490	1830	535	1840
12	149	e240	e225	e150	e144	e133	2090	3840	1530	1590	711	1460
13	147	e230	e220	e150	e142	e138	2040	4040	1430	1320	739	1340
14	141	e225	e220	e155	e144	e145	1960	4000	1310	1140	950	1280
15	144	e220	e220	e160	e146	e160	1850	3920	1160	1060	1160	1230
16	137	e210	e210	e160	e146	e190	1760	3820	1040	965	1200	1160
17	258	e205	e200	e160	e143	e220	1670	3650	947	918	1060	1090
18	511	e200	e190	e160	e140	e250	1590	3360	879	915	913	1010
19	514	e205	e180	e160	e137	e360	1510	2960	824	853	805	929
20	543	e210	e170	e160	e132	e550	1450	2530	782	762	723	853
21	485	e240	e160	e160	e130	e900	1390	2180	740	702	660	784
22	424	e270	e160	e160	e129	e3000	1380	1910	702	650	607	733
23	396	e300	e150	e160	e131	e3300	1350	1680	673	617	571	692
24	368	e325	e150	e160	e134	e3350	1280	1490	647	582	541	648
25	351	e350	e150	e160	e135	e3330	1240	1340	648	583	597	617
26	353	e370	e150	e155	e138	e3300	1170	1220	669	577	669	602
27	352	e400	e150	e150	e140	e3330	1110	1130	667	594	630	590
28	375	e440	e150	e145	e142	3450	1060	1040	661	699	579	594
29	376	e480	e150	e145	---	3580	1000	971	640	685	538	621
30	380	e500	e150	e140	---	3870	942	878	628	639	501	593
31	372	---	e150	e140	---	3900	---	820	---	584	475	---
TOTAL	7815	9019	7825	4770	3906	38977	61692	59572	27895	31290	20208	39861
MEAN	252	301	252	154	140	1257	2056	1922	930	1009	652	1329
MAX	543	500	525	160	149	3900	3700	4040	1530	2300	1200	3410
MIN	67	200	150	140	129	131	942	737	628	569	447	470
AC-FT	15500	17890	15520	9460	7750	77310	122400	118200	55330	62060	40080	79060
CFSM	.16	.19	.16	.10	.09	.81	1.32	1.23	.60	.65	.42	.85
IN.	.19	.22	.19	.11	.09	.93	1.47	1.42	.67	.75	.48	.95

e Estimated

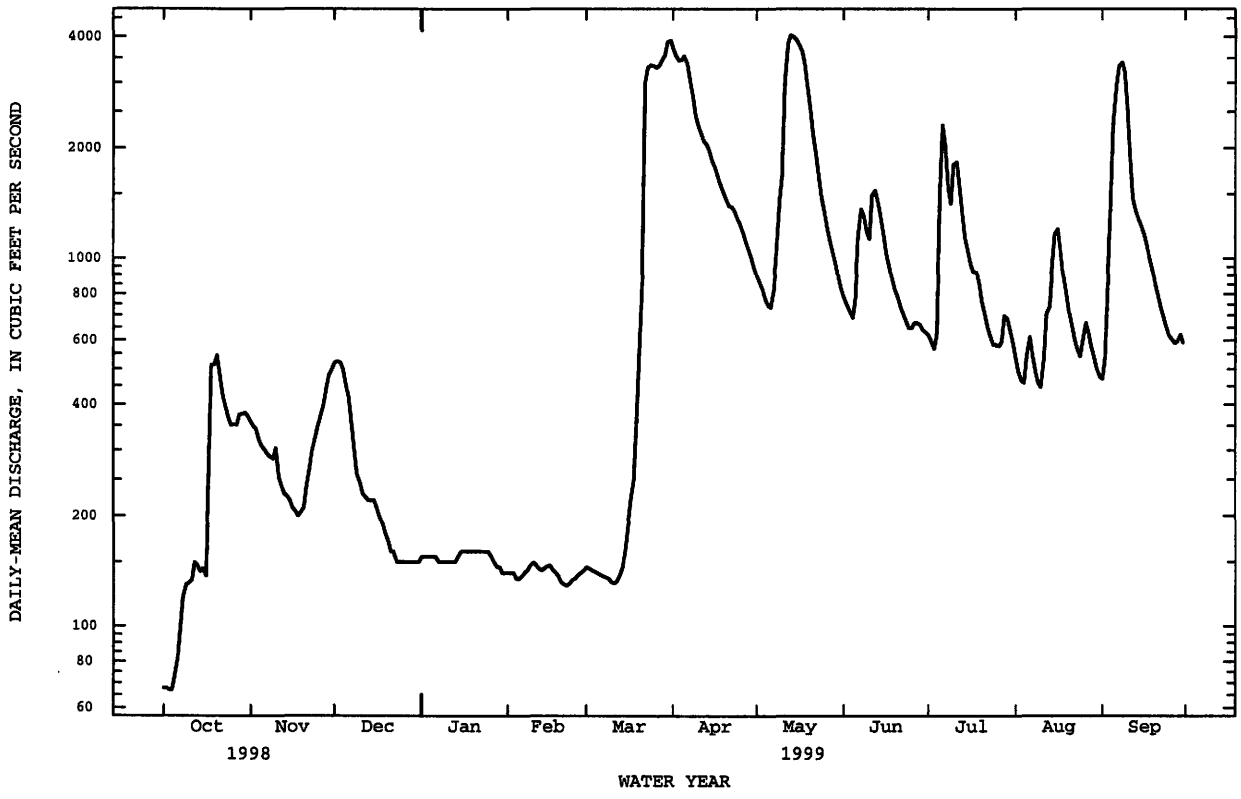
05064000 WILD RICE RIVER AT HENDRUM, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1944 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	134	124	75.6	55.4	64.1	325	1198	658	454	400	161	135
MAX	744	784	252	188	767	1485	5115	2137	1776	3136	1833	1329
(WY)	1972	1972	1999	1998	1998	1966	1997	1998	1962	1975	1993	1999
MIN	.44	3.32	1.08	.092	.22	.46	106	56.1	9.15	8.82	1.07	.18
(WY)	1949	1949	1977	1977	1977	1949	1981	1977	1952	1951	1977	1948

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1944 - 1999	
ANNUAL TOTAL	300299		312830			
ANNUAL MEAN	823		857		309[a]	
HIGHEST ANNUAL MEAN					857	1999
LOWEST ANNUAL MEAN					28.9	1977
HIGHEST DAILY MEAN	6520	May 19	4040	May 13	10300	Apr 18 1997
LOWEST DAILY MEAN	66	Sep 25	67	Oct 3	.00	Sep 13 1948
ANNUAL SEVEN-DAY MINIMUM	68	Sep 23	75	Oct 1	.00	Sep 27 1948
INSTANTANEOUS PEAK FLOW			4080[b]	May 13	10600[c]	Apr 18 1997
INSTANTANEOUS PEAK STAGE			22.75[d]	Mar 30	33.85[d]	Apr 18 1997
ANNUAL RUNOFF (AC-FT)	595600		620500		223700	
ANNUAL RUNOFF (CFSM)	.53		.55		.20	
ANNUAL RUNOFF (INCHES)	7.16		7.46		2.69	
10 PERCENT EXCEEDS	2530		2300		762	
50 PERCENT EXCEEDS	368		541		95	
90 PERCENT EXCEEDS	100		140		16	

a Median of annual mean discharges is 270 ft^3/s.
b Gage height, 20.83 ft.
c From measurement of discharge.
d Backwater from Red River of the North.



05064500 RED RIVER OF THE NORTH AT HALSTAD, MN

LOCATION.--Lat 47°21'10", long 96°50'50", on line between secs.24 and 25, T.145 N., R.49 W., Traill County, ND, Hydrologic Unit 09020107, on left bank on upstream side of highway bridge, 0.5 mi west of Halstad, MN, 2.5 mi downstream from Wild Rice River, and at mile 375.2.

DRAINAGE AREA.--21,800 mi^2 (approximately), including 3,800 mi^2 in closed basins.

PERIOD OF RECORD.--April 1936 to June 1937 (no winter records), April 1942 to September 1960 (spring and summer months only), May 1961 to current year.

REVISED RECORDS.--WSP 1388: 1936, 1950. WSP 1728: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 826.65 ft above sea level. Prior to July 17, 1961, nonrecording gage at same site and datum.

REMARKS.--Records good except for periods of estimated discharge, which are poor.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in 1897 reached a stage of about 38.5 ft.

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	880	2100	e1800	e840	e900	e1000	16700	4810	4320	3410	2600	1750
2	914	2130	e1850	e840	e880	e1100	16500	4640	4070	3190	2480	1890
3	877	2100	e1900	e820	e860	e1150	16300	4470	3930	3090	2290	2920
4	867	1960	e1900	e820	e840	e1250	16200	4280	3880	3200	2090	4900
5	911	1810	e1900	e820	e820	e1350	16400	4190	3970	4820	1970	7180
6	986	1720	e1900	e820	e810	e1600	16200	4220	4270	5950	1920	8470
7	1010	1670	e1910	e820	e800	e2000	15600	4480	4560	5580	1700	9120
8	973	1620	e1920	e820	e780	e2400	14900	5020	4750	4910	1470	9500
9	946	1590	e1900	e820	e760	e2700	14100	5860	5120	4550	1340	9470
10	938	1630	e2000	e840	e740	e2800	13100	6900	5550	4690	1300	8790
11	958	1780	e2200	e860	e740	e2800	12000	11200	6120	4770	1440	7510
12	1040	e1700	e2300	e880	e740	e2800	10900	14000	6310	4540	1770	6410
13	1270	e1600	e2200	e900	e740	e2750	9950	14700	5840	4160	2220	5700
14	1260	e1450	e2100	e920	e740	e2600	9220	14600	5380	3780	2680	5220
15	1190	e1300	e1900	e950	e740	e2600	8650	14200	5210	3480	2930	4890
16	1150	e1200	e1700	e970	e760	e2700	8160	13700	5160	3240	3540	4650
17	1360	e1100	e1500	e980	e760	e2900	7820	13200	5060	3100	4210	4400
18	2500	e1100	e1300	e980	e760	e3300	7550	12600	4830	3110	4480	4120
19	4170	e1050	e1200	e1000	e760	e3700	7300	11900	4520	3070	4280	3820
20	4800	e1000	e1050	e1050	e780	e5000	7030	11100	4200	2940	3710	3550
21	4360	e1000	e1000	e1050	e800	e7000	6760	10200	3900	2840	3180	3320
22	3730	e1000	e960	e1050	e810	e10000	6480	9320	3680	2820	2850	3140
23	3290	e1100	e920	e1000	e820	e13000	6230	8500	3600	2790	2680	2980
24	3010	e1200	e850	e1000	e830	e15000	6020	7730	3580	2720	2620	2830
25	2750	e1350	e840	e1000	e850	e15500	5850	7000	3640	2640	2500	2680
26	2540	e1450	e840	e1000	e880	e16500	5680	6290	4010	2610	2540	2570
27	2330	e1500	e850	e990	e900	e17000	5480	5750	4360	2670	2480	2480
28	2160	e1600	e840	e980	e950	e17500	5320	5350	4330	2720	2300	2370
29	2060	e1750	e840	e950	---	17900	5140	5080	4040	2680	2090	2310
30	2020	e1800	e850	e930	---	17300	4970	4840	3700	2620	1920	2210
31	2100	---	e840	e920	---	17100	---	4590	---	2620	1810	---
TOTAL	59350	45360	46060	28620	22550	212300	302510	254720	135890	109310	77390	141150
MEAN	1915	1512	1486	923	805	6848	10080	8217	4530	3526	2496	4705
MAX	4800	2130	2300	1050	950	17900	16700	14700	6310	5950	4480	9500
MIN	867	1000	840	820	740	1000	4970	4190	3580	2610	1300	1750
AC-FT	117700	89970	91360	56770	44730	421100	600000	505200	269500	216800	153500	280000

e Estimated

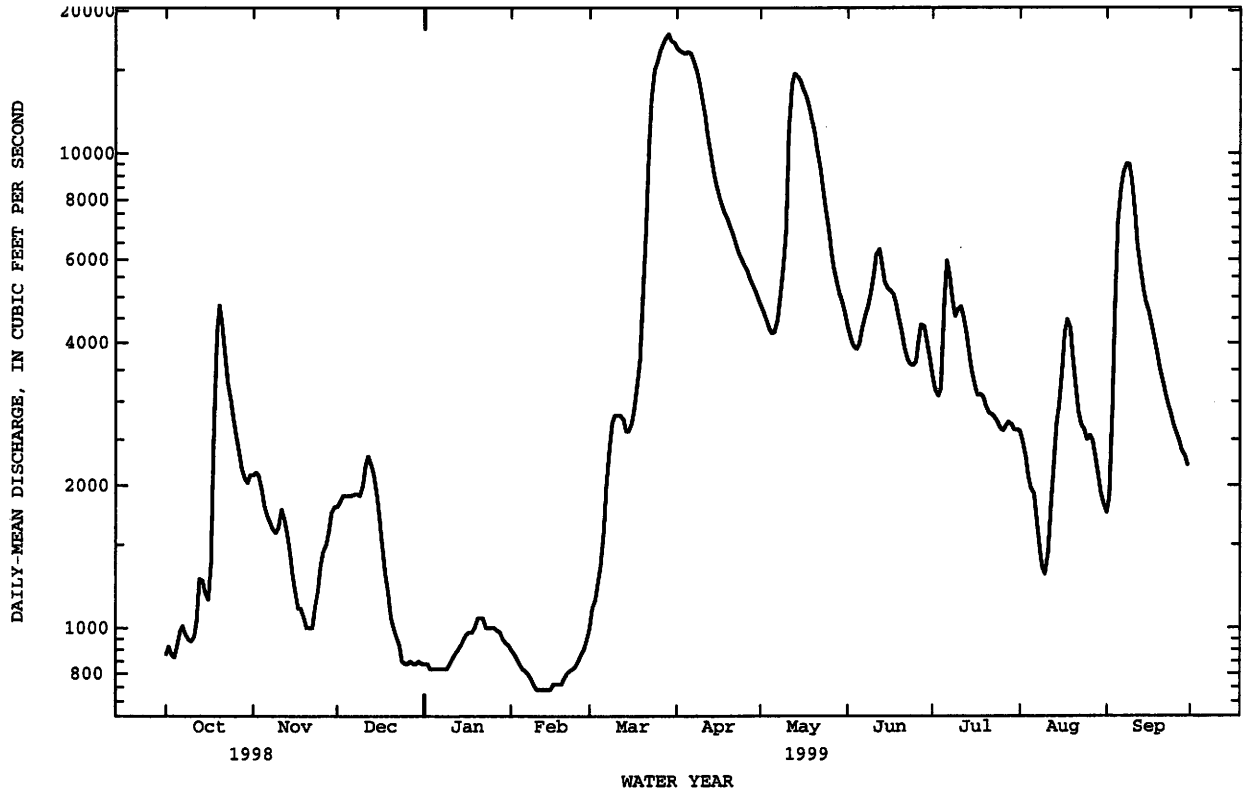
05064500 RED RIVER OF THE NORTH AT HALSTAD, MN--Continued

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

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	839	747	591	489	536	2587	7881	3926	2761	2806	1176	831
MAX	2875	1843	1486	1023	1952	9444	38460	15570	10310	20060	11700	4705
(WY)	1995	1995	1999	1987	1998	1995	1997	1997	1962	1975	1993	1999
MIN	61.5	92.3	51.2	32.1	45.9	249	705	449	242	153	59.5	38.4
(WY)	1977	1977	1977	1977	1977	1962	1981	1977	1977	1988	1977	1976

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1961 - 1999	
ANNUAL TOTAL	1469440		1435210			
ANNUAL MEAN	4026		3932		2112	
HIGHEST ANNUAL MEAN					6028	1997
LOWEST ANNUAL MEAN					214	1977
HIGHEST DAILY MEAN	19200	May 20	17900	Mar 29	69900	Apr 19 1997
LOWEST DAILY MEAN	658	Sep 27	740	Feb 10	10	Sep 2 1976
ANNUAL SEVEN-DAY MINIMUM	789	Sep 25	743	Feb 9	17	Aug 28 1976
INSTANTANEOUS PEAK FLOW			18100[a]	Mar 29	71500	Apr 19 1997
INSTANTANEOUS PEAK STAGE			30.46[b]	Mar 26	40.74	Apr 19 1997
INSTANTANEOUS LOW FLOW					5.4	Oct 8 1936
ANNUAL RUNOFF (AC-FT)	2915000		2847000		1530000	
10 PERCENT EXCEEDS	10300		9380		4720	
50 PERCENT EXCEEDS	2100		2620		832	
90 PERCENT EXCEEDS	920		846		221	

a Gage height, 28.21 ft.
b Backwater from ice.



05064500 RED RIVER OF THE NORTH AT HALSTAD, MN--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1961-67, 1972 to current year.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: October 1997 to current year.

SPECIFIC CONDUCTANCE: October 1997 to current year.

INSTRUMENTATION.--Water-quality sensors since October 1997.

REMARKS.--Records fair. Interruptions in daily record are due to recorder malfunctions.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum recorded, 28.7°C, July 24, 1999; minimum recorded, 0.2°C, on many days.

SPECIFIC CONDUCTANCE: Maximum recorded, 1,120 microsiemens/cm, Dec. 31, 1998; minimum recorded, 329 microsiemens/cm, Feb. 25, 1998.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURE: Maximum recorded, 28.7°C, July 24; minimum recoded, 0.7°C, on many days.

SPECIFIC CONDUCTANCE: Maximum recorded, 1,120 microsiemens/cm, Dec. 31; minimum recorded, 500 microsiemens/cm, Mar. 23-24.

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

DATE	TIME	DIS-CHARGE, IN CUBIC FEET PER SECOND (00060)	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM) (90095)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)
OCT											
23...	1315	3290	--	--	--	660	--	8.9	--	--	--
DEC											
11...	1215	--	2240	--	--	1000	3.0	1.5	--	--	--
FEB											
10...	1245	740	--	--	--	744	--	1.2	--	--	--
11...	1015	--	706	--	--	425	-7.0	.5	--	--	--
MAR											
02...	1400	1100	--	--	--	643	--	.8	--	--	--
24...	1130	--	14800	8.2	396	380	11.0	.0	160	36	17
APR											
15...	1200	8650	--	--	--	684	--	9.3	--	--	--
MAY											
10...	1000	6900	--	--	--	783	--	12.1	--	--	--
24...	1100	7730	--	--	--	833	--	17.6	--	--	--
JUN											
15...	0900	5210	--	--	--	681	--	21.4	--	--	--
JUL											
16...	0800	3240	--	--	--	697	--	26.4	--	--	--
AUG											
20...	1600	3710	--	--	--	--	--	21.0	--	--	--
SEP											
15...	1100	4890	--	--	--	748	--	14.9	--	--	--
21...	0945	--	3400	8.3	767	784	10.0	13.0	360	75	43

05064500 RED RIVER OF THE NORTH AT HALSTAD, MN--Continued

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

DATE	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	SODIUM ADSORPTION RATIO (00931)	SODIUM PERCENT (00932)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	ANC UNFLTRD TIT 4.5 LAB (MG/L AS CACO3) (90410)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	SOLIDS, DISSOLVED (TONS PER DAY) (70302)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)
OCT										
23...	--	--	--	--	--	--	--	--	--	--
DEC										
11...	--	--	--	--	--	--	--	--	--	--
FEB										
10...	--	--	--	--	--	--	--	--	--	--
11...	--	--	--	--	--	--	--	--	--	--
MAR										
02...	--	--	--	--	--	--	--	--	--	--
24...	6.5	.5	15	14	118	9.5	.10	68	10300	257
APR										
15...	--	--	--	--	--	--	--	--	--	--
MAY										
10...	--	--	--	--	--	--	--	--	--	--
24...	--	--	--	--	--	--	--	--	--	--
JUN										
15...	--	--	--	--	--	--	--	--	--	--
JUL										
16...	--	--	--	--	--	--	--	--	--	--
AUG										
20...	--	--	--	--	--	--	--	--	--	--
SEP										
15...	--	--	--	--	--	--	--	--	--	--
21...	8.2	.8	17	35	246	18	.20	180	5040	549

DATE	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)	LITHIUM DISSOLVED (UG/L AS LI) (01130)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MERCURY DISSOLVED (UG/L AS HG) (71890)	MOLYBDENUM, DISSOLVED (UG/L AS MO) (01060)	SELENIUM, DISSOLVED (UG/L AS SE) (01145)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)
OCT										
23...	--	--	--	--	--	--	--	--	--	--
DEC										
11...	--	--	--	--	--	--	--	--	--	--
FEB										
10...	--	--	--	--	--	--	--	--	--	--
11...	--	--	--	--	--	--	--	--	--	--
MAR										
02...	--	--	--	--	--	--	--	--	--	--
24...	222	3	40	<1.0	20	60	<.1	<1.0	1	200
APR										
15...	--	--	--	--	--	--	--	--	--	--
MAY										
10...	--	--	--	--	--	--	--	--	--	--
24...	--	--	--	--	--	--	--	--	--	--
JUN										
15...	--	--	--	--	--	--	--	--	--	--
JUL										
16...	--	--	--	--	--	--	--	--	--	--
AUG										
20...	--	--	--	--	--	--	--	--	--	--
SEP										
15...	--	--	--	--	--	--	--	--	--	--
21...	507	4	20	1.0	40	30	<.1	1.0	<1	360

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

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	15.4	14.0	14.7	---	---	---	2.1	1.5	1.8	1.2	1.2	1.2
2	14.6	13.1	13.8	---	---	---	2.1	1.7	1.9	1.2	1.2	1.2
3	13.7	12.5	13.1	---	---	---	2.2	1.9	2.0	1.2	1.2	1.2
4	13.3	12.4	12.7	---	---	---	2.0	1.8	1.9	1.2	1.2	1.2
5	12.5	11.9	12.2	---	---	---	2.0	1.8	1.9	1.2	1.2	1.2
6	12.5	12.2	12.3	---	---	---	1.9	1.6	1.8	1.2	1.2	1.2
7	12.9	11.6	12.3	---	---	---	1.6	1.3	1.4	1.2	1.2	1.2
8	13.1	11.6	12.4	---	---	---	1.4	1.3	1.3	1.2	1.2	1.2
9	13.8	12.1	12.9	---	---	---	1.4	1.3	1.3	1.2	1.2	1.2
10	13.6	12.9	13.2	3.6	2.4	3.0	1.5	1.4	1.4	1.2	1.2	1.2
11	13.3	12.7	13.0	2.4	1.7	2.1	---	---	---	1.2	1.2	1.2
12	12.7	11.1	11.8	1.7	.9	1.1	---	---	---	1.2	1.2	1.2
13	11.1	10.1	10.5	1.3	.7	1.0	---	---	---	1.2	1.2	1.2
14	10.2	9.7	10.0	1.4	1.2	1.3	---	---	---	1.2	1.1	1.1
15	10.3	9.6	10.0	1.3	1.1	1.1	---	---	---	1.1	1.1	1.1
16	10.4	10.2	10.3	1.4	1.0	1.2	---	---	---	1.1	1.1	1.1
17	10.4	8.8	9.7	1.6	1.2	1.4	---	---	---	1.1	1.1	1.1
18	8.8	8.2	8.5	1.2	.8	1.0	---	---	---	1.1	1.1	1.1
19	8.6	8.2	8.4	1.0	.8	.9	---	---	---	1.1	1.1	1.1
20	8.2	7.7	8.0	.9	.8	.9	---	---	---	1.1	1.1	1.1
21	8.1	7.6	7.9	.9	.9	.9	---	---	---	1.1	1.1	1.1
22	8.8	8.0	8.3	.9	.9	.9	1.4	1.4	1.4	1.1	1.1	1.1
23	---	---	---	1.0	.9	1.0	1.4	1.4	1.4	1.1	1.1	1.1
24	---	---	---	1.1	1.0	1.0	1.4	1.4	1.4	1.1	1.1	1.1
25	---	---	---	1.1	1.0	1.0	1.4	1.4	1.4	1.1	1.1	1.1
26	---	---	---	1.1	1.0	1.0	1.4	1.4	1.4	1.1	1.1	1.1
27	---	---	---	1.2	1.0	1.1	1.4	1.4	1.4	1.1	1.0	1.1
28	---	---	---	1.2	1.1	1.1	1.4	1.4	1.4	1.0	1.0	1.0
29	---	---	---	1.3	1.1	1.2	1.4	1.4	1.4	1.0	1.0	1.0
30	---	---	---	1.8	1.2	1.5	1.4	1.4	1.4	1.0	1.0	1.0
31	---	---	---	---	---	---	1.4	1.4	1.4	1.0	1.0	1.0
MONTH	---	---	---	---	---	---	---	---	---	1.2	1.0	1.1

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	1.0	1.0	1.0	.8	.8	.8	6.2	6.0	6.1	16.4	14.9	15.7
2	1.0	1.0	1.0	.8	.8	.8	6.1	5.5	5.9	16.9	15.6	16.3
3	1.0	1.0	1.0	.8	.8	.8	5.5	4.6	5.0	17.1	16.2	16.7
4	1.0	1.0	1.0	.8	.8	.8	4.8	4.4	4.6	17.6	16.8	17.2
5	1.0	1.0	1.0	.8	.8	.8	5.2	4.6	4.8	18.0	17.3	17.6
6	1.0	1.0	1.0	.8	.8	.8	6.0	5.2	5.6	18.0	17.5	17.8
7	1.0	1.0	1.0	.8	.8	.8	7.1	6.0	6.5	17.5	15.2	16.2
8	1.0	1.0	1.0	.8	.8	.8	8.3	7.1	7.6	15.2	14.1	14.5
9	1.0	1.0	1.0	.8	.8	.8	9.2	8.3	8.6	14.1	12.6	13.0
10	1.0	.9	.9	.8	.8	.8	9.2	8.9	9.0	12.6	11.8	12.4
11	.9	.9	.9	.8	.8	.8	9.2	8.7	8.9	11.9	11.1	11.5
12	.9	.9	.9	.8	.8	.8	9.4	8.6	9.0	12.3	11.8	12.0
13	.9	.9	.9	.8	.8	.8	10.3	9.1	9.7	12.7	12.3	12.5
14	.9	.9	.9	.8	.8	.8	10.8	10.1	10.4	13.2	12.6	12.9
15	.9	.9	.9	.8	.8	.8	10.5	9.7	10.2	14.2	13.1	13.5
16	.9	.9	.9	.8	.8	.8	9.7	8.4	9.0	15.5	14.2	14.7
17	.9	.9	.9	.8	.8	.8	8.4	7.4	7.8	16.3	15.4	15.8
18	.9	.9	.9	.8	.8	.8	7.6	6.9	7.3	16.9	15.8	16.3
19	.9	.9	.9	.8	.8	.8	7.8	7.1	7.4	17.4	16.4	16.9
20	.9	.9	.9	.9	.8	.8	7.8	7.5	7.6	18.4	17.1	17.7
21	.9	.9	.9	.8	.7	.8	8.3	7.2	7.8	18.9	17.8	18.3
22	.9	.9	.9	.8	.7	.8	8.9	7.9	8.4	19.1	18.3	18.7
23	.9	.8	.9	.9	.7	.8	10.1	8.5	9.2	18.8	18.1	18.4
24	.8	.8	.8	.9	.7	.8	11.3	9.5	10.3	18.3	17.8	18.0
25	.8	.8	.8	1.0	.7	.8	12.6	10.7	11.6	18.2	17.1	17.7
26	.8	.8	.8	2.0	.8	1.3	13.1	12.0	12.6	18.9	17.6	18.2
27	.8	.8	.8	2.2	1.9	2.1	13.3	12.6	12.9	19.6	18.1	18.8
28	.8	.8	.8	2.7	2.1	2.4	13.9	12.6	13.2	20.5	18.8	19.6
29	---	---	---	3.7	2.7	3.2	14.6	13.3	13.9	21.4	19.8	20.5
30	---	---	---	5.1	3.6	4.2	15.7	14.1	14.8	21.3	20.7	20.9
31	---	---	---	6.2	5.1	5.6	---	---	---	20.7	19.6	20.0
MONTH	1.0	.8	.9	6.2	.7	1.3	15.7	4.4	8.9	21.4	11.1	16.5

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

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	19.6	18.8	19.1	23.3	22.1	22.7	---	---	---	22.2	20.4	21.3
2	19.6	18.2	18.8	23.8	22.7	23.3	---	---	---	20.4	19.4	20.0
3	19.9	19.3	19.6	24.6	23.1	23.8	---	---	---	19.4	17.1	18.2
4	21.0	19.5	20.2	24.8	24.0	24.4	---	---	---	17.1	16.2	16.6
5	21.9	20.4	21.0	24.7	24.2	24.5	---	---	---	16.5	16.0	16.2
6	23.1	21.5	22.3	24.8	23.6	24.2	---	---	---	16.8	15.9	16.3
7	23.8	22.3	23.0	25.1	24.0	24.5	---	---	---	17.3	16.6	16.9
8	24.5	23.2	23.8	24.9	24.2	24.4	---	---	---	17.2	16.9	17.1
9	24.8	23.9	24.3	24.2	23.2	23.6	---	---	---	17.0	16.5	16.7
10	24.7	24.1	24.3	23.3	22.4	22.9	---	---	---	16.7	16.1	16.3
11	24.3	23.5	23.9	23.9	22.6	23.2	---	---	---	16.3	15.7	15.8
12	24.2	23.3	23.7	24.9	23.4	24.1	---	---	---	15.7	15.2	15.4
13	23.9	23.1	23.4	25.9	24.4	25.1	---	---	---	15.3	14.7	14.9
14	23.2	22.3	22.8	26.9	25.5	26.1	---	---	---	14.7	14.2	14.4
15	22.7	21.7	22.1	27.0	26.2	26.7	---	---	---	14.6	13.9	14.2
16	22.1	21.2	21.7	26.8	26.1	26.5	---	---	---	14.9	13.9	14.4
17	22.2	21.0	21.6	26.3	25.4	25.9	---	---	---	15.5	14.3	14.8
18	22.0	21.1	21.5	25.9	25.1	25.4	---	---	---	15.9	15.0	15.4
19	21.7	20.9	21.2	26.1	24.9	25.5	---	---	---	15.9	15.2	15.4
20	21.7	20.6	21.1	26.5	25.4	25.9	---	---	---	15.2	14.4	14.7
21	22.1	21.2	21.6	27.5	25.9	26.7	22.7	21.5	22.1	14.7	13.7	14.3
22	23.1	21.9	22.4	27.5	26.7	27.2	23.3	22.1	22.6	15.2	14.1	14.6
23	23.9	22.7	23.2	28.3	26.8	27.5	23.1	22.6	22.8	15.4	14.7	15.1
24	24.1	23.0	23.6	28.7	27.5	28.1	23.1	22.1	22.6	15.4	14.8	15.2
25	24.8	23.5	24.1	28.5	27.8	28.1	23.6	22.4	23.0	15.3	15.0	15.2
26	24.9	24.4	24.7	---	---	---	24.4	23.1	23.6	15.0	14.3	14.8
27	24.7	24.1	24.3	---	---	---	24.8	23.6	24.2	14.4	13.7	14.1
28	24.1	23.3	23.6	---	---	---	24.6	23.9	24.3	14.0	13.2	13.6
29	23.3	22.3	22.7	---	---	---	23.9	22.8	23.2	13.4	12.7	13.0
30	23.0	21.9	22.4	---	---	---	22.8	21.1	21.9	12.9	11.7	12.3
31	---	---	---	---	---	---	22.4	20.7	21.4	---	---	---
MONTH	24.9	18.2	22.4	---	---	---	---	---	---	22.2	11.7	15.6

05064500 RED RIVER OF THE NORTH AT HALSTAD, MN--Continued

SPECIFIC CONDUCTANCE (MICROSIEMENS/CM AT 25 DEG.C), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	769	691	721	---	---	---	890	877	882	1060	1030	1040
2	772	753	769	---	---	---	901	879	891	1040	1010	1030
3	753	668	710	---	---	---	881	863	871	1030	1020	1020
4	749	667	696	---	---	---	878	864	870	1050	1030	1040
5	779	689	740	---	---	---	884	876	880	1030	928	964
6	689	665	671	---	---	---	893	883	887	928	900	909
7	680	641	662	---	---	---	924	889	907	905	875	887
8	641	613	628	---	---	---	965	916	942	875	869	871
9	675	640	657	831	828	829	964	945	953	880	870	874
10	671	664	667	835	831	833	982	959	974	898	880	887
11	673	662	670	836	827	832	1000	979	995	899	895	898
12	685	670	675	840	829	834	---	---	---	895	888	891
13	682	662	673	845	824	836	---	---	---	896	885	892
14	678	626	650	836	819	824	---	---	---	885	853	865
15	661	631	645	865	836	849	---	---	---	853	833	841
16	685	660	671	883	864	870	---	---	---	833	821	827
17	685	661	669	901	883	894	---	---	---	821	807	812
18	670	625	645	899	867	891	---	---	---	808	805	806
19	651	592	629	867	840	859	---	---	---	811	804	808
20	618	592	602	853	603	662	---	---	---	809	799	802
21	597	541	556	755	697	724	---	---	---	807	797	802
22	625	566	590	744	734	740	972	937	945	804	794	797
23	660	625	650	744	721	731	983	972	977	794	784	787
24	---	---	---	797	744	780	989	976	983	787	781	783
25	---	---	---	834	796	813	1000	988	992	781	769	773
26	---	---	---	852	832	842	1010	1000	1010	770	762	765
27	---	---	---	877	849	867	1010	998	1010	762	755	758
28	---	---	---	856	841	848	998	947	977	801	755	778
29	---	---	---	864	843	854	947	902	925	775	750	759
30	---	---	---	879	858	869	1060	903	965	771	754	757
31	---	---	---	---	---	---	1120	1060	1090	756	738	749
MONTH	---	---	---	---	---	---	---	---	---	1060	738	854

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	743	731	737	680	646	664	625	607	612	741	735	738
2	747	738	742	673	639	648	642	624	634	747	738	742
3	749	738	743	644	635	640	668	641	654	746	741	745
4	753	741	746	649	620	637	676	668	673	744	737	740
5	767	752	760	634	603	619	675	663	670	751	744	746
6	772	761	765	634	624	629	671	661	665	762	751	756
7	771	750	757	658	627	638	672	665	668	770	757	764
8	754	743	748	685	658	676	682	667	675	784	770	777
9	754	744	749	708	685	701	693	682	687	797	784	790
10	751	740	745	706	661	678	710	693	701	808	797	803
11	772	749	757	764	664	714	725	710	719	811	808	810
12	775	764	770	805	764	789	727	722	724	809	787	800
13	806	766	788	831	805	818	731	727	728	787	744	764
14	809	779	794	842	830	836	731	729	730	744	724	728
15	781	747	757	854	842	847	734	730	733	766	729	746
16	761	735	741	854	829	847	733	730	732	807	766	787
17	748	738	743	829	724	786	730	725	728	841	807	824
18	750	743	746	724	677	707	725	720	722	868	841	855
19	754	743	748	677	618	656	735	720	726	891	868	878
20	768	752	759	618	588	602	743	735	740	892	880	889
21	782	762	774	594	551	580	743	722	728	880	857	867
22	762	737	751	551	507	528	722	721	721	857	846	849
23	769	735	743	523	500	507	722	718	720	872	847	859
24	771	746	761	522	500	505	721	717	719	900	872	885
25	789	746	768	525	503	514	720	717	718	932	900	916
26	800	767	786	542	525	533	722	718	720	955	931	942
27	778	738	758	573	542	561	720	717	719	955	937	944
28	738	646	684	576	572	574	727	717	722	946	915	939
29	---	---	---	573	565	569	732	725	728	915	866	881
30	---	---	---	595	572	588	736	731	733	866	862	864
31	---	---	---	609	594	602	---	---	---	863	817	844
MONTH	809	646	754	854	500	651	743	607	705	955	724	822

SPECIFIC CONDUCTANCE (MICROSIEMENS/CM AT 25 DEG.C), WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	817	808	812	725	711	717	---	---	---	703	699	701
2	822	811	816	725	709	716	---	---	---	716	701	705
3	811	801	808	720	702	709	---	---	---	716	640	696
4	803	779	792	709	685	697	---	---	---	640	585	602
5	783	747	767	685	538	613	---	---	---	585	549	562
6	747	731	735	539	506	522	---	---	---	550	520	534
7	755	732	744	606	531	574	---	---	---	556	529	544
8	764	738	755	647	606	622	---	---	---	560	552	556
9	738	733	734	661	646	656	---	---	---	588	559	571
10	741	725	731	656	599	621	---	---	---	595	587	590
11	740	703	719	631	609	622	---	---	---	617	595	605
12	703	667	681	638	628	633	---	---	---	640	617	629
13	667	654	656	669	632	646	---	---	---	665	640	654
14	679	655	665	696	669	688	---	---	---	681	663	671
15	699	679	686	706	683	691	---	---	---	695	681	688
16	737	699	717	729	706	722	---	---	---	700	695	698
17	766	737	753	743	727	738	---	---	---	703	699	701
18	763	741	751	732	712	722	---	---	---	715	701	708
19	745	737	740	712	700	708	---	---	---	716	708	711
20	761	745	752	706	698	701	---	---	---	714	705	708
21	770	761	764	733	702	719	600	569	582	724	708	716
22	780	770	775	746	728	738	623	600	611	729	724	726
23	773	760	767	767	741	759	629	623	625	737	729	734
24	779	761	771	767	757	763	651	626	633	739	729	735
25	761	734	747	762	748	759	678	651	671	741	735	739
26	756	732	743	---	---	---	704	678	694	745	737	740
27	798	748	782	---	---	---	704	693	700	745	738	741
28	777	687	712	---	---	---	693	680	685	743	736	739
29	747	719	738	---	---	---	681	678	679	736	720	726
30	733	708	718	---	---	---	680	678	679	727	720	724
31	---	---	---	---	---	---	699	680	689	---	---	---
MONTH	822	654	744	---	---	---	---	---	---	745	520	672

05067500 MARSH RIVER NEAR SHELLY, MN

LOCATION.--Lat 47°24'45", long 96°45'50", in NE¼NW¼ sec. 3, T.145 N., R.48 W., Norman County, Hydrologic Unit 09020107, near center of span on downstream truss of County Road 129 bridge, 3.8 mi southeast of Shelly and 10 mi upstream from mouth.

DRAINAGE AREA.--220 mi^2.

PERIOD OF RECORD.--March 1944 to September 1983 and April 1985 to current year (no winter records since 1989). Monthly discharge only for March 1944, published in WSP 1308. Operated as a high-flow partial-record station October 1983 to March 1985.

GAGE.--Water-stage recorder. Datum of gage is 841.14 ft above sea level (levels by U.S. Army Corps of Engineers). Prior to Oct. 1, 1965, nonrecording gage at datum 3.0 ft higher. Oct. 1, 1965 to May 17, 1989, nonrecording gage at present site and datum.

REMARKS.--Records fair except those for estimated daily discharges, which are poor. Large part of high flow of Wild Rice River diverted into Marsh River basin at overflow section 4.6 mi east of Ada. Another diversion from Wild Rice River basin formed in 1947, 1.5 mi southeast of Ada and diverted water at all stages 1947- 51, after which it was closed except for a small regulated flow diverted for abatement of pollution from Ada sewage plant effluent.

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	.00	10	---	---	---	---	465	18	7.7	6.8	7.7	2.1
2	.00	10	---	---	---	---	483	16	6.8	7.6	5.7	3.0
3	.00	e9.2	---	---	---	---	432	13	6.1	8.5	4.1	5.5
4	.00	---	---	---	---	---	701	13	5.4	10	2.8	14
5	.00	---	---	---	---	---	809	16	5.4	25	2.2	77
6	.23	---	---	---	---	---	485	30	9.8	32	2.0	228
7	2.2	---	---	---	---	---	328	50	14	39	1.6	240
8	2.7	---	---	---	---	---	259	89	33	48	1.5	209
9	2.8	---	---	---	---	---	211	117	41	184	1.5	150
10	3.2	---	---	---	---	---	176	168	33	272	1.2	106
11	3.6	---	---	---	---	---	147	323	24	196	1.2	78
12	4.0	---	---	---	---	---	128	343	14	117	1.6	65
13	4.2	---	---	---	---	---	109	293	8.1	78	2.1	62
14	5.1	---	---	---	---	---	95	254	5.4	58	2.2	61
15	5.3	---	---	---	---	---	89	220	4.6	42	2.5	65
16	5.1	---	---	---	---	---	78	193	3.8	31	2.7	55
17	59	---	---	---	---	e20	71	165	4.5	23	2.9	40
18	233	---	---	---	---	e300	64	136	4.2	15	2.9	27
19	151	---	---	---	---	e500	59	111	3.1	9.9	2.7	15
20	83	---	---	---	---	e750	56	89	3.3	7.7	2.5	9.5
21	55	---	---	---	---	e900	56	74	2.8	6.1	2.3	5.4
22	40	---	---	---	---	e1050	56	54	3.2	5.4	2.3	3.0
23	30	---	---	---	---	e1050	54	43	4.9	6.6	2.5	2.3
24	21	---	---	---	---	e900	50	34	5.5	5.0	2.5	1.6
25	13	---	---	---	---	e740	43	25	5.2	3.8	2.6	2.0
26	10	---	---	---	---	583	36	19	5.8	3.1	2.6	2.0
27	8.9	---	---	---	---	602	33	14	5.7	2.4	2.4	2.4
28	7.5	---	---	---	---	856	29	10	5.9	2.1	2.2	2.7
29	7.2	---	---	---	---	1380	24	8.0	6.2	1.7	1.8	3.0
30	8.8	---	---	---	---	1060	21	6.4	6.6	8.2	1.6	4.0
31	11	---	---	---	---	625	---	6.7	---	9.9	1.5	---
TOTAL	776.83	---	---	---	---	---	5647	2951.1	289.0	1264.8	77.9	1540.5
MEAN	25.1	---	---	---	---	---	188	95.2	9.63	40.8	2.51	51.3
MAX	233	---	---	---	---	---	809	343	41	272	7.7	240
MIN	.00	---	---	---	---	---	21	6.4	2.8	1.7	1.2	1.6
AC-FT	1540	---	---	---	---	---	11200	5850	573	2510	155	3060
CFSM	.11	---	---	---	---	---	.86	.43	.04	.19	.01	.23
IN.	.13	---	---	---	---	---	.95	.50	.05	.21	.01	.26

e Estimated

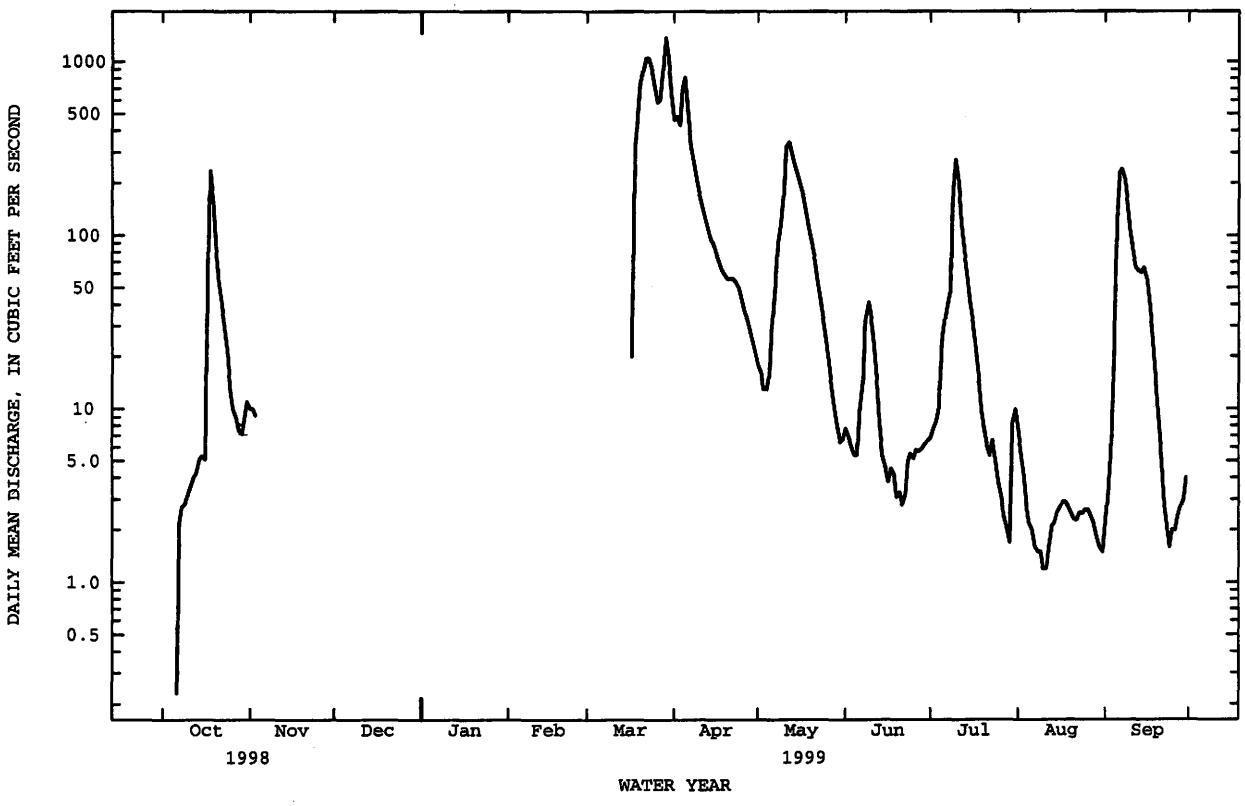
05067500 MARSH RIVER NEAR SHELLY, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1944 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	13.6	11.0	5.60	3.79	3.29	77.9	304	129	83.4	76.2	19.1	13.0
MAX	130	102	77.1	64.5	62.1	437	1537	2617	1030	820	363	144
(WY)	1952	1952	1951	1951	1951	1945	1950	1950	1950	1950	1949	1944
MIN	.000	.000	.000	.000	.000	.000	.078	.87	.000	.000	.000	.000
(WY)	1955	1956	1956	1946	1946	1964	1981	1980	1980	1961	1959	1954

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1944 - 1999	
ANNUAL MEAN					63.3[a]	
HIGHEST ANNUAL MEAN					543[a]	1950
LOWEST ANNUAL MEAN					1.24	1977
HIGHEST DAILY MEAN	1470	May 17	1380	Mar 29	4740	Apr 19 1979
LOWEST DAILY MEAN	.00	Aug 14	.00	Oct 1-5	.00[b]	Sep 4 1945
ANNUAL SEVEN-DAY MINIMUM	.00	Aug 14	.35	Oct 1	.00	Sep 12 1945
INSTANTANEOUS PEAK FLOW			1420	Mar 29	4880[c]	Apr 19 1979
INSTANTANEOUS PEAK STAGE			15.04	Mar 29	25.45[d]	Apr 18 1997
ANNUAL RUNOFF (AC-FT)					45850	
ANNUAL RUNOFF (CFSM)					.29	
ANNUAL RUNOFF (INCHES)					3.91	
10 PERCENT EXCEEDS	322		298		116	
50 PERCENT EXCEEDS	13		13		1.4	
90 PERCENT EXCEEDS	.00		2.1		.00	

a Based on complete years only, 1945-83, 86-89.
b Many days, most years.
c Gage-height, 22.36 ft., from floodmark.
d From floodmark.



05069000 SAND HILL RIVER AT CLIMAX, MN

LOCATION.--Lat 47°36'43", long 96°48'52", in NE¼NE¼ sec. 30, T.148 N., R.48 W., Polk County, Hydrologic Unit 09020301, on left bank 25 ft upstream from bridge on U.S. Highway 75 in Climax and 3.7 mi upstream from mouth.

DRAINAGE AREA.--420 mi^2.

PERIOD OF RECORD.--March 1943 to September 1984, June 1985 to current year (winter records incomplete prior to 1947). Monthly discharge only for some periods, published in WSP 1308 and 1728. October 1984 to May 1985, operated as a high-flow partial-record station.

REVISED RECORDS.--WSP 1388: 1943(M), 1944, 1947(M). WSP 1728: 1951(M), 1960 (average discharge).

GAGE.--Water stage recorder. Datum of gage is 820.10 ft above sea level (levels by U.S. Army Corps of Engineers). Prior to Oct. 1, 1966, nonrecording gage at site 3.2 mi upstream at datum 12.78 ft higher. Oct. 1, 1966 to Sept 5, 1989, nonrecording gage at present site and datum.

REMARKS.--Records good except those for estimated daily discharges, which are poor.

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	22	75	101	e35	e33	e38	3540	143	134	74	77	108
2	21	70	96	e34	e33	e39	3340	133	125	69	75	137
3	20	66	94	e32	e34	e40	2900	126	113	65	84	191
4	21	64	e90	e30	e34	e41	2790	122	104	68	99	312
5	29	62	e84	e29	e34	e41	2520	139	99	67	92	430
6	45	59	e76	e29	e34	e41	2120	162	106	65	87	469
7	50	57	e67	e28	e34	e42	1810	187	105	64	78	552
8	41	56	e64	e28	e35	e43	1540	267	127	83	75	667
9	36	54	e62	e28	e35	e44	1270	273	148	149	73	703
10	33	52	e60	e28	e35	e45	995	892	147	120	81	662
11	33	37	e58	e28	e35	e46	713	991	151	113	91	615
12	35	e41	e57	e29	e35	e49	480	540	230	115	121	587
13	43	e45	e56	e29	e35	e52	424	556	304	112	156	548
14	40	e47	e55	e29	e35	e55	380	713	323	100	180	509
15	39	e47	e54	e30	e35	e60	365	829	316	94	186	475
16	38	e45	e53	e30	e35	e64	336	840	306	100	195	445
17	118	e44	e52	e30	e35	e73	314	751	287	107	207	415
18	339	e44	e50	e30	e35	e82	299	614	257	114	214	379
19	265	e43	e49	e29	e35	e97	287	488	221	115	219	348
20	179	e44	e48	e29	e35	e115	279	413	186	116	218	324
21	120	e44	e47	e29	e35	e140	274	360	156	107	210	305
22	100	e45	e47	e29	e36	e175	266	317	133	107	193	288
23	94	e45	e46	e29	e36	e240	250	280	121	161	177	270
24	97	e46	e45	e29	e37	e400	234	253	108	157	156	248
25	107	e48	e45	e30	e37	e600	227	237	96	147	152	229
26	106	e52	e44	e31	e37	e1000	208	216	91	139	137	215
27	97	e60	e43	e31	e37	e2000	200	196	84	127	117	210
28	87	e70	e42	e32	e37	e2800	188	179	77	118	105	199
29	117	80	e40	e32	---	e3300	174	161	76	103	100	189
30	112	93	e38	e32	---	3480	158	142	76	90	99	180
31	85	---	e36	e32	---	3680	---	139	---	83	101	---
TOTAL	2569	1635	1799	930	983	18922	28881	11659	4807	3249	4155	11209
MEAN	82.9	54.5	58.0	30.0	35.1	610	963	376	160	105	134	374
MAX	339	93	101	35	37	3680	3540	991	323	161	219	703
MIN	20	37	36	28	33	38	158	122	76	64	73	108
AC-FT	5100	3240	3570	1840	1950	37530	57290	23130	9530	6440	8240	22230
CFSM	.20	.13	.14	.07	.08	1.45	2.29	.90	.38	.25	.32	.89
IN.	.23	.14	.16	.08	.09	1.68	2.56	1.03	.43	.29	.37	.99

e Estimated

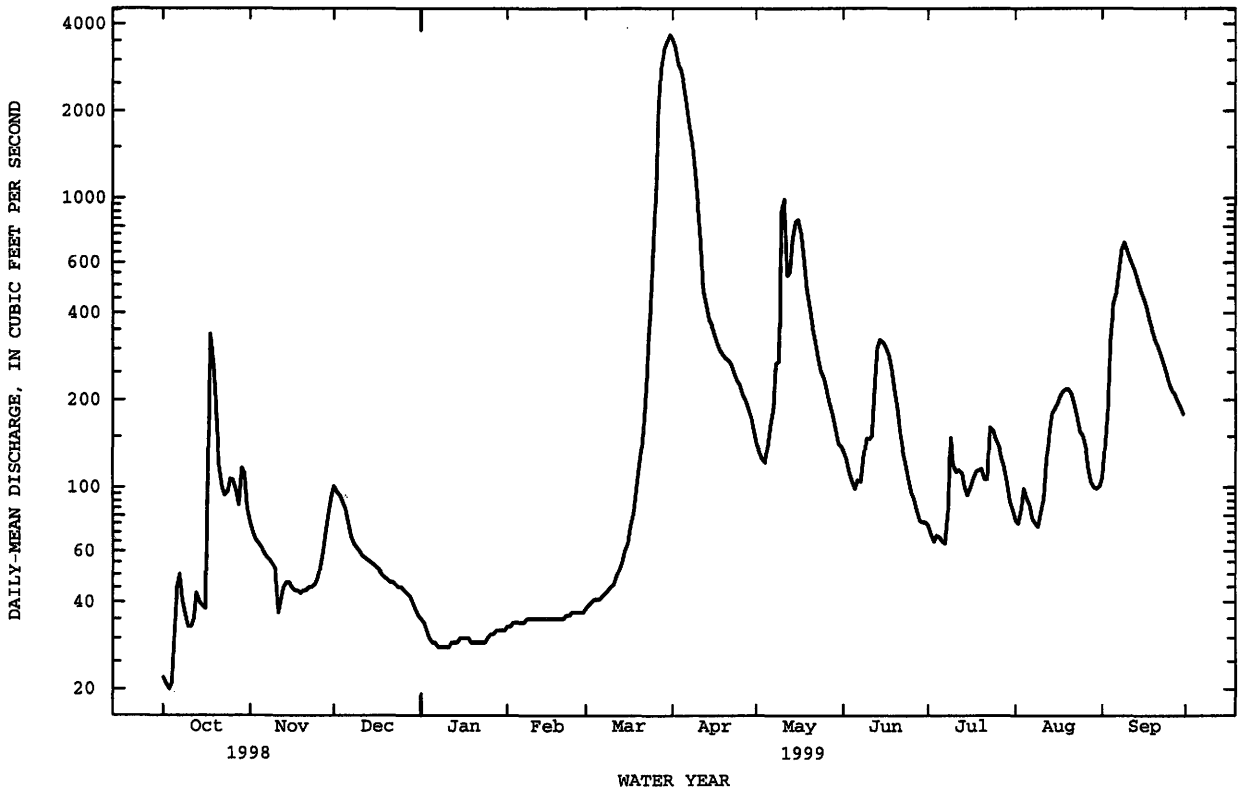
05069000 SAND HILL RIVER AT CLIMAX, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1943 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	36.9	29.8	19.1	13.9	16.6	95.9	385	134	100	82.0	40.2	33.2
MAX	223	209	58.0	32.0	183	610	1568	1156	596	478	426	374
(WY)	1972	1972	1999	1998	1998	1999	1997	1950	1984	1997	1993	1999
MIN	9.43	8.64	5.11	2.02	3.55	5.81	25.3	23.7	11.5	8.95	6.30	6.49
(WY)	1977	1956	1964	1962	1962	1948	1981	1958	1980	1980	1961	1955

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1943 - 1999	
ANNUAL TOTAL	61148		90798			
ANNUAL MEAN	168		249		82.4[a]	
HIGHEST ANNUAL MEAN					249	1999
LOWEST ANNUAL MEAN					18.4	1977
HIGHEST DAILY MEAN	1430	May 20	3680	Mar 31	4360	Apr 14 1965
LOWEST DAILY MEAN	20	Sep 20	20	Oct 3	1.0	Jan 17 1962
ANNUAL SEVEN-DAY MINIMUM	20	Sep 19	28	Jan 5	1.1	Jan 12 1962
INSTANTANEOUS PEAK FLOW			3720	Mar 31	4560[b]	Apr 14 1965
INSTANTANEOUS PEAK STAGE			21.24	Mar 31	39.40[c]	Apr 20 1997
ANNUAL RUNOFF (AC-FT)	121300		180100		59710	
ANNUAL RUNOFF (CFSM)	.40		.59		.20	
ANNUAL RUNOFF (INCHES)	5.42		8.04		2.67	
10 PERCENT EXCEEDS	380		483		167	
50 PERCENT EXCEEDS	64		96		24	
90 PERCENT EXCEEDS	30		33		9.0	

a Median of annual mean discharges is 64 ft^3/s.
b Gage height, 17.81 ft, site and datum then in use.
c Backwater from Red River of the North.



05073500 UPPER RED LAKE AT WASKISH, MN

LOCATION.--Lat 48°10'32", long 94°30'51", in SW¼NE¼NW¼ sec. 8, T.154 N., R. 30 W., Beltrami County, Hydrologic Unit 09020302, on east side of Upper Red Lake, near mouth of Tamarac River, on Minnesota Department of Natural Resources property, 500 feet west of State Highway 72 bridge on north edge of Waskish.

PERIOD OF RECORD.-- October 1921 to September 1933, May 1940 to July 1946, October 1995 to current year.

GAGE.-- Water-stage recorder. Datum of gage is 1,100 ft, above sea level adjustment of 1912. October 1921 to September 1929, non-recording gage at datum 1170.00 ft (no winter readings). April 1930 to September 1933, non-recording gage at datum 1100.00 ft (some winter readings). May 1940 to July 1946, non-recording gage at datum 1170.00 ft.

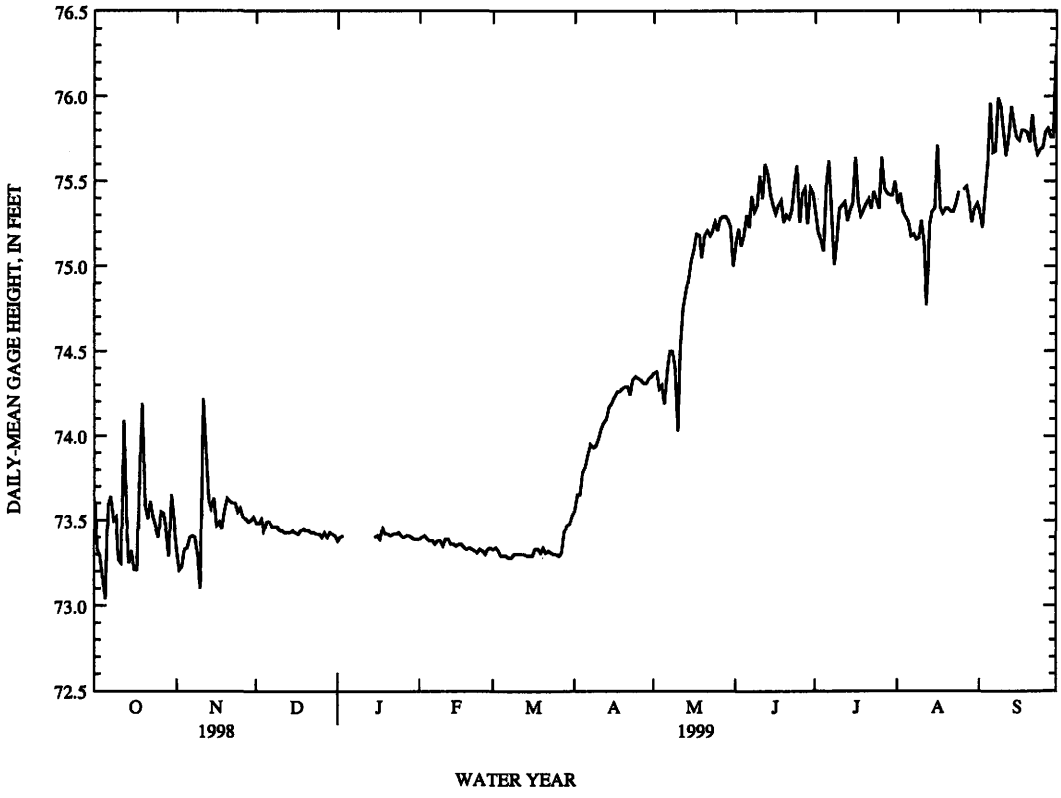
REMARKS.-- Water level subject to fluctuation caused by seiches, and the stage of the Tamarac River.

EXTREMES FOR PERIOD OF RECORD.-- Maximum gage height, 78.34 ft (present datum), June 28, 1943; minimum recorded, 72.10 ft, Oct. 17, 1932.

EXTREMES FOR CURRENT YEAR.-- Maximum gage height, 76.58 ft, Sept. 30; maximum daily, 76.24 ft, Sept. 30; minimum gage height, 72.66 ft, Nov. 10; minimum daily, 73.04 ft, Oct. 5.

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	73.61	73.32	73.48	73.38	73.39	73.33	73.56	74.37	75.14	75.32	75.37	75.32
2	73.33	73.21	73.48	73.40	73.40	73.34	73.65	74.38	75.22	75.20	75.43	75.23
3	73.29	73.23	73.51	73.41	73.41	73.32	73.65	74.28	75.12	75.16	75.32	75.42
4	73.16	73.33	73.44	---	73.39	73.29	73.79	74.30	75.18	75.09	75.29	75.61
5	73.04	73.34	73.49	---	73.38	73.29	73.82	74.19	75.30	75.47	75.26	75.96
6	73.59	73.40	73.49	---	73.38	73.29	73.89	74.38	75.23	75.62	75.18	75.67
7	73.64	73.41	73.46	---	73.36	73.28	73.95	74.50	75.41	75.31	75.19	75.68
8	73.50	73.40	73.46	---	73.38	73.28	73.93	74.50	75.32	75.01	75.16	75.99
9	73.52	73.29	73.46	---	73.38	73.30	73.94	74.41	75.36	75.16	75.17	75.94
10	73.27	73.10	73.44	---	73.35	73.30	73.98	74.03	75.53	75.34	75.27	75.79
11	73.25	74.22	73.44	---	73.39	73.30	74.04	74.50	75.40	75.36	75.13	75.65
12	74.09	73.92	73.43	---	73.39	73.30	74.08	74.75	75.60	75.38	74.77	75.77
13	73.52	73.62	73.43	---	73.36	73.30	74.10	74.84	75.54	75.27	75.25	75.94
14	73.25	73.57	73.43	---	73.36	73.29	74.17	74.93	75.42	75.33	75.32	75.84
15	73.32	73.63	73.44	73.40	73.35	73.29	74.19	75.03	75.36	75.37	75.34	75.76
16	73.21	73.47	73.43	73.41	73.36	73.29	74.23	75.10	75.31	75.64	75.71	75.74
17	73.21	73.49	73.42	73.39	73.36	73.33	74.26	75.19	75.36	75.38	75.34	75.80
18	73.78	73.45	73.44	73.45	73.34	73.33	74.26	75.18	75.39	75.30	75.31	75.80
19	74.19	73.56	73.45	73.42	73.33	73.31	74.28	75.05	75.26	75.33	75.34	75.79
20	73.59	73.63	73.44	73.42	73.34	73.34	74.29	75.18	75.30	75.37	75.34	75.73
21	73.51	73.61	73.44	73.41	73.33	73.31	74.29	75.21	75.28	75.40	75.32	75.89
22	73.61	73.60	73.43	73.42	73.32	73.32	74.24	75.18	75.33	75.34	75.32	75.73
23	73.52	73.60	73.43	73.42	73.31	73.31	74.33	75.20	75.48	75.44	75.37	75.66
24	73.46	73.55	73.42	73.43	73.33	73.30	74.35	75.26	75.59	75.39	75.44	75.69
25	73.40	73.57	73.42	73.41	73.32	73.30	74.34	75.21	75.26	75.34	---	75.70
26	73.55	73.52	73.40	73.40	73.30	73.29	74.33	75.28	75.43	75.64	75.45	75.79
27	73.54	73.51	73.43	73.41	73.33	73.31	74.31	75.29	75.46	75.46	75.47	75.81
28	73.44	73.49	73.40	73.41	73.34	73.43	74.31	75.29	75.25	75.43	75.38	75.76
29	73.29	73.50	73.43	73.40	---	73.47	74.34	75.27	75.46	75.42	75.26	75.76
30	73.65	73.52	73.42	73.39	---	73.48	74.35	75.23	75.43	75.42	75.34	76.24
31	73.50	---	73.41	73.39	---	73.53	---	75.00	---	75.50	75.37	---
MEAN	73.48	73.50	73.44	---	73.36	73.33	74.11	74.86	75.36	75.36	---	75.75
MAX	74.19	74.22	73.51	---	73.41	73.53	74.35	75.29	75.60	75.64	---	76.24
MIN	73.04	73.10	73.40	---	73.30	73.28	73.56	74.03	75.12	75.01	---	75.23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DAILY-MEAN GAGE HEIGHT, IN FEET
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WATER YEAR

05073650 LOWER RED LAKE AT BATTLE RIVER MOUTH NEAR SAUM, MN

LOCATION.-- Lat 47°57'35", long 94°44'31", in SE¼NW¼NW¼ sec. 28, T. 152 N., R. 32 W., Beltrami County, Hydrologic Unit 09020302, on east side of Lower Red Lake, 200 feet upstream of mouth of Battle River, 900 feet southwest of highway bridge, and 2.3 mi southwest of Saum.

PERIOD OF RECORD.--June 5, 1996 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,100.00 ft above sea level, adjustment of 1912.

REMARKS.--Water level subject to the stage of the Battle River and ice pile up at the river's mouth; and by fluctuations caused by lake seiches.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 76.05 ft, Sept. 30, 1999; minimum recorded, 73.29 ft, Oct. 4, 1998.

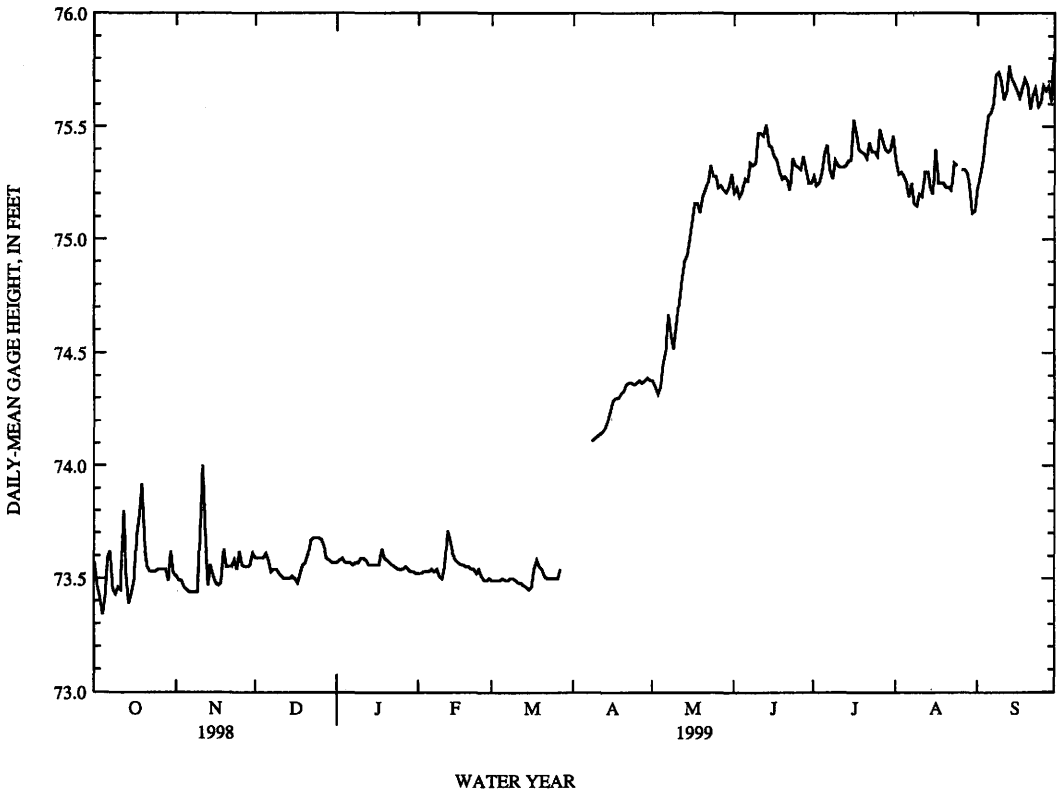
EXTREMES FOR CURRENT YEAR.--Maximum gage height, 76.05 ft, Sept. 30; maximum daily, 75.82 ft, Sept. 30; minimum gage height, 73.29 ft, Oct. 4; minimum daily, 73.34 ft, Oct. 4.

REVISIONS.--Prior to Oct. 1, 1997, daily-mean, -maximum, and -minimum gage heights revised upwards by 0.11 ft. Datum of gage had been established 0.11 ft too low.

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	73.57	73.51	73.59	73.57	73.52	73.49	---	74.38	75.21	75.28	75.35	75.23
2	73.47	73.49	73.59	73.58	73.52	73.49	---	74.35	75.23	75.24	75.29	75.29
3	73.42	73.49	73.59	73.59	73.53	73.49	---	74.32	75.19	75.25	75.30	75.35
4	73.34	73.46	73.59	73.57	73.53	73.49	---	74.35	75.21	75.30	75.28	75.47
5	73.42	73.45	73.61	73.57	73.53	73.50	---	74.45	75.27	75.38	75.25	75.55
6	73.59	73.44	73.58	73.57	73.54	73.49	---	74.51	75.26	75.42	75.19	75.56
7	73.62	73.44	73.53	73.56	73.53	73.49	---	74.67	75.34	75.31	75.25	75.60
8	73.45	73.44	73.54	73.57	73.54	73.50	74.11	74.58	75.33	75.27	75.16	75.73
9	73.43	73.44	73.54	73.57	73.51	73.50	74.12	74.52	75.34	75.35	75.15	75.74
10	73.46	73.67	73.52	73.59	73.50	73.49	74.13	74.63	75.47	75.33	75.20	75.70
11	73.45	74.00	73.51	73.59	73.55	73.48	74.14	74.71	75.47	75.32	75.19	75.62
12	73.80	73.69	73.50	73.58	73.71	73.48	74.15	74.82	75.46	75.32	75.30	75.66
13	73.52	73.47	73.50	73.56	73.67	73.47	74.17	74.90	75.51	75.33	75.30	75.77
14	73.39	73.56	73.50	73.56	73.61	73.46	74.20	74.93	75.42	75.35	75.24	75.71
15	73.43	73.51	73.51	73.56	73.58	73.45	74.24	74.99	75.41	75.35	75.20	75.69
16	73.49	73.48	73.50	73.56	73.57	73.46	74.29	75.08	75.37	75.53	75.40	75.66
17	73.69	73.47	73.48	73.56	73.56	73.54	74.30	75.16	75.35	75.47	75.25	75.63
18	73.78	73.48	73.52	73.63	73.56	73.58	74.30	75.16	75.30	75.40	75.25	75.67
19	73.92	73.63	73.56	73.59	73.55	73.55	74.32	75.12	75.27	75.39	75.25	75.71
20	73.64	73.55	73.57	73.58	73.55	73.54	74.33	75.19	75.28	75.38	75.23	75.68
21	73.55	73.55	73.61	73.57	73.54	73.51	74.36	75.22	75.26	75.36	75.23	75.58
22	73.53	73.55	73.67	73.56	73.54	73.50	74.37	75.26	75.22	75.43	75.22	75.64
23	73.53	73.58	73.68	73.55	73.52	73.50	74.37	75.33	75.36	75.39	75.34	75.67
24	73.53	73.54	73.68	73.54	73.54	73.50	74.36	75.28	75.33	75.39	75.33	75.59
25	73.54	73.62	73.68	73.54	73.51	73.50	74.37	75.28	75.32	75.37	---	75.61
26	73.54	73.56	73.67	73.54	73.49	73.50	74.38	75.23	75.31	75.49	75.31	75.68
27	73.54	73.55	73.64	73.55	73.49	73.54	74.37	75.24	75.37	75.44	75.31	75.66
28	73.54	73.55	73.59	73.54	73.50	---	74.38	75.22	75.31	75.40	75.29	75.68
29	73.49	73.56	73.58	73.53	---	---	74.39	75.21	75.25	75.39	75.23	75.61
30	73.62	73.61	73.57	73.53	---	---	74.38	75.23	75.25	75.40	75.12	75.82
31	73.52	---	73.57	73.52	---	---	---	75.29	---	75.46	75.13	---
MEAN	73.54	73.54	73.57	73.56	73.55	---	---	74.92	75.32	75.37	---	75.62
MAX	73.92	74.00	73.68	73.63	73.71	---	---	75.33	75.51	75.53	---	75.82
MIN	73.34	73.44	73.48	73.52	73.49	---	---	74.32	75.19	75.24	---	75.23

05073650 LOWER RED LAKE AT BATTLE RIVER MOUTH NEAR SAUM, MN--Continued



05075000 RED LAKE RIVER AT HIGH LANDING, NEAR GOODRIDGE, MN

LOCATION.--Lat 48°02'34", long 95°48'28", in NW¼NW¼ sec. 28, T.153 N., R.40 W., Pennington County, Hydrologic Unit 09020303, on left bank 50 ft upstream from County Highway 24 bridge at High Landing, 7 mi south of Goodridge and 33 mi upstream from Thief River.

DRAINAGE AREA.--2,300 mi^2 (approximately).

PERIOD OF RECORD.--September 1929 to current year. Prior to October 1930, published as "at Kratka".

GAGE.--Water-stage recorder. Datum of gage is 1,141.57 ft above sea level, adjustment of 1912 (levels by U.S. Army Corps of Engineers). See WSP 1308 or 1738 for history of changes prior to Oct. 1, 1949.

REMARKS.--Records fair except those for estimated daily discharges, which are poor. Flow regulated by outlet dam on Lower Red Lake.

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	837	754	e690	e680	e680	e700	2180	1190	1390	1070	e1190	1210
2	814	758	e680	e680	e680	e700	e1830	1170	1380	1060	e1180	1620
3	756	758	e680	e680	e680	e700	1460	1150	1360	1060	1170	1880
4	703	753	e680	e680	e690	e700	1420	1140	1360	1060	1150	2120
5	695	739	e680	e680	e690	e700	1940	1160	1300	1060	1140	2360
6	706	724	e520	e680	e690	e700	1950	1180	1010	1040	1130	2150
7	676	714	e500	e680	e690	e700	1830	1200	881	1030	1140	1840
8	654	709	e660	e680	e690	e710	1730	e1220	854	1070	1160	1480
9	639	706	e680	e680	e690	e710	1570	e1280	734	1120	1160	1200
10	625	717	e680	e680	e690	e710	1450	1800	e810	1140	1150	1000
11	631	670	e680	e680	e690	e710	1350	2280	1140	1140	1150	907
12	628	e555	e680	e680	e690	e710	1280	1860	1170	1140	1350	1110
13	610	e500	e680	e680	e690	e710	1390	1800	1230	1140	1590	1350
14	617	e535	e680	e680	e690	e710	1570	1470	1250	1150	1500	e1550
15	622	e695	e680	e680	e690	e710	1580	1170	1250	1150	1200	1600
16	625	e675	e670	e680	e690	e720	1540	1050	1230	1170	1050	1520
17	710	e630	e660	e680	e690	e720	1510	940	1210	1160	926	1310
18	821	e600	e650	e680	e690	e720	1560	1050	1190	1160	960	1050
19	797	e575	e630	e680	e690	e720	1560	1300	1170	1160	1070	835
20	756	e560	e600	e680	e690	e720	1540	1340	1170	1160	1150	728
21	745	e540	e620	e680	e690	e720	1510	1320	1150	1150	1190	813
22	739	e590	e650	e680	e690	e720	1470	1290	1140	1140	1210	958
23	731	e630	e670	e680	e690	e720	1420	1250	1170	1170	1320	1070
24	727	e670	e680	e680	e700	e650	1370	1210	1190	1150	1390	1130
25	741	e690	e680	e680	e700	e600	1330	1210	1170	1140	1320	1170
26	753	e690	e680	e680	e700	e590	1300	1280	1160	e1200	1090	1230
27	747	e690	e680	e680	e700	e580	1270	1310	1140	e1250	1030	1320
28	744	e690	e680	e680	e700	990	1250	1310	1120	e1250	1060	1340
29	750	e690	e680	e680	---	1540	1230	1300	1110	e1240	1090	1290
30	758	e690	e680	e680	---	1990	1200	1290	1100	e1220	1110	1200
31	754	---	e680	e680	---	2220	---	1350	---	e1200	1120	---
TOTAL	22111	19897	20440	21080	19340	25500	45590	40870	34539	35350	36446	40341
MEAN	713	663	659	680	691	823	1520	1318	1151	1140	1176	1345
MAX	837	758	690	680	700	2220	2180	2280	1390	1250	1590	2360
MIN	610	500	500	680	680	580	1200	940	734	1030	926	728
AC-FT	43860	39470	40540	41810	38360	50580	90430	81070	68510	70120	72290	80020
CFSM	.31	.29	.29	.30	.30	.36	.66	.57	.50	.50	.51	.58
IN.	.36	.32	.33	.34	.31	.41	.74	.66	.56	.57	.59	.65

e Estimated

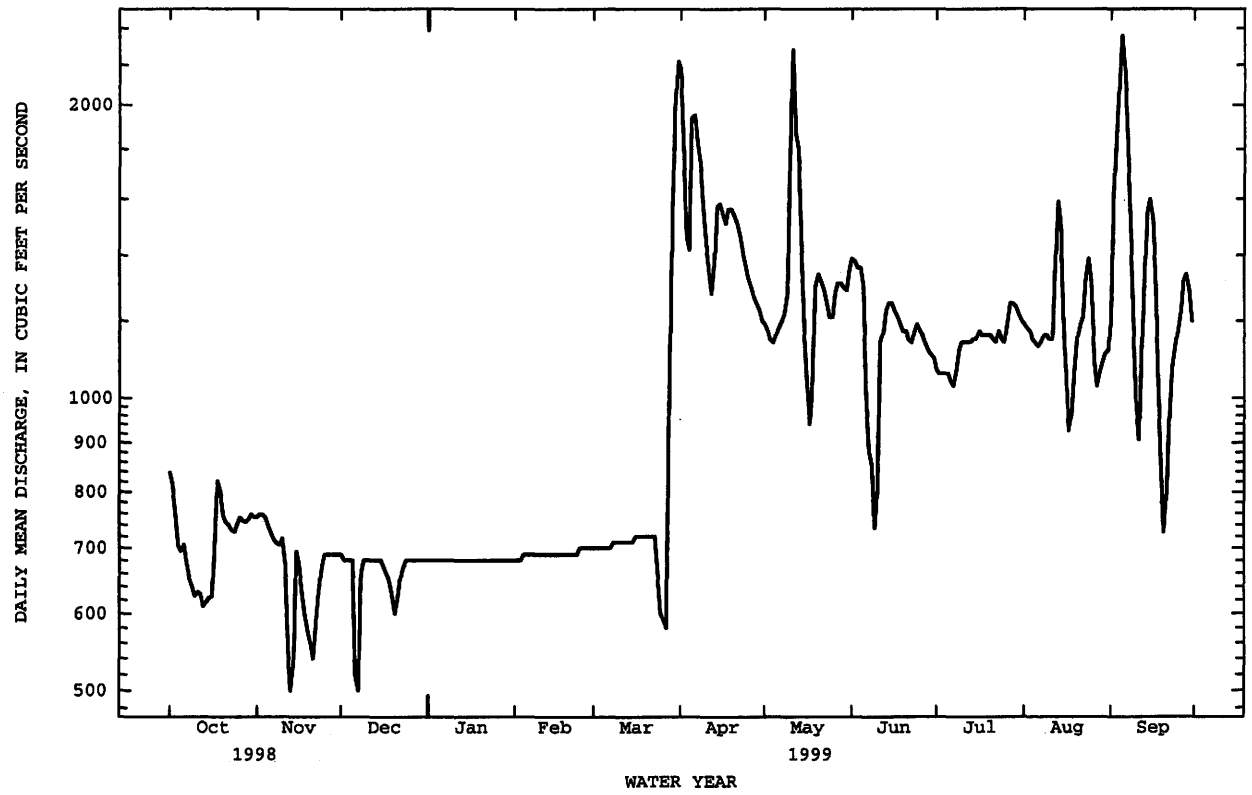
05075000 RED LAKE RIVER AT HIGH LANDING, NEAR GOODRIDGE, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1930 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	550	520	482	476	475	516	699	692	685	601	532	548
MAX	1955	1730	1539	1424	1366	1453	1980	3179	2161	2474	1478	1733
(WY)	1951	1951	1951	1951	1951	1951	1951	1950	1950	1975	1975	1950
MIN	2.11	1.61	.000	.000	.000	.000	24.7	5.58	1.04	5.92	.026	.000
(WY)	1934	1934	1934	1934	1934	1936	1933	1933	1936	1934	1934	1934

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1930 - 1999	
ANNUAL TOTAL	342974		361504			
ANNUAL MEAN	940		990		565	
HIGHEST ANNUAL MEAN					1407	1951
LOWEST ANNUAL MEAN					6.21	1934
HIGHEST DAILY MEAN	2480	May 17	2360	Sep 5	4040	Jul 7 1975
LOWEST DAILY MEAN	380	Jun 30	500a	Nov 13, Dec 7	.00b	Oct 11 1931
ANNUAL SEVEN-DAY MINIMUM	589	Nov 17	589	Nov 17	.00	Nov 16 1933
INSTANTANEOUS PEAK FLOW			2390	Sep 5	4060c	Jul 7 1975
INSTANTANEOUS PEAK STAGE			11.85	Sep 5	13.44	Jul 3 1975
ANNUAL RUNOFF (AC-FT)	680300		717000		409200	
ANNUAL RUNOFF (CFSM)	.41		.43		.25	
ANNUAL RUNOFF (INCHES)	5.55		5.85		3.34	
10 PERCENT EXCEEDS	1150		1460		1190	
50 PERCENT EXCEEDS	980		837		490	
90 PERCENT EXCEEDS	660		673		37	

a Estimated
b Many days, several years.
c Gage-height, 13.39 ft.



05076000 THIEF RIVER NEAR THIEF RIVER FALLS, MN

LOCATION.--Lat 48°11'08", long 96°10'11", in NW¼SW¼ sec. 3, T.154 N., R.43 W., Marshall County, Hydrologic Unit 09020304, on right bank, 0.2 mi upstream from highway bridge, 5 mi north of Thief River Falls, 7 mi upstream from mouth, and 9 mi downstream from Mud Lake National Wildlife Refuge.

DRAINAGE AREA.--985 mi^2.

PERIOD OF RECORD.--July 1909 to September 1917, April 1920 to September 1921, October 1922 to September 1924, October 1928 to September 1981, March 1982 to current year. Monthly discharge only for some periods, annual maximums for water years 1919, 1922, 1925, 1926, published in WSP 1308. October 1981 to February 1982, operated as a high-flow partial-record station.

REVISED RECORDS.--WSP 925: Drainage area. WSP 1308: 1917(M), 1924(M), 1929(M), 1931-33(M), 1935(M), 1937(M).

GAGE.--Water-stage recorder and control of grouted boulders. Datum of gage is 1,112.33 ft above sea level (levels by Minnesota Department of Transportation). Prior to May 4, 1939, nonrecording gages at same site and datum.

REMARKS.--Records good except those for estimated daily discharges, which are poor. Some regulation by Thief and Mud Lakes.

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	8.1	593	457	e20	e14	e7.6	e2800	1560	1750	746	278	329
2	8.6	577	499	e18	e15	e7.8	e3000	1500	1590	714	261	973
3	9.0	596	505	e16	e16	e8.1	e3000	1450	1470	629	162	1610
4	9.1	581	508	e15	e16	e8.4	e3100	1410	1570	629	130	2100
5	15	557	e520	e14	e16	e8.7	e3600	1520	1720	627	121	2390
6	24	460	e510	e13	e16	e9.0	e3900	1510	1580	616	116	2280
7	28	179	e490	e12	e16	e9.3	e3790	1520	1470	603	120	2170
8	53	176	e460	e11	e16	e9.4	3770	1640	1450	593	123	2240
9	58	293	e390	e10	e16	e9.7	3760	1590	1540	592	126	2320
10	60	295	e320	e9.2	e17	e10	3720	2190	1620	592	365	2300
11	58	402	e200	e8.5	e18	e10	3660	2830	1610	588	404	2230
12	65	e400	e60	e7.8	e19	e11	3560	2860	1540	582	417	2150
13	63	e400	e60	e7.4	e20	e11	3390	2950	1450	523	466	2040
14	63	e100	e60	e6.8	e20	e11	3230	2850	1370	400	463	2060
15	87	e50	157	e6.4	e19	e12	3020	2740	1320	439	443	2030
16	90	e80	161	e6.5	e17	e15	2830	2610	1290	417	597	1900
17	438	e380	160	e6.7	e15	e20	2650	2420	1260	487	659	1730
18	1000	e380	164	e7.0	e13	e30	2510	2230	1160	478	587	1610
19	953	e380	e160	e7.5	e11	e42	2370	2070	949	465	458	1510
20	1230	e390	e157	e8.0	e9.2	e52	2270	1900	930	387	355	1430
21	1130	e430	e135	e8.5	e8.2	e64	2190	1790	917	372	296	1350
22	1020	e430	e110	e9.0	e7.6	e90	2120	1700	831	370	254	1300
23	905	e420	e87	e9.5	e7.0	e98	2030	1640	834	368	718	1200
24	591	e410	e73	e10	e6.8	e102	1940	1590	845	367	902	991
25	545	e390	e59	e10	e6.8	e104	1880	1540	869	373	722	1150
26	557	295	e47	e11	e6.9	e110	1820	1490	886	404	548	1160
27	619	211	e41	e12	e7.1	e160	1750	1440	878	442	435	1170
28	609	201	e33	e12	e7.3	e250	1680	1420	841	346	363	1020
29	597	198	e28	e13	---	e500	1610	1420	753	349	303	964
30	605	221	e25	e13	---	e1250	1550	1420	756	326	251	866
31	607	---	e22	e14	---	e2050	---	1890	---	301	214	---
TOTAL	12104.8	10475	6658	332.8	376.9	5080.0	82500	58690	37049	15125	11657	48573
MEAN	390	349	215	10.7	13.5	164	2750	1893	1235	488	376	1619
MAX	1230	596	520	20	20	2050	3900	2950	1750	746	902	2390
MIN	8.1	50	22	6.4	6.8	7.6	1550	1410	753	301	116	329
AC-FT	24010	20780	13210	660	748	10080	163600	116400	73490	30000	23120	96340
CFSM	.40	.35	.22	.01	.01	.17	2.79	1.92	1.25	.50	.38	1.64
IN.	.46	.40	.25	.01	.01	.19	3.12	2.22	1.40	.57	.44	1.83

e Estimated

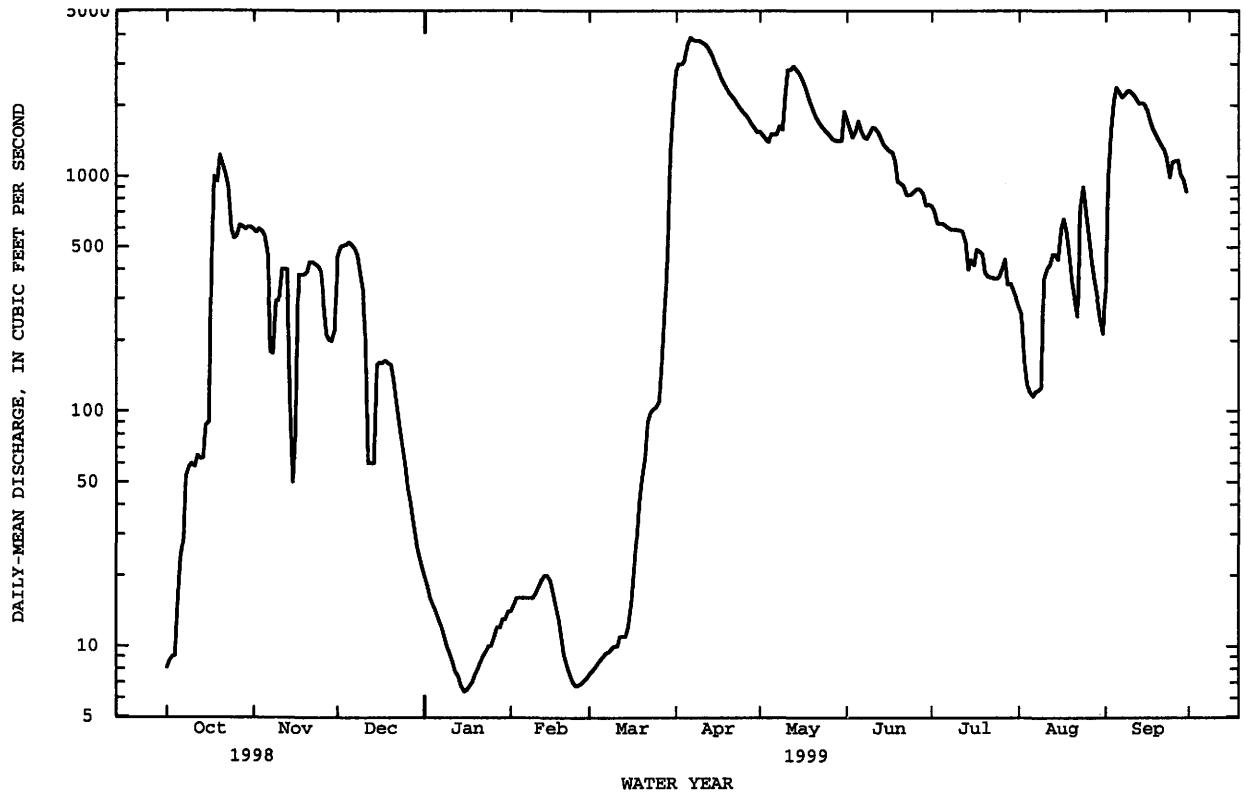
05076000 THIEF RIVER NEAR THIEF RIVER FALLS, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	91.1	71.4	23.2	5.69	4.72	77.8	618	510	313	233	103	115
MAX	637	844	215	100	101	773	2827	4274	1774	2103	1012	1619
(WY)	1986	1972	1999	1910	1998	1995	1966	1950	1962	1975	1993	1999
MIN	.000	.000	.000	.000	.000	.000	7.75	1.83	.032	.000	.000	.000
(WY)	1911	1911	1911	1911	1911	1930	1981	1990	1980	1932	1932	1929

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1909 - 1999	
ANNUAL TOTAL	118016.01		288621.5			
ANNUAL MEAN	323		791		180[a]	
HIGHEST ANNUAL MEAN					791	1999
LOWEST ANNUAL MEAN					1.28	1939
HIGHEST DAILY MEAN	1760	May 17	3900[b]	Apr 6	5580	May 13 1950
LOWEST DAILY MEAN	.88	Jan 22	6.4[b]	Jan 15	.00[c]	Oct 1 1910
ANNUAL SEVEN-DAY MINIMUM	.89	Jan 19	6.9	Jan 13	.00	Oct 1 1910
INSTANTANEOUS PEAK FLOW					5610	May 13 1950
INSTANTANEOUS PEAK STAGE			16.53[d]	Apr 5	17.38	May 13 1950
ANNUAL RUNOFF (AC-FT)	234100		572500		130500	
ANNUAL RUNOFF (CFSM)	.33		.80		.18	
ANNUAL RUNOFF (INCHES)	4.46		10.90		2.48	
10 PERCENT EXCEEDS	969		2180		570	
50 PERCENT EXCEEDS	130		430		9.0	
90 PERCENT EXCEEDS	1.1		9.9		.00	

a Median of annual mean discharges is 120 ft^3/s.
b Estimated.
c Many days, several years.
d Backwater from ice.



05078000 CLEARWATER RIVER AT PLUMMER, MN

LOCATION.--Lat 47°55'24", long 96°02'46", in SE¼SW¼ sec. 4, T.151 N., R.42 W., Red Lake County, Hydrologic Unit 09020305, on right bank 200 ft downstream from Soo Line Railroad bridge, 300 ft downstream from bridge on U.S. Highway 59, 0.9 mi northwest of railroad depot in Plummer, and 8 mi upstream from Hill River.

DRAINAGE AREA.--555 mi^2.

PERIOD OF RECORD.--April 1939 to September 1979, March 1982 to current year. Annual maximums only, October 1979 to February 1982.

GAGE.--Water-stage recorder. Datum of gage is 1,098.57 ft above sea level (levels by U.S. Army Corps of Engineers). Prior to Nov. 10, 1939, nonrecording gage at site 100 ft upstream at same datum.

REMARKS.--Records good except those for estimated daily discharges, which are poor. Since 1968, undetermined amounts of water diverted for the flooding of wild rice paddies upstream.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 630 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Apr 1	0930	*2,380	10.57	May 13	1700	1,960	9.34
Apr 6	0330	2,060	9.52	Sep 6	0300	2,090	9.57

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	36	49	e100	e70	e72	e79	2300	150	251	172	240	190
2	36	55	e104	e69	e72	e80	1920	149	218	165	201	543
3	35	51	e106	e69	e72	e81	1490	140	195	159	194	682
4	34	48	e106	e68	e72	e82	1350	132	185	154	207	978
5	54	50	e107	e68	e72	e83	1750	149	189	266	190	1650
6	50	57	e105	e68	e72	e84	1990	149	290	307	160	1990
7	33	47	e103	e68	e72	e85	1800	182	422	346	155	1580
8	44	47	e103	e68	e72	e87	1680	302	438	305	167	1220
9	43	51	e103	e68	e72	e88	1550	357	425	328	149	979
10	35	63	e100	e68	e73	e90	1410	601	555	484	159	781
11	40	45	e98	e68	e73	e91	1260	1050	614	588	161	628
12	42	e45	e96	e68	e73	e93	1120	1590	597	611	182	584
13	44	e48	e95	e68	e73	e95	986	1890	579	550	348	606
14	36	e51	e93	e68	e73	e98	859	1850	515	470	407	654
15	29	e50	e91	e69	e73	e101	763	1660	437	415	330	687
16	67	e49	e91	e69	e73	e105	640	1510	377	399	279	647
17	99	e47	e91	e69	e73	e110	585	1360	329	439	261	571
18	171	e46	e91	e70	e73	e117	581	1210	288	410	242	506
19	158	e45	e90	e71	e73	e127	534	1050	250	338	231	455
20	121	e44	e89	e71	e73	e140	450	931	227	306	207	417
21	88	e46	e87	e72	e73	e160	385	821	198	294	196	378
22	70	e49	e85	e72	e73	e175	339	714	169	270	189	348
23	71	e54	e84	e72	e74	e205	310	613	163	279	259	318
24	69	e59	e82	e72	e75	e250	300	536	175	275	391	291
25	70	e65	e81	e72	e76	e330	298	471	166	261	316	267
26	73	e70	e78	e72	e76	e450	290	409	161	280	259	258
27	69	e75	e77	e73	e77	e750	237	366	161	382	224	290
28	57	e82	e75	e73	e78	e1100	188	321	156	407	199	310
29	49	e88	e73	e73	---	e1750	165	271	149	375	183	289
30	47	e94	e72	e73	---	e1950	142	232	155	303	171	276
31	46	---	e71	e72	---	e2000	---	235	---	265	162	---
TOTAL	1916	1670	2827	2171	2053	11036	27672	21401	9034	10603	7019	19373
MEAN	61.8	55.7	91.2	70.0	73.3	356	922	690	301	342	226	646
MAX	171	94	107	73	78	2000	2300	1890	614	611	407	1990
MIN	29	44	71	68	72	79	142	132	149	154	149	190
AC-FT	3800	3310	5610	4310	4070	21890	54890	42450	17920	21030	13920	38430
CFSM	.11	.10	.16	.13	.13	.64	1.66	1.24	.54	.62	.41	1.16
IN.	.13	.11	.19	.15	.14	.74	1.85	1.43	.61	.71	.47	1.30

e Estimated

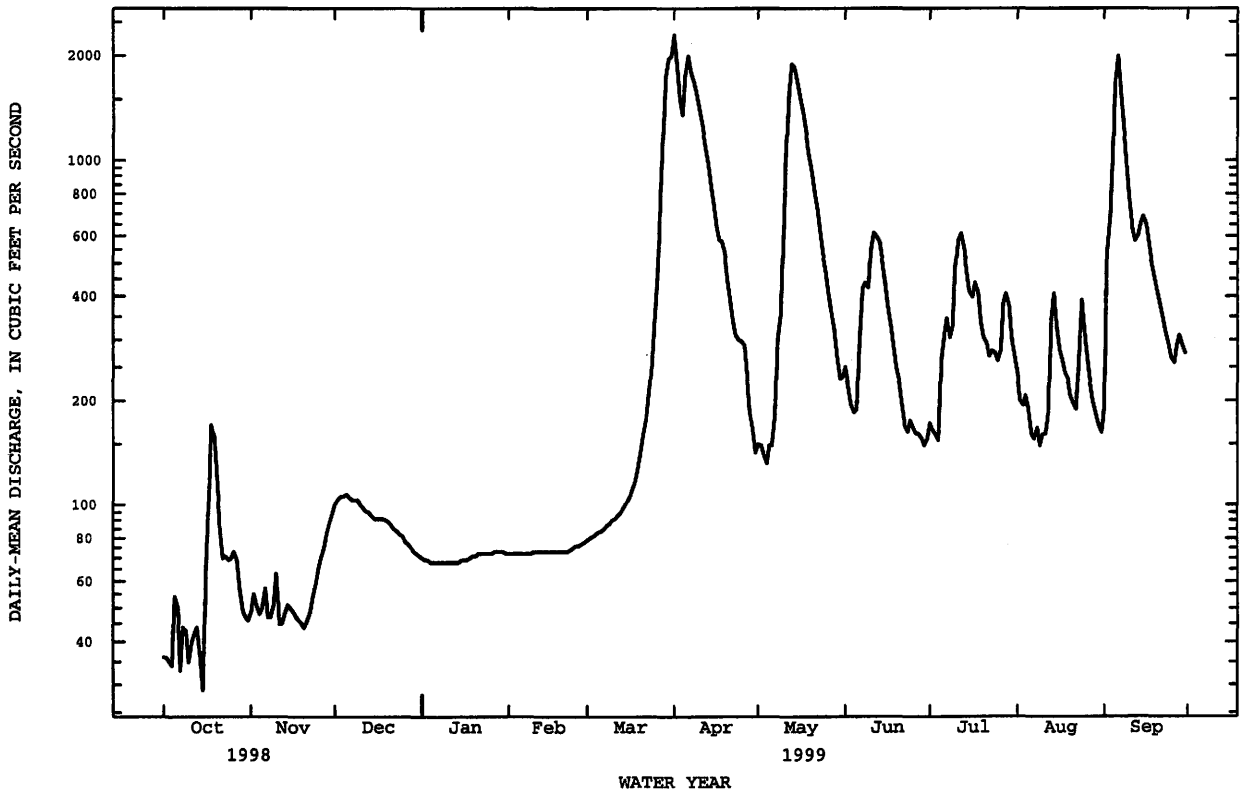
05078000 CLEARWATER RIVER AT PLUMMER, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1939 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	115	91.6	65.2	52.8	51.1	121	542	365	253	226	124	114
MAX	483	503	140	90.1	184	445	1472	1974	1140	1072	507	666
(WY)	1972	1972	1978	1952	1998	1995	1997	1950	1962	1997	1985	1973
MIN	21.5	23.8	24.4	18.4	19.0	22.8	26.8	7.52	30.1	16.0	13.3	14.1
(WY)	1941	1991	1990	1940	1940	1940	1977	1977	1991	1940	1940	1940

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1939 - 1999	
ANNUAL TOTAL	63930		116775			
ANNUAL MEAN	175		320		178[a]	
HIGHEST ANNUAL MEAN					354	1950
LOWEST ANNUAL MEAN					57.0	1990
HIGHEST DAILY MEAN	2860	May 17	2300	Apr 1	3840	Apr 25 1979
LOWEST DAILY MEAN	29	Oct 15	29	Oct 15	2.6	May 16 1977
ANNUAL SEVEN-DAY MINIMUM	37	Sep 7	38	Oct 9	2.9	May 10 1977
INSTANTANEOUS PEAK FLOW			2380	Apr 1	3940[b]	Apr 25 1979
INSTANTANEOUS PEAK STAGE			11.59[c]	Mar 30	12.74[c]	Apr 16 1997
INSTANTANEOUS LOW FLOW			26	Oct 15	2.5	May 16 1977
ANNUAL RUNOFF (AC-FT)	126800		231600		128700	
ANNUAL RUNOFF (CFSM)	.32		.58		.32	
ANNUAL RUNOFF (INCHES)	4.29		7.83		4.35	
10 PERCENT EXCEEDS	338		770		415	
50 PERCENT EXCEEDS	88		158		77	
90 PERCENT EXCEEDS	42		53		33	

a Median of annual mean discharges is 176 ft^3/s.
b Gage-height, 12.31 ft.
c Backwater from ice



05078230 LOST RIVER AT OKLEE, MN

LOCATION.--Lat 47°50'35", long 95°51'30", in SE¼NE¼ sec. 2, T.150 N., R.41 W., Red Lake County, Hydrologic Unit 09020305, on downstream side of bridge on State Highway 222 at northwest edge of Oklee, 12 mi upstream from mouth.

DRAINAGE AREA.--254 mi^2.

PERIOD OF RECORD.--April 1960 to September 1981, February 1982 to current year. Monthly and daily figures for April 1960 to June 1960, published in WSP 2113.

GAGE.--Water-stage recorder. Datum of gage is 1,126.94 ft above sea level, adjustment of 1912 (levels by U.S. Army Corps of Engineers). Prior to Sept. 9, 1960, reference points at same site at datum 8.00 ft higher. Sept. 9, 1960 to Sept. 30, 1964, nonrecording gage at same site at datum 8.00 ft higher. Oct. 1, 1964 to Sept. 30, 1981, and Feb. 24, 1982 to Sept. 6, 1989, nonrecording gage at same site and datum.

REMARKS.--Records good except those for estimated daily discharges, which are poor.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage known since at least 1897, 18.39 ft, present datum, Apr. 21, 1950, from floodmarks, discharge, 2,790 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	.86	20	e38	e9.8	e10	e11	e910	83	107	46	67	80
2	1.0	22	e38	e9.7	e10	e11	821	79	100	42	69	160
3	1.4	20	e38	e9.7	e10	e12	713	75	79	35	72	342
4	2.0	19	e37	e9.6	e10	e12	830	72	75	39	67	747
5	3.8	19	e36	e9.6	e10	e12	1390	68	103	119	58	1310
6	8.4	16	e32	e9.5	e10	e12	1020	70	200	142	51	993
7	8.7	e16	e28	e9.5	e10	e12	765	123	220	140	49	611
8	6.5	e15	e24	e9.5	e10	e12	612	190	168	110	48	373
9	5.1	e15	e21	e9.5	e10	e13	498	155	187	190	43	265
10	4.8	e14	e19	e9.4	e10	e13	409	517	290	304	37	217
11	4.4	e12	e18	e9.4	e10	e13	355	1160	198	270	35	196
12	8.5	e11	e18	e9.4	e10	e13	319	1090	142	179	46	256
13	12	e11	e18	e9.4	e10	e13	290	1440	111	133	97	268
14	12	e12	e18	e9.5	e10	e14	266	1110	95	112	137	304
15	12	e13	e17	e9.5	e10	e15	239	714	86	105	139	275
16	12	e12	e17	e9.6	e10	e25	217	503	80	170	110	225
17	38	e12	e16	e9.7	e10	e45	209	379	75	257	91	185
18	111	e11	e15	e9.8	e10	e80	206	297	70	180	80	157
19	90	e11	e14	e9.9	e10	e140	199	246	62	134	73	137
20	72	e10	e13	e10	e10	e240	187	214	55	109	68	121
21	61	e10	e12	e10	e10	e270	182	187	47	98	64	111
22	48	e12	e12	e10	e10	e290	169	170	41	94	60	105
23	36	e14	e11	e10	e10	e320	151	160	47	83	112	99
24	25	e17	e11	e10	e11	e360	136	145	58	80	155	94
25	25	e20	e11	e10	e11	e400	125	133	52	78	116	90
26	25	e24	e10	e10	e11	e450	114	124	45	106	103	97
27	25	e28	e10	e10	e11	e580	106	117	43	119	91	123
28	22	e33	e10	e10	e11	e880	99	110	42	101	80	129
29	20	e35	e9.9	e10	---	e1300	92	103	39	88	75	114
30	21	e36	e9.9	e10	---	e1430	86	99	42	78	72	103
31	21	---	e9.8	e10	---	e1190	---	109	---	70	69	---
TOTAL	743.46	520	591.6	302.0	285	8188	11715	10042	2959	3811	2434	8287
MEAN	24.0	17.3	19.1	9.74	10.2	264	390	324	98.6	123	78.5	276
MAX	111	36	38	10	11	1430	1390	1440	290	304	155	1310
MIN	.86	10	9.8	9.4	10	11	86	68	39	35	35	80
AC-FT	1470	1030	1170	599	565	16240	23240	19920	5870	7560	4830	16440
CFSM	.09	.07	.08	.04	.04	1.04	1.54	1.28	.39	.48	.31	1.09
IN.	.11	.08	.09	.04	.04	1.20	1.72	1.47	.43	.56	.36	1.21

e Estimated

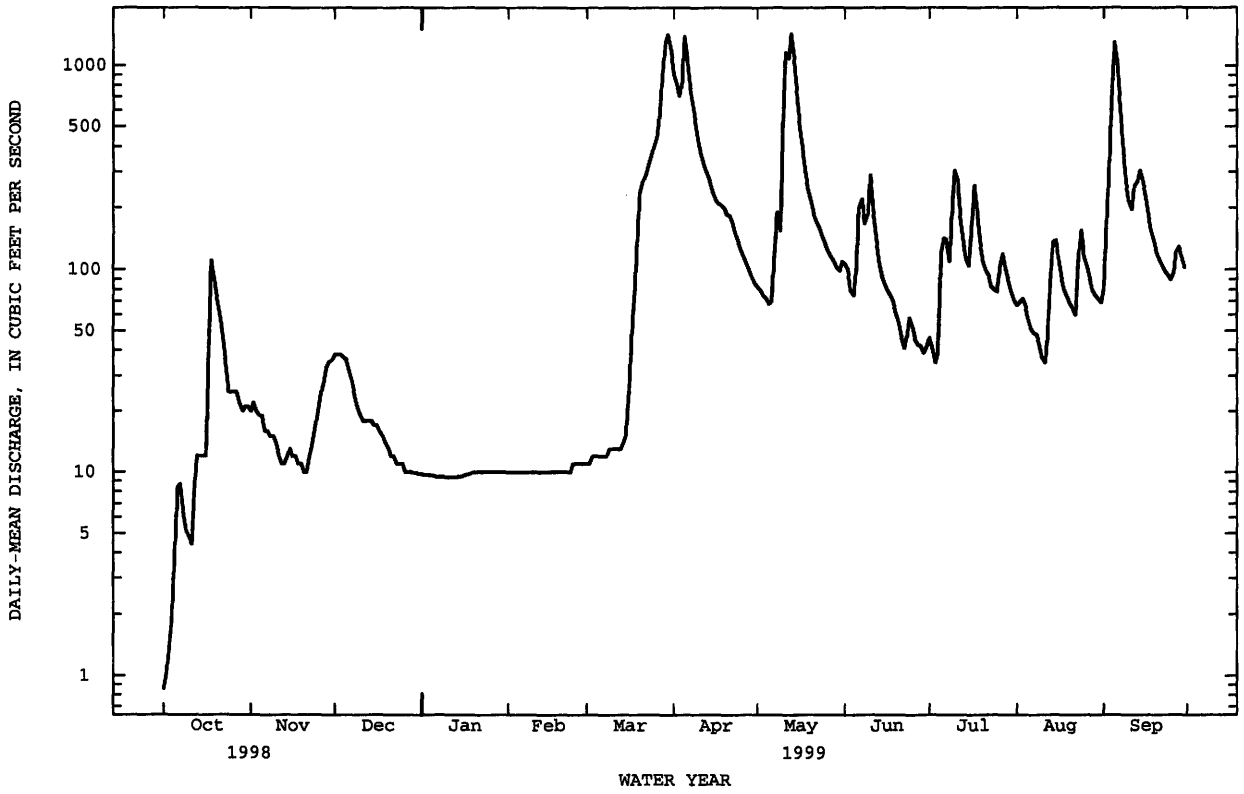
05078230 LOST RIVER AT OKLEE, MN--Continued

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

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	47.8	31.3	15.0	9.44	10.2	79.0	309	142	89.9	85.8	40.3	43.0
MAX	470	232	56.6	26.7	76.3	264	904	622	657	442	351	330
(WY)	1972	1972	1978	1998	1998	1999	1996	1962	1962	1962	1985	1973
MIN	1.02	1.11	.050	.002	.000	.19	29.5	10.5	8.20	1.99	1.17	.000
(WY)	1991	1977	1977	1977	1977	1964	1991	1980	1980	1961	1961	1990

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1960 - 1999	
ANNUAL TOTAL	25954.50		49878.06			
ANNUAL MEAN	71.1		137		75.2	
HIGHEST ANNUAL MEAN					177	1962
LOWEST ANNUAL MEAN					18.2	1990
HIGHEST DAILY MEAN	1740	May 17	1440	May 13	3040	Apr 11 1969
LOWEST DAILY MEAN	.02	Sep 23	.86	Oct 1	.00[a]	Feb 16 1963
ANNUAL SEVEN-DAY MINIMUM	.12	Sep 18	3.7	Oct 1	.00	Feb 16 1963
INSTANTANEOUS PEAK FLOW			1510[b]	Apr 5	3210[c]	Apr 11 1969
INSTANTANEOUS PEAK STAGE			14.13[d]	Mar 29	16.91[d]	Apr 8 1997
ANNUAL RUNOFF (AC-FT)	51480		98930		54510	
ANNUAL RUNOFF (CFSM)	.28		.54		.30	
ANNUAL RUNOFF (INCHES)	3.80		7.30		4.02	
10 PERCENT EXCEEDS	114		304		177	
50 PERCENT EXCEEDS	27		51		19	
90 PERCENT EXCEEDS	8.5		10		2.6	

a Many days, several years.
b Gage-height, 12.56 ft.
c Gage-height, 14.91 ft.; from floodmark.
d Backwater from ice.



05078500 CLEARWATER RIVER AT RED LAKE FALLS, MN

LOCATION.--Lat 47°53'15", long 96°16'25", in NW¼NE¼ sec. 22, T.151 N., R.44 W., Red Lake County, Hydrologic Unit 09020305, on left bank 40 ft downstream from Great Northern Railroad bridge in Red Lake Falls, 1.4 mi upstream from mouth, and 3 mi downstream from Badger Creek.

DRAINAGE AREA.--1,380 mi^2.

PERIOD OF RECORD.--June 1909 to September 1917, October 1934 to September 1981, March 1982 to current year. Monthly discharge only for October, November, 1934, published in WSP 1308. October 1981 to February 1982, operated as a high-flow partial-record station.

REVISED RECORDS.--WSP 355: 1911-12. WSP 1438: 1910-11, 1917(M). WDR MN-84-1:1983.

GAGE.--Water-stage recorder. Datum of gage is 948.94 ft above sea level (levels by U.S. Army Corps of Engineers). Prior to Sept. 12, 1911, nonrecording gage at site 0.5 mi upstream, and Sept. 12, 1911 to Sept. 30, 1917, nonrecording gage at site 40 ft upstream at different datum.

REMARKS.--Records good except those for estimated daily discharges, which are poor.

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	46	155	e220	e140	e128	e143	5270	461	594	316	456	391
2	43	155	e235	e135	e128	e145	4740	445	559	326	408	1050
3	42	155	e245	e132	e128	e148	3730	429	501	318	368	1860
4	47	150	e255	e130	e128	e150	3600	415	454	298	375	3040
5	58	141	e260	e126	e128	e151	4570	424	437	333	364	4810
6	84	140	e265	e124	e128	e153	4760	444	540	494	323	4740
7	86	146	e270	e122	e129	e156	4170	511	824	574	304	3840
8	78	131	e272	e121	e129	e159	3610	783	928	598	307	2820
9	87	130	e273	e120	e129	e162	3180	940	1010	e600	302	2230
10	90	144	e273	e120	e130	e164	2800	1450	1400	e760	292	1870
11	85	109	e270	e120	e130	e168	2470	2740	1550	e960	353	1610
12	82	76	e270	e120	e130	e171	2210	3430	1330	e1060	476	1570
13	86	e109	e265	e120	e130	e180	1990	4500	1150	1000	690	1640
14	88	e126	e260	e121	e130	e185	1830	4530	1030	920	805	1730
15	91	e134	252	e121	e130	e195	1670	3840	924	827	795	1710
16	87	e126	265	e121	e130	e205	1490	3160	790	747	772	1540
17	237	e119	258	e122	e130	e220	1350	2700	680	816	705	1350
18	502	e105	250	e122	e130	e240	1320	2320	583	874	653	1170
19	487	94	249	e123	e130	e280	1250	1990	507	724	643	1040
20	387	e107	e245	e124	e130	e320	1160	1740	448	628	582	952
21	317	e93	e230	e124	e130	e370	1050	1550	410	622	513	878
22	269	e100	e215	e125	e131	e440	977	1390	368	619	471	804
23	236	e110	e205	e126	e134	e530	901	1230	351	623	728	734
24	215	e120	e195	e126	e136	e670	830	1100	335	608	852	672
25	204	e130	e185	e126	e137	e950	786	989	331	541	763	620
26	196	e140	e175	e126	e138	e1500	751	897	331	505	605	608
27	196	e155	e170	e127	e140	e2500	692	811	318	614	521	642
28	187	e170	e160	e127	e141	3640	601	743	319	697	458	707
29	173	e190	e155	e128	---	4650	546	664	314	657	427	697
30	163	e205	e150	e128	---	4970	491	594	307	581	409	643
31	161	---	e145	e128	---	5680	---	572	---	498	387	---
TOTAL	5110	3965	7137	3875	3672	29595	64795	47792	19623	19738	16107	47968
MEAN	165	132	230	125	131	955	2160	1542	654	637	520	1599
MAX	502	205	273	140	141	5680	5270	4530	1550	1060	852	4810
MIN	42	76	145	120	128	143	491	415	307	298	292	391
AC-FT	10140	7860	14160	7690	7280	58700	128500	94800	38920	39150	31950	95140
CFSM	.12	.10	.17	.09	.10	.69	1.57	1.12	.47	.46	.38	1.16
IN.	.14	.11	.19	.10	.10	.80	1.75	1.29	.53	.53	.43	1.29

e Estimated

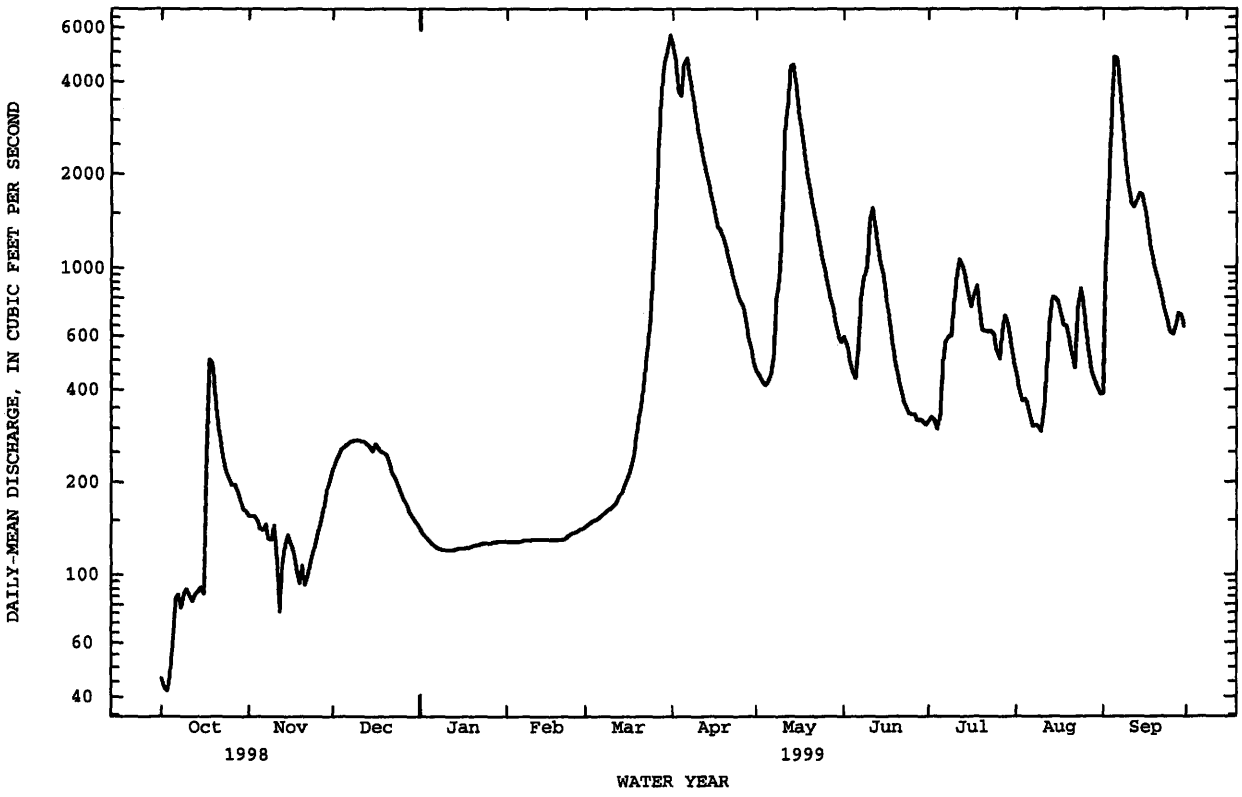
05078500 CLEARWATER RIVER AT RED LAKE FALLS, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	189	141	92.8	74.0	71.1	251	1184	704	488	404	209	196
MAX	1350	1233	260	221	385	1136	3507	5059	3042	2389	1686	1599
(WY)	1972	1972	1910	1998	1998	1995	1997	1950	1962	1997	1985	1999
MIN	10.0	19.0	21.4	21.4	19.1	13.6	61.0	32.2	26.5	8.34	1.49	2.92
(WY)	1935	1935	1937	1940	1937	1937	1981	1977	1980	1936	1936	1936

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1909 - 1999	
ANNUAL TOTAL	151839		269377			
ANNUAL MEAN	416		738		331[a]	
HIGHEST ANNUAL MEAN					855	1950
LOWEST ANNUAL MEAN					64.4	1939
HIGHEST DAILY MEAN	5840	May 17	5680	Mar 31	9930	Apr 25 1979
LOWEST DAILY MEAN	41	Sep 28	42	Oct 3	.10	Sep 15 1936
ANNUAL SEVEN-DAY MINIMUM	45	Sep 27	58	Oct 1	.24	Sep 12 1936
INSTANTANEOUS PEAK FLOW			6020	Mar 31	10300[b]	Apr 25 1979
INSTANTANEOUS PEAK STAGE			9.75	Mar 31	15.85[c]	Mar 6 1983
INSTANTANEOUS LOW FLOW			30[d]	Nov 12	.00[e]	Sep 15 1936
ANNUAL RUNOFF (AC-FT)	301200		534300		239800	
ANNUAL RUNOFF (CFSM)	.30		.53		.24	
ANNUAL RUNOFF (INCHES)	4.09		7.26		3.26	
10 PERCENT EXCEEDS	852		1780		807	
50 PERCENT EXCEEDS	225		331		114	
90 PERCENT EXCEEDS	84		122		38	

a Median of annual mean discharges is 286 ft^3/s.
b Gage-height, 12.38 ft.
c From highwater mark, backwater from ice.
d Result of freezeup.
e Also occurred Sep. 14, 1939, and Aug. 19-22, 1940.



05079000 RED LAKE RIVER AT CROOKSTON, MN

LOCATION.--Lat 47°46'32", long 96°36'33", in SW¼SW¼ sec. 30, T.150 N., R.46 W., Polk County, Hydrologic Unit 09020303, on right bank 100 ft upstream from Sargent Street bridge in Crookston, 0.3 mi downstream from Interstate Power Co.'s dam, 0.6 mi downstream from bridge on U.S. Highway 75, and 53 mi upstream from mouth.

DRAINAGE AREA.--5,270 mi^2.

PERIOD OF RECORD.--May 1901 to current year. Monthly discharge only for some periods, published in WSP 1308. Figures of daily discharge for Apr. 3-30, 1904, published in WSP 130, have been found unreliable and should not be used.

REVISED RECORDS.--WSP 1115: 1906, 1915-16, 1919-20, 1922, 1925, 1927, 1929. WSP 1308: 1916(M), 1919(M), 1928(M), 1930(M). (See also PERIOD OF RECORD).

GAGE.--Water-stage recorder. Datum of gage is 832.72 ft above sea level. May 18, 1901 to June 30, 1909, nonrecording gage at bridge 300 ft upstream at same datum. July 1, 1909 to Sept. 25, 1911, nonrecording gage, Sept. 26, 1911 to Sept. 30, 1919, water-stage recorder, Oct. 1, 1919 to Sept. 30, 1930, nonrecording gage, at present site and datum.

REMARKS.--Records good except those for estimated daily discharges, which are poor. Diurnal fluctuation prior to 1975 caused by power plant 1,000 ft upstream. Runoff from 1,950 mi^2 in the headwaters of Red Lake River is completely controlled by dam at outlet of Lower Red Lake. Flow partially affected by occasional regulation at Thief and Mud Lakes in Thief River basin (see station 05076000).

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	904	1600	1350	e740	e700	e640	14600	3460	4390	2310	e1800	1770
2	858	1580	1460	e740	e700	e640	13800	3350	4280	2310	e1750	2510
3	876	1550	1600	e740	e700	e640	12800	3240	3900	2240	1690	4480
4	849	1540	1630	e740	e680	e640	10700	3210	3720	2120	1610	8590
5	898	1530	1580	e740	e680	e640	11700	3140	4000	2090	1570	11200
6	909	1490	1650	e740	e680	e640	12800	3270	4090	2150	1520	12600
7	916	1410	e1500	e740	e680	e640	13400	3380	3830	2280	1480	11400
8	843	1160	e1400	e740	e680	e640	12600	3570	3590	2370	1440	9410
9	820	1030	e1300	e740	e680	e640	11200	4190	3540	2500	1480	7780
10	827	1160	e1150	e740	e680	e640	10100	4810	3710	2570	1460	6720
11	817	1180	e1100	e720	e680	e660	9190	8560	4360	2780	1720	5910
12	844	854	e1100	e720	e680	e660	8470	10600	4480	2910	2050	5420
13	814	727	e1050	e720	e680	e660	7840	11200	4170	2940	2840	5280
14	796	1000	e1050	e720	e680	e660	7510	11900	3950	2810	3220	5520
15	798	1100	e1000	e740	e680	e660	7370	10500	3820	2470	3110	5940
16	820	e1000	e1000	e720	e680	e700	7010	8820	3650	2470	2880	5950
17	1040	e800	e980	e720	e680	e750	6470	7620	3440	2350	3150	5560
18	2280	e640	e950	e720	e680	e800	6100	6700	3300	2540	2910	5000
19	3370	e600	e940	e720	e660	e860	5910	5930	3110	2510	2550	4490
20	2760	e600	e850	e700	e660	e920	5650	5670	2790	2320	2270	3960
21	2750	e640	e800	e700	e660	e1000	5460	5390	2670	2160	2120	3560
22	2470	e800	e760	e700	e660	e1200	5250	5020	2660	2170	2040	3310
23	2260	e1200	e760	e700	e660	e1300	5010	4740	2640	2250	2840	3230
24	2110	e1400	e760	e700	e660	e1500	4790	4440	2560	2180	5010	3220
25	1680	1500	e760	e700	e660	e1800	4540	4210	2560	2110	4540	2960
26	1600	1540	e760	e700	e660	e2500	4360	4010	2640	e2050	3460	3190
27	1590	1470	e760	e700	e660	e3000	4160	3890	2630	e2000	2800	3260
28	1660	1350	e760	e700	e660	e5000	3950	3810	2540	e1980	2260	3400
29	1640	1310	e760	e700	---	e8500	3750	3690	2480	e1950	2010	3370
30	1610	1360	e760	e700	---	e14000	3550	3630	2330	e1900	1860	3260
31	1600	---	e760	e700	---	15200	---	3710	---	e1850	1810	---
TOTAL	44009	35121	33040	22300	18900	68730	240040	169660	101830	71640	73250	162250
MEAN	1420	1171	1066	719	675	2217	8001	5473	3394	2311	2363	5408
MAX	3370	1600	1650	740	700	15200	14600	11900	4480	2940	5010	12600
MIN	796	600	760	700	660	640	3550	3140	2330	1850	1440	1770
AC-FT	87290	69660	65530	44230	37490	136300	476100	336500	202000	142100	145300	321800
CFSM	.27	.22	.20	.14	.13	.42	1.52	1.04	.64	.44	.45	1.03
IN.	.31	.25	.23	.16	.13	.49	1.69	1.20	.72	.51	.52	1.15

e Estimated

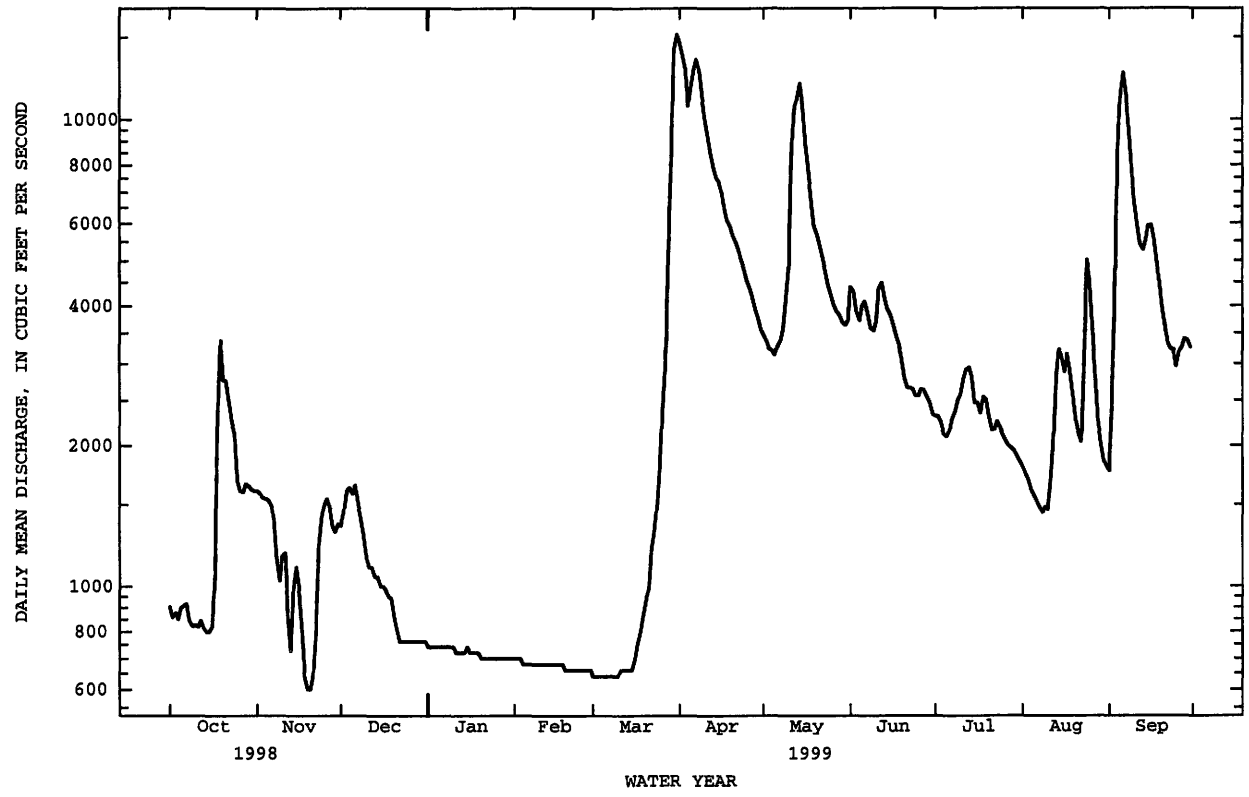
05079000 RED LAKE RIVER AT CROOKSTON, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1901 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	842	700	582	518	502	1009	3109	2152	1697	1366	852	868
MAX	2836	3172	1900	1663	1778	4257	11870	15290	7205	6851	3868	5408
(WY)	1972	1972	1904	1951	1998	1995	1997	1950	1962	1975	1985	1999
MIN	8.02	10.1	5.34	15.6	17.8	24.9	232	154	80.4	26.2	12.3	8.87
(WY)	1937	1937	1937	1934	1937	1936	1981	1934	1934	1936	1934	1934

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1901 - 1999	
ANNUAL TOTAL	684703		1040770			
ANNUAL MEAN	1876		2851		1179	
HIGHEST ANNUAL MEAN					3129	1950
LOWEST ANNUAL MEAN					83.6	1934
HIGHEST DAILY MEAN	11500	May 18	15200	Mar 31	27500	Apr 18 1997
LOWEST DAILY MEAN	600	Nov 19	600	Nov 19,20	2.5	Sep 29 1936
ANNUAL SEVEN-DAY MINIMUM	726	Nov 16	640	Mar 1	3.9	Sep 28 1936
INSTANTANEOUS PEAK FLOW			18800	Mar 30	28400	Apr 12 1969
INSTANTANEOUS PEAK STAGE			23.44	Mar 30	28.40[a]	Apr 17 1997
INSTANTANEOUS LOW FLOW					.00[b]	Jul 13 1960
ANNUAL RUNOFF (AC-FT)	1358000		2064000		854400	
ANNUAL RUNOFF (CFSM)	.36		.54		.22	
ANNUAL RUNOFF (INCHES)	4.83		7.35		3.04	
10 PERCENT EXCEEDS	3190		6010		2620	
50 PERCENT EXCEEDS	1400		1850		705	
90 PERCENT EXCEEDS	907		680		116	

a From highwater mark, backwater from ice.
b From regulation by power plant upstream.



05080000 RED LAKE RIVER AT FISHER, MN

LOCATION.--Lat 47°48'01", long 96°48'31", in SW¼NE¼ sec. 21, T.150 N., R.48 W., Polk County, Hydrologic Unit 09020303, on left bank 10 ft upstream from bridge on county highway, 0.3 mile west of Fisher and at river mile 27.6.

DRAINAGE AREA.--5,678 mi^2.

PERIOD OF RECORD.--March to September 1999 (gage heights and maximum discharge only).

GAGE.--Water-stage recorder. Datum of gage is 800.00 ft above sea level (levels by Minnesota Department of Transportation).

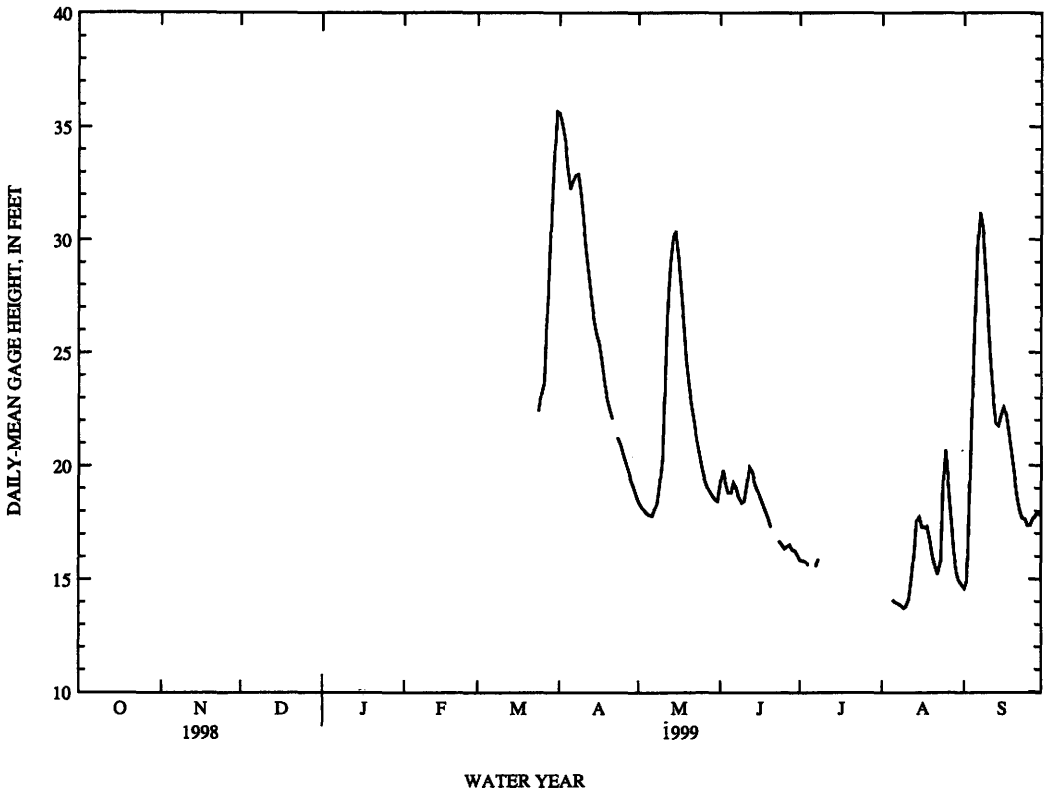
REMARKS.-- Runoff from 1,950 mi^2 of Red Lake River basin above Lower Red Lake outlet is completely comtrolled by dam at outlet of Lower Red Lake. Flow partially affected by occasional runoff of Thief and Mud Lakes in Thief River basin.

EXTREMES FOR PERIOD OF RECORD.-- Maximum discharge, 18,000 ft^3/s (approximately), gage-height 35.92 ft, Mar. 31, 1999; minimum gage-height, 13.60 ft, Aug. 9, 1999.

EXTREMES FOR CURRENT YEAR.-- Maximum discharge, 18,000 ft^3/s (approximately), gage-height 35.92 ft, Mar. 31; minimum gage-height, 13.60 ft, Aug. 9.

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	---	---	---	---	---	---	35.60	18.38	19.26	15.81	---	14.60
2	---	---	---	---	---	---	35.10	18.17	19.81	15.83	---	14.89
3	---	---	---	---	---	---	34.44	18.05	19.24	15.75	---	18.27
4	---	---	---	---	---	---	33.17	17.89	18.80	15.62	---	22.33
5	---	---	---	---	---	---	32.25	17.83	18.80	---	14.07	26.67
6	---	---	---	---	---	---	32.60	17.78	19.25	---	13.97	29.74
7	---	---	---	---	---	---	32.86	18.09	19.02	15.57	13.91	31.21
8	---	---	---	---	---	---	32.91	18.34	18.60	15.89	13.84	30.41
9	---	---	---	---	---	---	32.04	19.20	18.37	---	13.72	28.50
10	---	---	---	---	---	---	30.82	20.36	18.44	---	13.79	26.44
11	---	---	---	---	---	---	29.58	23.52	19.13	---	14.08	24.51
12	---	---	---	---	---	14.32	28.40	27.24	19.91	---	14.92	22.87
13	---	---	---	---	---	---	27.35	28.97	19.70	---	16.20	21.87
14	---	---	---	---	---	---	26.48	30.08	19.20	---	17.55	21.75
15	---	---	---	---	---	---	25.85	30.39	18.89	---	17.75	22.20
16	---	---	---	---	---	14.35	25.37	29.24	18.62	---	17.30	22.57
17	---	---	---	---	---	14.71	24.59	27.66	18.28	---	17.26	22.29
18	---	---	---	---	---	---	23.67	26.19	17.99	---	17.33	21.48
19	---	---	---	---	---	15.82	22.99	24.73	17.68	---	16.67	20.54
20	---	---	---	---	---	---	22.49	23.52	17.29	---	15.95	19.55
21	---	---	---	---	---	18.38	22.07	22.72	---	---	15.57	18.67
22	---	---	---	---	---	---	---	21.93	---	---	15.22	18.05
23	---	---	---	---	---	---	21.25	21.17	16.69	---	15.73	17.69
24	---	---	---	---	---	22.43	20.94	20.50	16.54	---	19.14	17.65
25	---	---	---	---	---	23.16	20.53	19.90	16.38	---	20.69	17.36
26	---	---	---	---	---	23.67	20.14	19.42	16.45	---	19.15	17.36
27	---	---	---	---	---	25.69	19.81	19.08	16.53	---	17.47	17.64
28	---	---	---	---	---	28.33	19.35	18.86	16.30	---	16.23	17.80
29	---	---	---	---	---	31.24	19.05	18.67	16.26	---	15.37	17.96
30	---	---	---	---	---	33.95	18.70	18.51	16.04	---	14.93	17.78
31	---	---	---	---	---	35.67	---	18.44	---	---	14.75	---
MEAN	---	---	---	---	---	---	---	21.77	---	---	---	21.36
MAX	---	---	---	---	---	---	---	30.39	---	---	---	31.21
MIN	---	---	---	---	---	---	---	17.78	---	---	---	14.60


DAILY-MEAN GAGE HEIGHT, IN FEET
40
35
30
25
20
15
10
O
N
D
J
F
M
A
M
J
J
A
S
1998
1999
WATER YEAR

05082500 RED RIVER OF THE NORTH AT GRAND FORKS, ND

LOCATION.--Lat 47°55'38", long 97°01'34", in sec.2, T.151 N., R.50 W., Grand Forks County, Hydrologic Unit 09020301, on right bank 200 ft upstream from the DeMers Avenue bridge, 0.4 mi downstream from Red Lake River, and at mile 297.6.

DRAINAGE AREA.--30,100 mi^2 (approximately), including 3,800 mi^2 in closed basins.

PERIOD OF RECORD.--April 1882 to current year. Prior to January 1904 monthly discharge only, published in WSP 1308.

REVISED RECORDS.--WSP 855: 1936(M). WSP 1115: 1942. WSP 1175: 1897(M). WSP 1388: 1904, 1914-15, 1917-19, 1921-22, 1927, 1950. WSP 1728: Drainage area. WRD-ND-81-1: 1882, 1897 (M).

GAGE.--Water-stage recorder. Datum of gage is 779.00 ft above sea level. Oct. 1, 1983, to Sept. 30, 1986, datum of gage was 780.00 ft at same site. Apr. 14, 1965, to Sept. 30, 1983, water-stage recorder 1.9 mi downstream at a datum of 778.35 ft. Nov. 3, 1933, to Apr. 13, 1965, water-stage recorder 0.3 mi upstream at 778.35 ft datum. See WSP 1728 or 1913 for history of changes prior to Nov. 3, 1933.

REMARKS.--Records good except for periods of estimated discharge, which are poor.

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	1640	3960	4810	e1690	e1660	e2100	49700	9210	10300	6640	4930	4070
2	1690	3950	5040	e1680	e1640	e2150	48200	8810	10300	6270	4830	3990
3	1700	3950	5340	e1670	e1620	e2200	46400	8490	9830	6000	4700	4920
4	1710	3920	5830	e1660	e1600	e2250	44200	8100	10000	5790	4440	7740
5	1850	3810	6010	e1650	e1580	e2300	42500	7790	9720	5790	4120	12700
6	1820	3650	5900	e1650	e1560	e2500	40900	7520	9860	7040	3910	17200
7	1870	3500	5710	e1650	e1540	e2800	39200	7710	10200	8240	3780	20600
8	1930	3360	5140	e1650	e1520	e3300	37600	8430	10900	8520	3580	22700
9	e1930	3100	4540	e1660	e1510	e3500	35800	10400	11800	8200	3320	23300
10	e1920	2880	4090	e1670	e1500	e3600	33900	13400	12500	8210	3160	22200
11	e2030	3010	3870	e1680	e1500	e3700	31800	17400	12900	8470	3140	20300
12	e2100	2860	e3800	e1690	e1500	e3700	29600	21900	13600	8780	3670	17700
13	e2100	2570	e3700	e1700	e1520	e3650	27300	25600	13900	9120	4310	14800
14	2030	2830	4350	e1720	e1530	e3600	25200	28300	13400	8790	5520	13300
15	2070	2720	4560	e1740	e1540	e3500	23300	30300	12500	7860	6550	12400
16	2090	2570	4480	e1760	e1550	e3600	21500	31000	11600	7050	6730	12000
17	2360	e2400	4090	e1780	e1560	e3800	19900	29800	10900	6530	7010	11600
18	3140	e2200	3590	e1790	e1570	e4300	18300	27900	10200	6170	7720	11100
19	5630	e2100	3070	e1800	e1600	e5100	16700	25800	9430	6220	7840	10300
20	7740	e2000	2480	e1800	e1630	e7700	15700	23500	8680	6100	7390	9420
21	8000	2000	2270	e1800	e1680	e11000	15000	21300	7750	5770	6660	8470
22	e7400	2180	2090	e1800	e1750	e13500	14400	19900	7210	5510	5980	7600
23	e6400	2770	e1950	e1790	e1820	e15500	13800	18400	7100	5560	5570	7110
24	e5700	3310	e1850	e1780	e1880	e18000	13200	16800	6850	5660	6090	6830
25	e5200	3540	e1800	e1770	e1950	e21000	12600	15300	6650	5460	7480	6630
26	4810	3820	e1750	e1760	e2000	e23500	12000	13700	6780	5240	7340	6330
27	4510	4290	e1740	e1750	e2000	e26000	11400	12100	7180	5060	6490	6300
28	4280	4670	e1730	e1740	e2050	e31000	10800	10700	7460	5080	5710	6250
29	4180	4730	e1720	e1720	---	e40000	10200	10100	7410	5290	5020	6210
30	4120	4740	e1710	e1700	---	45900	9680	9990	7140	5190	4560	6100
31	3960	---	e1700	e1680	---	49100	---	10300	---	5060	4240	---
TOTAL	107910	97390	110710	53380	46360	363850	770780	509950	294050	204670	165790	340170
MEAN	3481	3246	3571	1722	1656	11740	25690	16450	9802	6602	5348	11340
MAX	8000	4740	6010	1800	2050	49100	49700	31000	13900	9120	7840	23300
MIN	1640	2000	1700	1650	1500	2100	9680	7520	6650	5060	3140	3990
AC-FT	214000	193200	219600	105900	91960	721700	1529000	1011000	583200	406000	328800	674700

e Estimated

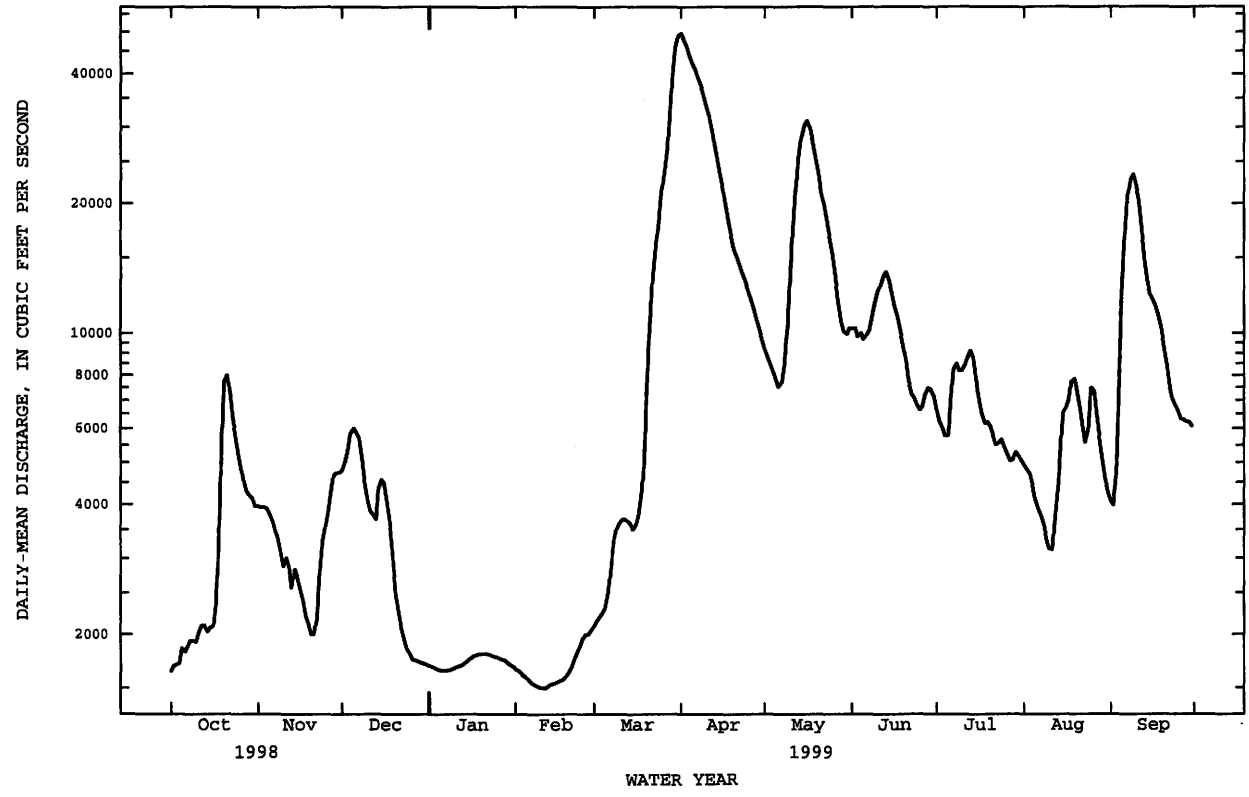
05082500 RED RIVER OF THE NORTH AT GRAND FORKS, ND--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1904 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	1446	1240	1021	852	838	2736	10120	5522	4064	3520	1815	1550
MAX	5127	5218	3571	2030	3520	15370	56210	36510	19340	25270	17050	11340
(WY)	1995	1972	1999	1996	1998	1995	1997	1950	1962	1975	1993	1999
MIN	12.1	30.5	17.8	18.8	2.87	42.1	954	373	151	88.8	30.6	20.3
(WY)	1937	1937	1937	1937	1937	1937	1938	1934	1934	1936	1934	1936

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1904 - 1999	
ANNUAL TOTAL	2397170		3065010			
ANNUAL MEAN	6568		8397		2877	
HIGHEST ANNUAL MEAN					10070	1997
LOWEST ANNUAL MEAN					244	1934
HIGHEST DAILY MEAN	29600	May 21	49700	Apr 1	127000	Apr 18 1997
LOWEST DAILY MEAN	1560	Sep 29	1500	Feb 10	1.8	Sep 2 1977
ANNUAL SEVEN-DAY MINIMUM	1640	Sep 27	1510	Feb 8	2.5	Feb 12 1937
INSTANTANEOUS PEAK FLOW			50000a	Mar 31	137000b	Apr 18 1997
INSTANTANEOUS PEAK STAGE			44.26	Apr 1	54.35c	Apr 22 1997
ANNUAL RUNOFF (AC-FT)	4755000		6079000		2085000	
10 PERCENT EXCEEDS	16700		20800		6350	
50 PERCENT EXCEEDS	3960		5240		1400	
90 PERCENT EXCEEDS	1840		1700		280	

a Gage height, 44.11 ft.
b Maximum observed, affected by breakout flow from Red River about 20 miles upstream of gage that entered Red Lake River about 2 miles from the confluence with Red River of the North.
c From floodmark.



05082500 RED RIVER OF THE NORTH AT GRAND FORKS, ND--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1949, 1956 to current year.

REMARKS.--Quality assurance sample also collected at this location.

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

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	PH WATER WHOLE LAB (STAND-ARD UNITS) (00403)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM) (90095)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)
OCT											
16...	1140	2080	--	--	--	592	9.5	9.0	--	--	--
DEC											
14...	1130	4210	--	--	--	--	4.0	.0	--	--	--
FEB											
25...	1445	2070	--	--	--	622	--	1.4	--	--	--
APR											
02...	1215	48100	7.9	--	376	358	3.0	2.5	150	37	15
MAY											
21...	1045	21300	--	--	--	856	19.2	17.0	--	--	--
JUN											
30...	0950	7020	--	--	--	577	22.5	22.1	--	--	--
AUG											
23...	1400	5510	8.3	8.1	506	511	21.5	21.5	240	54	25

DATE	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	SODIUM AD-SORP-TION RATIO (00931)	SODIUM PERCENT (00932)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	ANC UNFLTRD TIT 4.5 LAB (MG/L AS CACO3) (90410)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)
OCT										
16...	--	--	--	--	--	--	--	--	--	--
DEC										
14...	--	--	--	--	--	--	--	--	--	--
FEB										
25...	--	--	--	--	--	--	--	--	--	--
APR										
02...	5.5	.4	13	11	134	8.9	.20	56	30300	233
MAY										
21...	--	--	--	--	--	--	--	--	--	--
JUN										
30...	--	--	--	--	--	--	--	--	--	--
AUG										
23...	4.3	.4	11	14	185	10	.20	81	4790	322

WATER-QUALITY RECORDS

DATE	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	LITHIUM DIS-SOLVED (UG/L AS LI) (01130)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO) (01060)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)	STRON-TIUM, DIS-SOLVED (UG/L AS SR) (01080)
OCT 16...	--	--	--	--	--	--	--	--	--	--
DEC 14...	--	--	--	--	--	--	--	--	--	--
FEB 25...	--	--	--	--	--	--	--	--	--	--
APR 02...	215	3	500	<.00	20	50	<.1	2.0	1	180
MAY 21...	--	--	--	--	--	--	--	--	--	--
JUN 30...	--	--	--	--	--	--	--	--	--	--
AUG 23...	300	5	90	1.0	20	10	<.1	1.0	<1	260

05087500 MIDDLE RIVER AT ARGYLE, MN

LOCATION.--Lat 48°20'25", long 96°48'58", in NE¼NW¼ sec. 15, T.156 N., R.48 W., Marshall County, Hydrologic Unit 09020309, on left bank 30 ft upstream of bridge on County Highway 4 in Argyle and 14 mi upstream from mouth.

DRAINAGE AREA.--255 mi^2.

PERIOD OF RECORD.--March to September 1945, October 1950 to September 1981, February 1982 to current year. Monthly discharge only for some periods, published in WSP 1728. October 1981 to January 1982, operated as a high-flow partial-record station.

GAGE.--Water-stage recorder. Datum of gage is 828.53 ft above sea level. Prior to Nov. 8, 1951, nonrecording gage and Nov. 8, 1951 to Sept. 18, 1952, water- stage recorder at site 800 ft downstream at datum 1.0 ft higher. Sept. 19, 1952 to June 28, 1982, recording gage at site 800 feet downstream at present datum. June 29, 1982 to Sept. 20, 1983, nonrecording gage at present site and datum.

REMARKS.--Records fair except those for estimated daily discharges, which are poor.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of April 1950 reached a stage of 15.25 ft present datum, site then in use, from floodmarks, discharge, 2,790 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	e5.0	67	26	e2.6	e1.8	e2.7	e1500	83	139	442	36	99
2	e5.0	64	30	e2.6	e1.8	e2.7	e2000	77	316	388	31	88
3	e5.0	60	37	e2.5	e1.8	e2.7	e1600	69	366	359	25	82
4	e4.9	54	40	e2.5	e1.9	e2.7	1520	64	352	318	20	96
5	e4.9	47	44	e2.4	e1.9	e2.7	1410	61	461	281	17	207
6	e4.8	41	42	e2.4	e2.0	e2.5	1450	58	687	241	13	402
7	e4.8	37	46	e2.3	e2.1	e2.4	1660	63	905	199	9.3	548
8	e4.7	33	46	e2.2	e2.3	e2.3	2220	82	749	164	e8.0	571
9	e4.7	29	43	e2.1	e2.5	e2.2	2250	132	647	141	e10	463
10	e4.7	27	37	e2.0	e2.5	e2.0	1960	215	854	121	e15	361
11	e4.6	25	32	e1.9	e2.7	e1.8	1660	406	1010	106	e18	296
12	e4.6	21	28	e1.9	e2.9	e1.7	1360	770	1180	93	e22	237
13	e4.5	23	24	e1.8	e3.0	e1.0	1020	1230	907	86	25	190
14	e4.5	23	22	e1.8	e3.2	e1.9	772	1160	606	102	45	175
15	e4.4	20	20	e1.8	e3.4	e2.0	638	1040	418	251	89	174
16	4.4	17	17	e1.8	e3.5	e2.1	561	811	310	269	96	186
17	25	e14	e16	e1.8	e3.7	e2.3	484	658	230	292	107	196
18	74	e13	e14	e1.8	e3.5	e2.4	407	535	168	267	180	181
19	180	e15	e13	e1.9	e3.3	e2.5	350	416	129	216	184	145
20	204	17	e12	e1.9	e3.3	e3.0	308	324	105	164	150	116
21	196	18	e9.0	e1.9	e3.3	e4.0	274	250	92	120	119	92
22	172	17	e6.0	e1.9	e3.3	e5.0	244	194	87	94	97	75
23	130	16	e3.5	e1.9	e3.2	e6.0	216	155	141	81	97	62
24	97	14	e3.0	e1.9	e3.1	e8.0	193	131	453	70	271	52
25	78	15	e2.9	e1.9	e3.0	e10	167	116	597	62	464	45
26	70	16	e2.9	e1.9	e2.9	e20	146	103	631	52	533	39
27	62	17	e2.8	e1.9	e2.8	e80	129	91	856	49	468	34
28	60	19	e2.8	e1.9	e2.7	e300	115	81	946	47	346	34
29	58	21	e2.7	e1.9	---	e500	102	72	790	46	237	53
30	55	24	e2.7	e1.8	---	e700	90	67	581	42	159	66
31	58	---	e2.7	e1.8	---	e900	---	73	---	41	118	---
TOTAL	1594.5	824	630.0	62.7	77.4	2578.6	26806	9587	15713	5204	4009.3	5365
MEAN	51.4	27.5	20.3	2.02	2.76	83.2	894	309	524	168	129	179
MAX	204	67	46	2.6	3.7	900	2250	1230	1180	442	533	571
MIN	4.4	13	2.7	1.8	1.8	1.0	90	58	87	41	8.0	34
AC-FT	3160	1630	1250	124	154	5110	53170	19020	31170	10320	7950	10640
CFSM	.20	.11	.08	.01	.01	.33	3.50	1.21	2.05	.66	.51	.70
IN.	.23	.12	.09	.01	.01	.38	3.91	1.40	2.29	.76	.58	.78

e Estimated

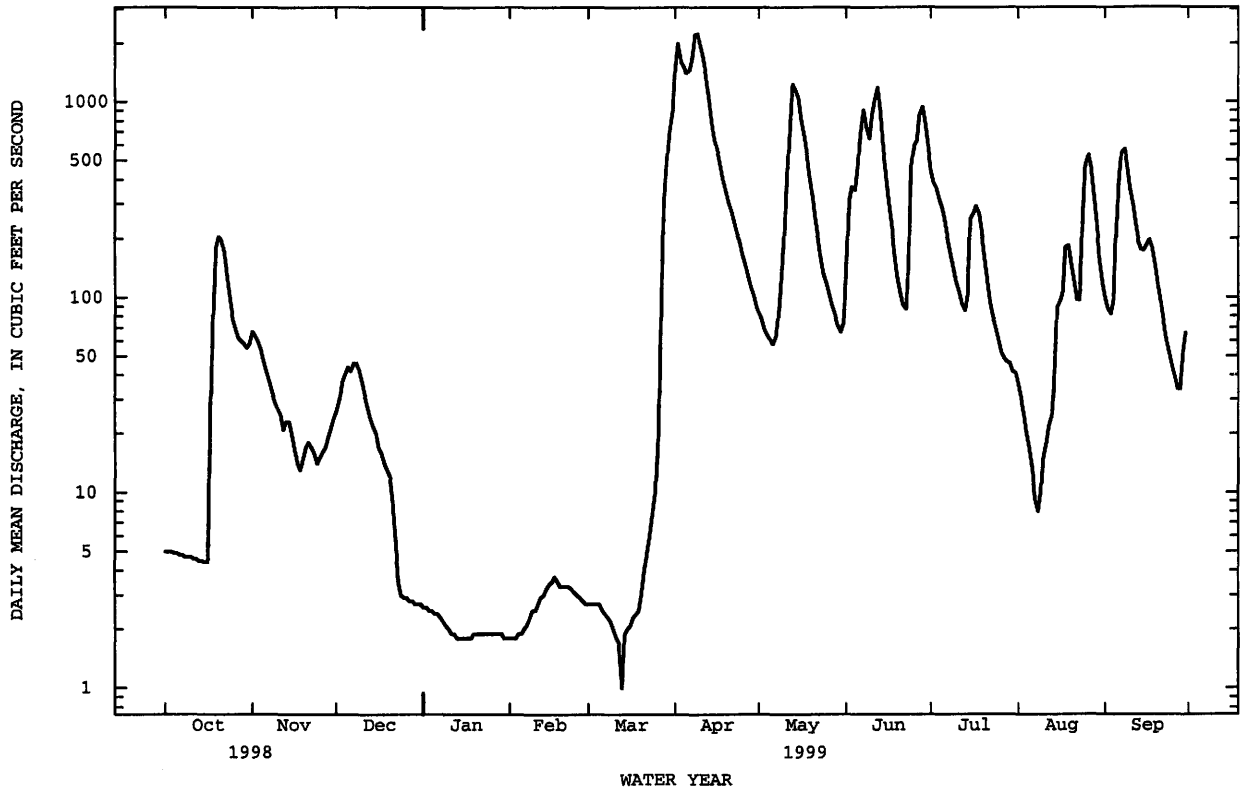
05087500 MIDDLE RIVER AT ARGYLE, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1945 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	12.0	8.42	3.41	1.34	1.50	36.4	234	94.4	78.1	62.9	12.9	18.6
MAX	94.1	108	22.2	8.77	30.0	335	966	896	660	688	265	272
(WY)	1983	1995	1995	1995	1998	1995	1997	1996	1970	1975	1993	1993
MIN	.000	.000	.000	.000	.000	.000	.20	2.12	.37	.000	.000	.000
(WY)	1954	1954	1954	1953	1953	1954	1991	1981	1973	1961	1961	1952

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1945 - 1999	
ANNUAL TOTAL	31322.20		72451.5			
ANNUAL MEAN	85.8		198		47.1[a]	
HIGHEST ANNUAL MEAN					198	1999
LOWEST ANNUAL MEAN					1.60	1977
HIGHEST DAILY MEAN	1190	Jun 28	2250	Apr 9	4800	May 19 1996
LOWEST DAILY MEAN	.64	Aug 30	1.0	Mar 13	.00[b]	Aug 18 1952
ANNUAL SEVEN-DAY MINIMUM	.79	Aug 26	1.8	Mar 10	.00	Aug 18 1952
INSTANTANEOUS PEAK FLOW			2370[c]	Apr 8	5020	May 19 1996
INSTANTANEOUS PEAK STAGE			15.64[d]	Apr 2	18.27[e]	May 19 1996
ANNUAL RUNOFF (AC-FT)	62130		143700		34150	
ANNUAL RUNOFF (CFSM)	.34		.78		.18	
ANNUAL RUNOFF (INCHES)	4.57		10.57		2.51	
10 PERCENT EXCEEDS	229		601		98	
50 PERCENT EXCEEDS	21		52		2.6	
90 PERCENT EXCEEDS	2.7		2.1		.00	

a Median of annual mean discharges is 40.3 ft^3/s.
b Many days, several years.
c Gage-height, 15.60 ft.
d Backwater from ice.
e From floodmark



05092000 RED RIVER OF THE NORTH AT DRAYTON, ND

LOCATION.--Lat 48°34'20", long 97°08'50", in SE¼SE¼SE¼ sec.24, T.159 N., R.51 W., Pembina County, Hydrologic Unit 09020311, on downstream side of bridge on North Dakota State Highway 66, at the North Dakota-Minnesota border, 1.5 mi northeast of Drayton, and at mile 206.7.

DRAINAGE AREA.--34,800 mi^2 (approximately) includes 3,800 mi^2 in closed basins.

PERIOD OF RECORD.--April 1936 to June 1937, April 1941 to current year (fragmentary prior to April 1949).

REVISED RECORDS.--WSP 1388: 1949-50. WSP 1728: Drainage area.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 755.00 ft above sea level (Minnesota highway bench mark). Prior to Nov. 30, 1954, nonrecording gage at site 1.5 mi upstream at datum 1.59 ft higher.

REMARKS.--Records fair.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of April 1897 reached a stage of about 41 ft at site and datum in use prior to Nov. 30, 1954.

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	1640	4260	5140	e1800	e1800	e2300	36700	15400	13900	11500	5040	5300
2	1610	4160	5250	e1800	e1700	e2300	40000	13700	12800	11000	4910	4630
3	1610	4070	5360	e1800	e1700	e2300	45300	12000	12200	10300	4790	4470
4	1630	3980	5570	e1800	e1700	e2400	50500	10600	11900	9700	4660	4650
5	1680	3900	6030	e1800	e1700	e2450	53500	9700	11900	8750	4540	6620
6	1740	3810	6390	e1800	e1700	e2500	55600	9390	11800	7980	4510	10500
7	1790	3720	6600	e1800	e1700	e2600	57400	9550	11900	8010	4490	14200
8	1840	3630	6600	e1800	e1700	e2750	58900	9940	12200	8900	4480	17300
9	1870	3550	6260	e1800	e1700	e2900	59100	10100	12400	9620	4480	19700
10	1880	3460	5660	e1800	e1700	e3200	57700	11100	13000	9720	4470	21400
11	1890	3350	5020	e1800	e1700	e3500	55600	13700	13800	9600	4470	22500
12	1890	3230	4560	e1800	e1700	e3800	53300	16800	14700	9610	4450	22700
13	1890	3130	4380	e1900	e1700	e4000	49900	20300	15500	9740	4440	21600
14	1890	3020	4400	e2000	e1700	e4000	44600	23600	15800	9930	4490	19800
15	1920	2920	4500	e2000	e1700	e4000	41100	26200	15500	10000	5290	17700
16	1990	2820	4620	e2100	e1800	e3900	38900	28200	14800	9920	6560	16400
17	2080	2750	4710	e2100	e1900	e3700	37200	29500	13800	9530	7370	15300
18	2380	2310	4550	e2100	e1900	e3600	35900	30500	12700	8770	7710	14300
19	3240	2020	4140	e2100	e2000	e3600	34600	31200	11700	7980	8230	13400
20	4670	2020	3630	e2100	e2000	e3500	33300	31600	11000	7440	8620	12500
21	6660	2270	3270	e2100	e2100	e4100	31900	30900	10500	7070	8510	11400
22	7930	2570	2910	e2100	e2100	e5500	30400	29700	10100	6650	7950	10400
23	8180	2760	2640	e2000	e2100	e8000	28800	28100	9720	6220	7310	9260
24	7720	2960	2520	e2000	e2200	e11000	27000	26300	9820	5920	6950	8210
25	6940	3300	e2400	e2000	e2200	e14000	25100	25200	10000	5840	7290	7480
26	6180	3700	e2300	e1900	e2300	e17000	23000	23900	10400	5710	8520	7040
27	5400	4050	e2200	e1900	e2300	e20000	21000	22400	10900	5480	9430	6660
28	4820	4400	e2000	e1900	e2300	e23000	19900	20700	11300	5240	9320	6380
29	4500	4740	e1900	e1900	---	e25000	18600	18900	11500	5080	8600	6260
30	4420	5010	e1900	e1900	---	e28000	17100	17100	11700	5110	7590	6180
31	4350	---	e1800	e1800	---	e33000	---	15400	---	5120	6410	---
TOTAL	108230	101870	129210	59500	52800	251900	1181900	621680	369240	251440	195880	364240
MEAN	3491	3396	4168	1919	1886	8126	39400	20050	12310	8111	6319	12140
MAX	8180	5010	6600	2100	2300	33000	59100	31600	15800	11500	9430	22700
MIN	1610	2020	1800	1800	1700	2300	17100	9390	9720	5080	4440	4470
AC-FT	214700	202100	256300	118000	104700	499600	2344000	1233000	732400	498700	388500	722500

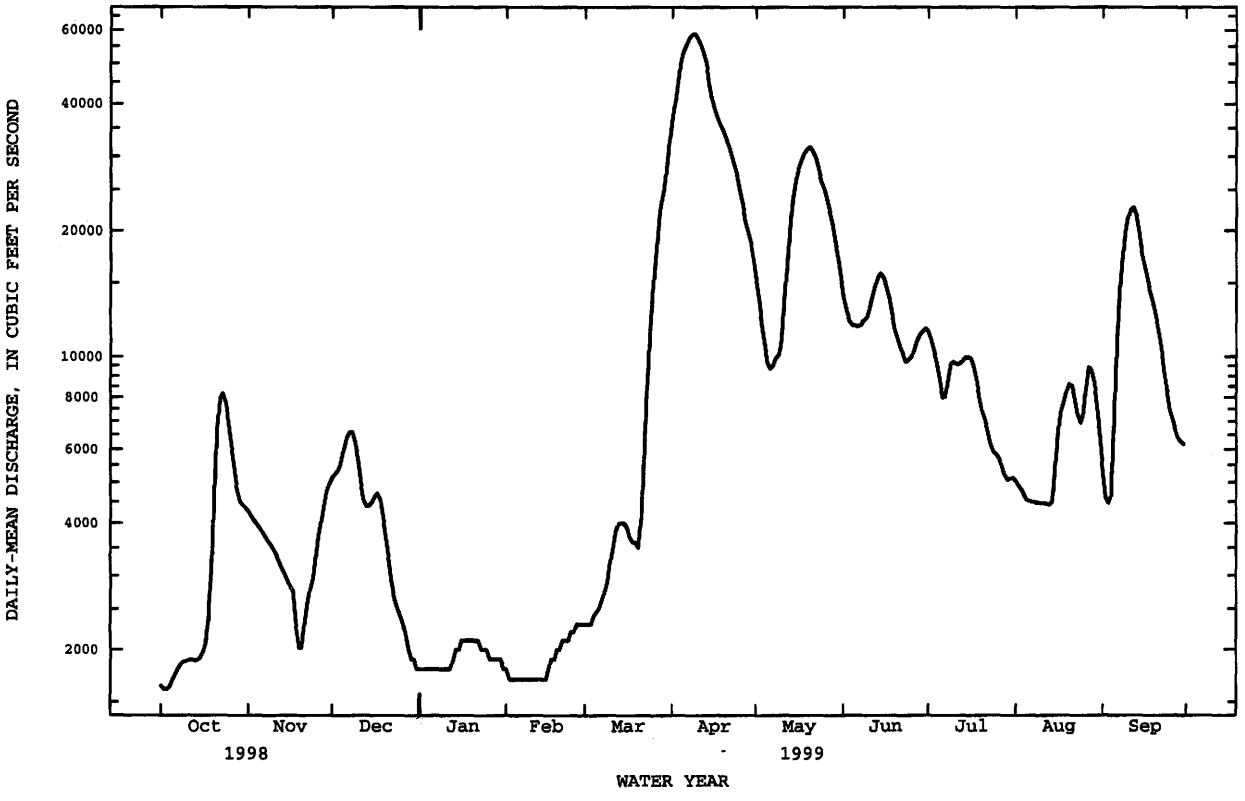
e Estimated

05092000 RED RIVER OF THE NORTH AT DRAYTON, ND--Continued

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

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	1904	1633	1349	1135	1111	3311	15430	9554	5600	5077	2551	2064
MAX	5194	5653	4168	2255	2598	16290	54710	58890	23420	28240	21580	12140
(WY)	1995	1972	1999	1998	1998	1998	1997	1950	1962	1975	1993	1999
MIN	317	277	149	174	201	280	1275	938	676	348	243	329
(WY)	1991	1977	1977	1990	1977	1962	1981	1977	1977	1988	1977	1988

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1949 - 1999	
ANNUAL TOTAL	2700520		3687890			
ANNUAL MEAN	7399		10100		4249	
HIGHEST ANNUAL MEAN					11280	1997
LOWEST ANNUAL MEAN					536	1977
HIGHEST DAILY MEAN	28200	May 24	59100	Apr 9	124000	Apr 24 1997
LOWEST DAILY MEAN	1610	Oct 2	1610	Oct 2	110	Dec 23 1989
ANNUAL SEVEN-DAY MINIMUM	1660	Sep 30	1670	Oct 1	118	Dec 28 1989
INSTANTANEOUS PEAK FLOW			59500	Apr 9	124000	Apr 24 1997
INSTANTANEOUS PEAK STAGE			41.66	Apr 9	45.55	Apr 24 1997
INSTANTANEOUS LOW FLOW					7.7	Oct 16 1936
ANNUAL RUNOFF (AC-FT)	5356000		7315000		3078000	
10 PERCENT EXCEEDS	19200		25600		9800	
50 PERCENT EXCEEDS	4500		5480		1840	
90 PERCENT EXCEEDS	2050		1800		480	



05092000 RED RIVER OF THE NORTH AT DRAYTON, ND--Continued

WATER-QUALITY RECORDS

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

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

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	PH WATER WHOLE LAB (STAND-ARD UNITS) (00403)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM) (90095)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)
JAN											
21...	1300	2120	--	--	--	740	-3.0	.5	--	--	--
APR											
07...	1600	55500	8.2	--	394	388	13.0	5.5	160	39	16
MAY											
24...	1050	26200	--	--	--	811	22.5	17.0	--	--	--
JUL											
01...	0930	11500	--	--	--	646	22.5	22.0	--	--	--
AUG											
17...	1300	7640	8.3	8.1	544	548	23.5	20.0	240	53	26

DATE	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	SODIUM AD-SORP-TION RATIO (00931)	SODIUM PERCENT (00932)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	ANC UNFLTRD TIT 4.5 LAB (MG/L AS CACO3) (90410)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)
JAN										
21...	--	--	--	--	--	--	--	--	--	--
APR										
07...	5.7	.4	14	13	122	12	.20	63	37600	251
MAY										
24...	--	--	--	--	--	--	--	--	--	--
JUL										
01...	--	--	--	--	--	--	--	--	--	--
AUG										
17...	4.9	.6	16	21	200	14	.20	78	7010	340

DATE	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	LITHIUM DIS-SOLVED (UG/L AS LI) (01130)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO) (01060)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)	STRON-TIUM, DIS-SOLVED (UG/L AS SR) (01080)
JAN										
21...	--	--	--	--	--	--	--	--	--	--
APR										
07...	222	4	90	1.0	20	20	<.1	<1.0	<1	190
MAY										
24...	--	--	--	--	--	--	--	--	--	--
JUL										
01...	--	--	--	--	--	--	--	--	--	--
AUG										
17...	317	5	80	<1.0	20	10	<.1	1.0	<1	260

South Branch Two Rivers near Lake Bronson, April 1969.

05094000 SOUTH BRANCH TWO RIVERS AT LAKE BRONSON, MN

LOCATION.--Lat 48°43'50", long 96°39'50", in SW¼SW¼ sec. 30, T.161 N., R.46 W., Kittson County, Hydrologic Unit 09020312, on left bank 70 ft upstream from culvert on U.S. Highway 59 at Lake Bronson and 3.4 mi downstream from dam at outlet of Bronson Lake.

DRAINAGE AREA.--422 mi^2.

PERIOD OF RECORD.--September 1928 to November 1936, April to September 1937, April 1941 to October 1943, April to December 1944, April 1945 to September 1947, October 1953 to September 1981, April 1985 to current year. Monthly discharge only for some periods, published in WSP 1308. October 1981 to March 1985, annual maximums only. Published as South Fork Two Rivers at Bronson prior to 1941.

REVISED RECORDS.--WSP 1308: 1929(M), 1931(M), 1936(M), 1944(M), 1947(M).

GAGE.--Water-stage recorder. Datum of gage is 928.53 ft above sea level (Minnesota Department of Transportation bench mark). Prior to Nov. 23, 1953, nonrecording gage at bridge 100 ft downstream at datum 2.00 ft higher. Nov 23, 1953 to Oct. 5, 1963, water-stage recorder at same site at datum 2.00 ft higher.

REMARKS.--Records good except those for estimated daily discharges, which are poor. Flow partly regulated since 1937 at Bronson Lake; usable capacity, 3,700 acre-ft.

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	.61	21	26	e8.4	e7.0	e15	e2600	193	240	977	60	8.8
2	.72	35	29	e8.0	e7.0	e12	2690	198	371	e800	58	9.2
3	.81	40	33	e8.0	e7.0	e10	2460	197	233	685	19	10
4	.80	39	36	e8.0	e7.0	e9.5	2450	194	243	626	13	13
5	2.0	36	39	e7.8	e6.8	e9.0	2240	193	360	641	3.4	17
6	2.5	33	42	e7.6	e6.6	e8.5	2190	190	642	e500	11	72
7	1.8	31	39	e7.6	e6.4	e8.5	2690	185	564	e400	33	146
8	2.1	29	36	e7.4	e6.2	e8.5	3350	184	416	e350	46	121
9	3.1	27	32	e7.4	e6.2	e8.5	3180	351	623	e300	39	230
10	3.0	27	30	e7.4	e6.2	e8.5	3240	514	1630	e250	35	123
11	4.8	24	25	e7.4	e6.0	e8.2	3150	590	1640	e220	35	110
12	7.2	22	23	e7.4	e6.0	e8.2	2630	912	1580	e200	34	114
13	7.2	21	21	e7.6	e6.0	e8.2	2150	937	1420	e200	26	99
14	8.3	20	20	e7.6	e6.0	e8.2	1860	1020	1360	e300	17	80
15	9.3	19	19	e7.8	e6.0	e9.0	1670	1000	1150	410	17	70
16	9.8	19	18	e8.2	e6.2	e10	1450	1020	1010	484	19	79
17	15	19	e18	e8.6	e6.2	e10	1370	971	636	346	19	81
18	47	e19	e18	e8.6	e6.2	e10	1140	843	463	376	20	71
19	344	e18	e18	e8.6	e6.2	e15	963	606	421	383	17	59
20	309	e17	e17	e8.6	e6.2	e20	855	393	258	330	14	61
21	166	e15	e16	e8.8	e6.4	e18	720	287	210	277	20	64
22	102	e14	e15	e8.6	e6.4	e30	689	259	128	265	21	42
23	117	15	e14	e8.4	e6.4	e80	574	263	305	157	59	31
24	117	15	e13	e8.2	e6.4	e74	439	270	718	135	58	19
25	113	16	e12	e8.0	e6.4	e74	347	271	451	147	40	19
26	75	17	e10	e7.6	e8.0	e450	386	225	821	60	20	22
27	41	19	e9.5	e7.6	e12	e15	369	173	1350	62	8.3	25
28	39	20	e9.0	e7.4	e16	e25	349	141	1280	65	9.3	27
29	43	22	e9.0	e7.4	---	e100	282	129	1070	67	11	26
30	54	24	e8.8	e7.2	---	e350	171	107	1060	65	11	27
31	50	---	e8.6	e7.2	---	e1600	---	114	---	62	26	---
TOTAL	1696.04	693	663.9	244.4	195.4	3020.8	48654	12930	22653	10140	819.0	1876.0
MEAN	54.7	23.1	21.4	7.88	6.98	97.4	1622	417	755	327	26.4	62.5
MAX	344	40	42	8.8	16	1600	3350	1020	1640	977	60	230
MIN	.61	14	8.6	7.2	6.0	8.2	171	107	128	60	3.4	8.8
AC-FT	3360	1370	1320	485	388	5990	96510	25650	44930	20110	1620	3720
CFSM	.13	.05	.05	.02	.02	.23	3.84	.99	1.79	.78	.06	.15
IN.	.15	.06	.06	.02	.02	.27	4.29	1.14	2.00	.89	.07	.17

e Estimated

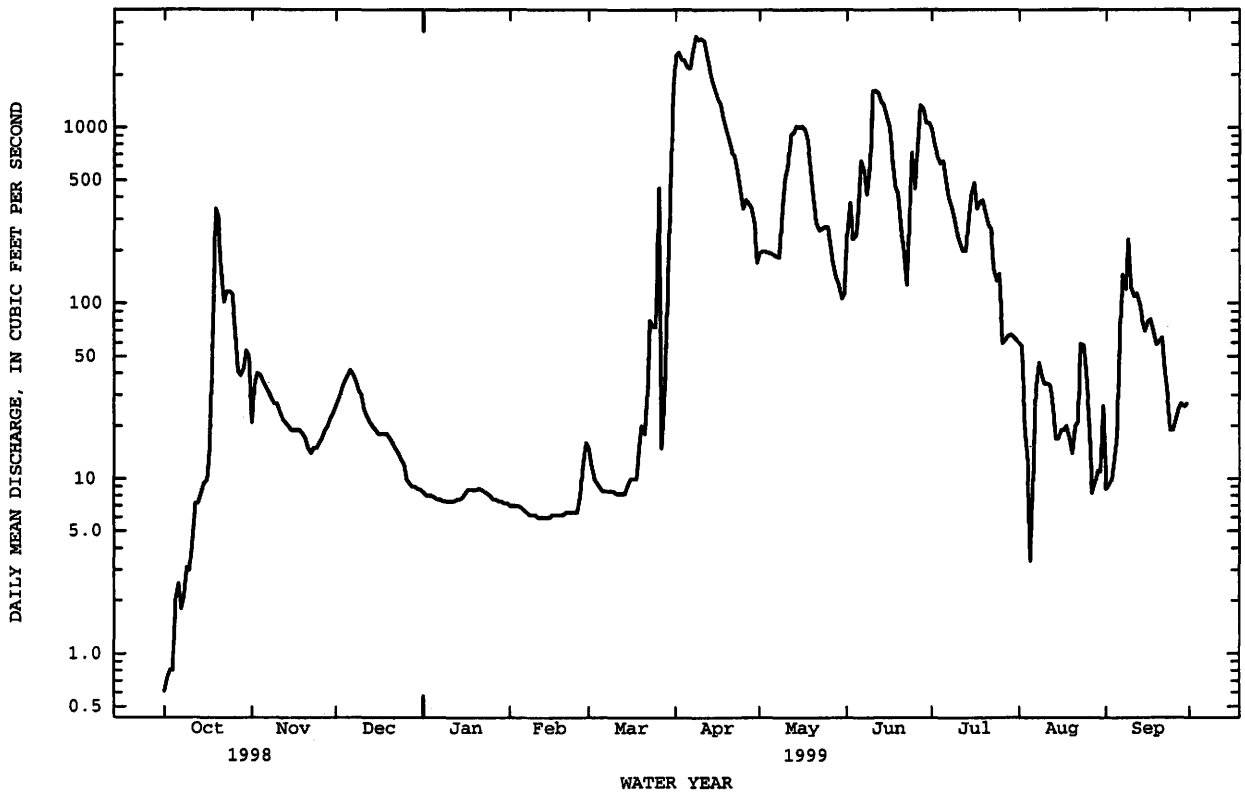
05094000 SOUTH BRANCH TWO RIVERS AT LAKE BRONSON, MN--Continued

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

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	21.7	13.6	5.38	3.15	5.13	77.6	446	222	171	116	47.6	43.9
MAX	153	97.0	34.5	12.1	93.1	689	1977	1500	1336	1136	1349	525
(WY)	1958	1995	1992	1992	1998	1995	1966	1996	1970	1956	1993	1957
MIN	.40	.38	.13	.12	.12	.66	.54	.98	1.43	.44	.089	.000
(WY)	1991	1990	1987	1987	1987	1934	1991	1991	1980	1988	1988	1937

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1929 - 1999	
ANNUAL TOTAL	47829.31		103585.54			
ANNUAL MEAN	131		284		98.6[a]	
HIGHEST ANNUAL MEAN					312	1966
LOWEST ANNUAL MEAN					2.89	1934
HIGHEST DAILY MEAN	1500	Mar 5	3350	Apr 8	5290	Apr 5 1966
LOWEST DAILY MEAN	.48	Sep 27	.61[b]	Oct 1	.00[c]	Jul 25 1937
ANNUAL SEVEN-DAY MINIMUM	.56	Sep 25	1.3	Oct 1	.00	Aug 2 1937
INSTANTANEOUS PEAK FLOW			4290	Apr 8	5410	Apr 5 1966
INSTANTANEOUS PEAK STAGE			14.64	Apr 8	18.23	Apr 5 1966
ANNUAL RUNOFF (AC-FT)	94870		205500		71440	
ANNUAL RUNOFF (CFSM)	.31		.67		.23	
ANNUAL RUNOFF (INCHES)	4.22		9.13		3.18	
10 PERCENT EXCEEDS	395		947		241	
50 PERCENT EXCEEDS	22		32		5.1	
90 PERCENT EXCEEDS	4.3		7.0		.80	

a Median of annual mean discharges is 59 ft^3/s.
b Rising stage.
c Many days, several years.



05104500 ROSEAU RIVER BELOW SOUTH FORK NEAR MALUNG, MN

LOCATION.--Lat 48°47'30", long 95°44'40", in NW¼SW¼ sec. 6, T.161 N., R.39 W., Roseau County, Hydrologic Unit 09020314, on left bank 0.3 mi downstream from South Fork and 1.5 mi northwest of Malung.

DRAINAGE AREA.--430 mi^2.

PERIOD OF RECORD.--October 1946 to current year.

REVISED RECORDS.--WSP 2113: 1948, 1950, 1951, 1956(M), 1957(M), 1962(M). WRIR 97-4249: Drainage area.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 1,029.67 ft, adjustment of 1912.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Some flow bypasses the gaging station through a natural overflow channel 0.8 mi. upstream and returns to river 0.5 mi downstream. Overflow begins at stage of about 13.0 ft, discharge, 1,800 ft^3/s. These records include any flow in the overflow channel.

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	11	117	82	e13	e8.6	e8.2	e1400	265	826	229	32	16
2	12	114	88	e12	e8.6	e8.2	e1250	236	967	200	25	18
3	14	107	97	e11	e8.6	e8.2	e1000	211	936	192	23	23
4	15	99	101	e10	e8.4	e8.2	e850	192	913	180	21	43
5	18	92	101	e10	e8.3	e8.2	e800	183	962	750	20	169
6	26	84	91	e9.8	e8.2	e8.2	e900	182	944	684	16	329
7	30	78	83	e9.0	e8.3	e8.1	2440	197	889	415	19	408
8	37	73	88	e8.3	e8.6	e8.0	3190	340	816	246	18	444
9	36	69	77	e8.0	e8.6	e8.4	2800	486	1040	198	17	408
10	30	68	67	e8.0	e8.6	e8.8	2540	544	1400	167	e18	391
11	34	64	59	e8.0	e8.6	e9.2	2570	756	1490	134	e20	387
12	39	51	55	e8.0	e8.6	e9.3	2570	1020	1480	110	e20	364
13	40	66	49	e8.0	e8.4	e9.4	2330	1410	1220	275	e21	372
14	44	66	45	e8.0	e8.2	e9.4	2050	1810	865	551	e22	470
15	42	62	45	e8.2	e8.0	e9.8	1840	2030	640	442	e20	500
16	43	61	41	e8.3	e8.0	e9.8	1650	1890	494	264	e22	483
17	87	59	38	e8.4	e8.0	e10	1440	1610	356	182	e27	437
18	206	56	35	e8.5	e7.7	e10	1270	1320	262	132	e31	373
19	215	46	35	e8.5	e8.0	e11	1110	1050	209	101	e28	316
20	223	44	e34	e8.6	e8.0	e11	985	832	174	82	e27	260
21	220	61	e32	e8.6	e8.2	e12	869	672	152	71	e25	224
22	214	59	e29	e8.6	e8.2	e13	768	579	134	63	e22	192
23	195	61	e27	e8.6	e8.2	e16	685	542	152	61	e23	165
24	176	63	e24	e8.6	e8.2	e30	616	523	164	54	e24	144
25	159	66	e22	e8.6	e8.2	e100	554	489	271	46	e21	125
26	146	69	e20	e8.6	e8.2	e200	506	439	1400	43	21	120
27	140	72	e18	e8.6	e8.2	e450	460	362	1030	42	21	118
28	133	73	e16	e8.6	e8.2	e900	395	293	606	40	20	121
29	128	73	e14	e8.6	---	e1300	338	244	421	40	18	125
30	124	76	e13	e8.6	---	e1700	291	213	290	39	16	126
31	119	---	e13	e8.6	---	e1600	---	428	---	36	14	---
TOTAL	2956	2149	1539	276.2	231.9	6502.4	40467	21348	21503	6069	672	7671
MEAN	95.4	71.6	49.6	8.91	8.28	210	1349	689	717	196	21.7	256
MAX	223	117	101	13	8.6	1700	3190	2030	1490	750	32	500
MIN	11	44	13	8.0	7.7	8.0	291	182	134	36	14	16
AC-FT	5860	4260	3050	548	460	12900	80270	42340	42650	12040	1330	15220
CFSM	.22	.17	.12	.02	.02	.49	3.14	1.60	1.67	.46	.05	.59
IN.	.26	.19	.13	.02	.02	.56	3.50	1.85	1.86	.53	.06	.66

e Estimated

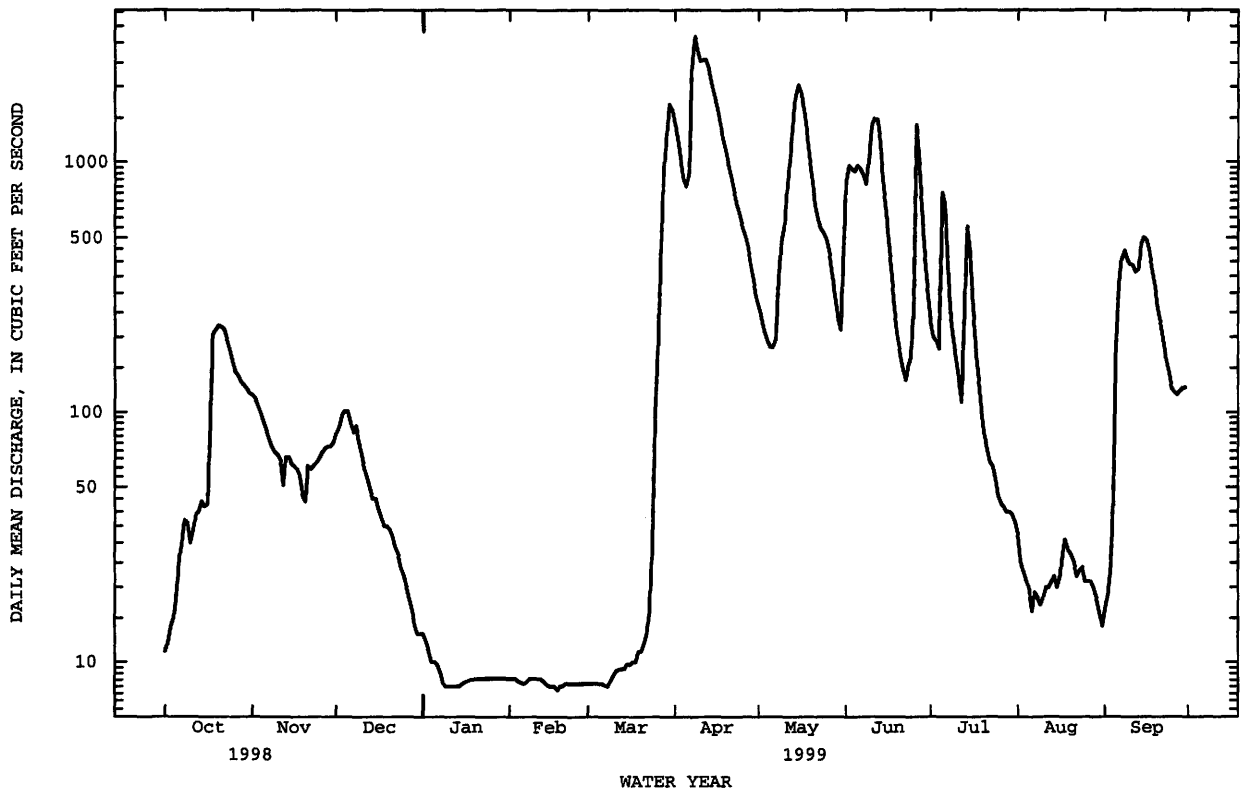
05104500 ROSEAU RIVER BELOW SOUTH FORK NEAR MALUNG, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1947 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	66.9	50.4	16.7	7.69	7.57	68.3	616	330	225	161	60.8	82.9
MAX	351	362	65.6	22.2	102	524	2035	1589	1140	1152	585	710
(WY)	1983	1995	1995	1997	1998	1995	1966	1950	1968	1968	1968	1957
MIN	.029	.16	.013	.000	.000	.83	5.60	8.77	4.16	.092	.000	.025
(WY)	1991	1991	1977	1977	1977	1977	1991	1990	1980	1980	1961	1988

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1947 - 1999	
ANNUAL TOTAL	48575.6		111384.5			
ANNUAL MEAN	133		305		141[a]	
HIGHEST ANNUAL MEAN					305	1999
LOWEST ANNUAL MEAN					7.28	1990
HIGHEST DAILY MEAN	1380	May 17	3190	Apr 8	6970	May 19 1996
LOWEST DAILY MEAN	2.4	Sep 18	7.7	Feb 18	.00[b]	Jul 23 1961
ANNUAL SEVEN-DAY MINIMUM	3.2	Sep 15	8.0	Feb 14	.00	Jul 23 1961
INSTANTANEOUS PEAK FLOW			3300	Apr 8	7310	May 19 1996
INSTANTANEOUS PEAK STAGE			18.22	Apr 8	23.45[c]	Apr 20 1996
ANNUAL RUNOFF (AC-FT)	96350		220900		102100	
ANNUAL RUNOFF (CFSM)	.31		.71		.33	
ANNUAL RUNOFF (INCHES)	4.20		9.64		4.46	
10 PERCENT EXCEEDS	316		964		327	
50 PERCENT EXCEEDS	61		69		19	
90 PERCENT EXCEEDS	8.7		8.4		1.8	

a Median of annual mean discharges is 124 ft^3/s.
b Many days, several years.
c From highwater mark,backwater from ice.



05107500 ROSEAU RIVER AT ROSS, MN

LOCATION.--Lat 48°54'37", long 95°55'18", in NE¼SE¼ sec. 27, T. 163 N., R. 41 W., Roseau County, Hydrologic Unit 090203014, on left bank 300 ft downstream from State Highway 89 bridge, 0.2 mi. north of Ross, and 2.3 mi downstream from Pine Creek.

DRAINAGE AREA.--1,090 mi^2.

PERIOD OF RECORD.--July 1928 to September 1991, April 1995 to current year.

REVISED RECORDS.--WSP 1055: 1945. WSP 1175: Drainage area. WSP 1308: 1936(m). WSP 1508: 1848-49(P).

GAGE.--Water-stage recorder. Datum of gage is 1,018.61 ft above sea level (levels by Geodetic Survey of Canada). Prior to Mar. 13, 1929, nonrecording gage at same site and datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair. High flow affected by natural storage in Roseau Lake.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage known, about 19 ft in 1896. Other floods reached the following stages, from information by local residents: flood of July 1919, 17.5 ft; flood of 1927, about 16 ft.

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	4.2	197	e130	e37	e23	e21	e1000	1990	1530	1600	120	40
2	4.0	189	e134	e36	e23	e21	e1100	1920	1540	1550	94	39
3	3.8	180	e133	e35	e23	e21	e1150	1850	1550	1490	74	43
4	3.8	169	e131	e34	e23	e21	e1250	1780	1570	1440	63	61
5	5.6	157	e129	e33	e23	e21	e1350	1720	1610	1420	55	141
6	11	149	e125	e32	e23	e21	e1650	1640	1640	1460	50	312
7	20	138	e122	e32	e23	e21	1860	1590	1660	1470	55	411
8	20	130	e118	e31	e23	e21	2060	1560	1670	1430	63	488
9	21	122	e115	e31	e23	e21	2240	1540	1740	1400	64	507
10	21	117	e111	e30	e22	e21	2390	1540	1850	1370	67	504
11	21	113	e104	e30	e22	e21	2480	1540	1960	1320	63	495
12	25	e113	e100	e29	e22	e21	2560	1580	2020	1250	57	478
13	32	e118	e95	e29	e22	e21	2630	1670	2080	1200	52	471
14	31	e119	e90	e28	e22	e21	2670	1770	2090	1170	48	515
15	33	e117	e85	e27	e22	e21	2690	1860	2070	1170	45	552
16	39	e115	e80	e27	e22	e21	2710	1960	2020	1150	46	548
17	63	e110	e78	e26	e22	e21	2720	2020	1960	1110	50	529
18	272	e100	e74	e26	e22	e22	2710	2050	1880	1060	62	501
19	443	e100	e70	e25	e22	e23	2690	2060	1800	993	65	461
20	451	e100	e67	e25	e22	e24	2660	2030	1720	923	61	409
21	443	e105	e64	e25	e22	e25	2610	1990	1630	850	56	345
22	399	e108	e60	e24	e22	e28	2560	1970	1530	780	51	287
23	355	e110	e57	e24	e22	e31	2480	1930	1470	706	54	247
24	314	e115	e54	e24	e22	e40	2420	1890	1390	631	60	220
25	278	e115	e51	e24	e21	e60	2370	1860	1330	550	62	195
26	254	e120	e48	e23	e21	e100	2320	1810	1450	467	61	176
27	237	e120	e45	e23	e21	e200	2270	1750	1590	404	58	167
28	225	e125	e43	e23	e21	e300	2210	1690	1650	348	54	164
29	214	e125	e42	e23	---	e600	2140	1620	1670	296	49	164
30	209	e130	e40	e23	---	e800	2070	1560	1650	235	44	164
31	204	---	e38	e23	---	e900	---	1530	---	167	41	---
TOTAL	4656.4	3826	2633	862	621	3510	66020	55270	51320	31410	1844	9634
MEAN	150	128	84.9	27.8	22.2	113	2201	1783	1711	1013	59.5	321
MAX	451	197	134	37	23	900	2720	2060	2090	1600	120	552
MIN	3.8	100	38	23	21	21	1000	1530	1330	167	41	39
AC-FT	9240	7590	5220	1710	1230	6960	131000	109600	101800	62300	3660	19110
CFSM	.14	.12	.08	.03	.02	.10	2.02	1.64	1.57	.93	.05	.29
IN.	.16	.13	.09	.03	.02	.12	2.25	1.89	1.75	1.07	.06	.33

e Estimated

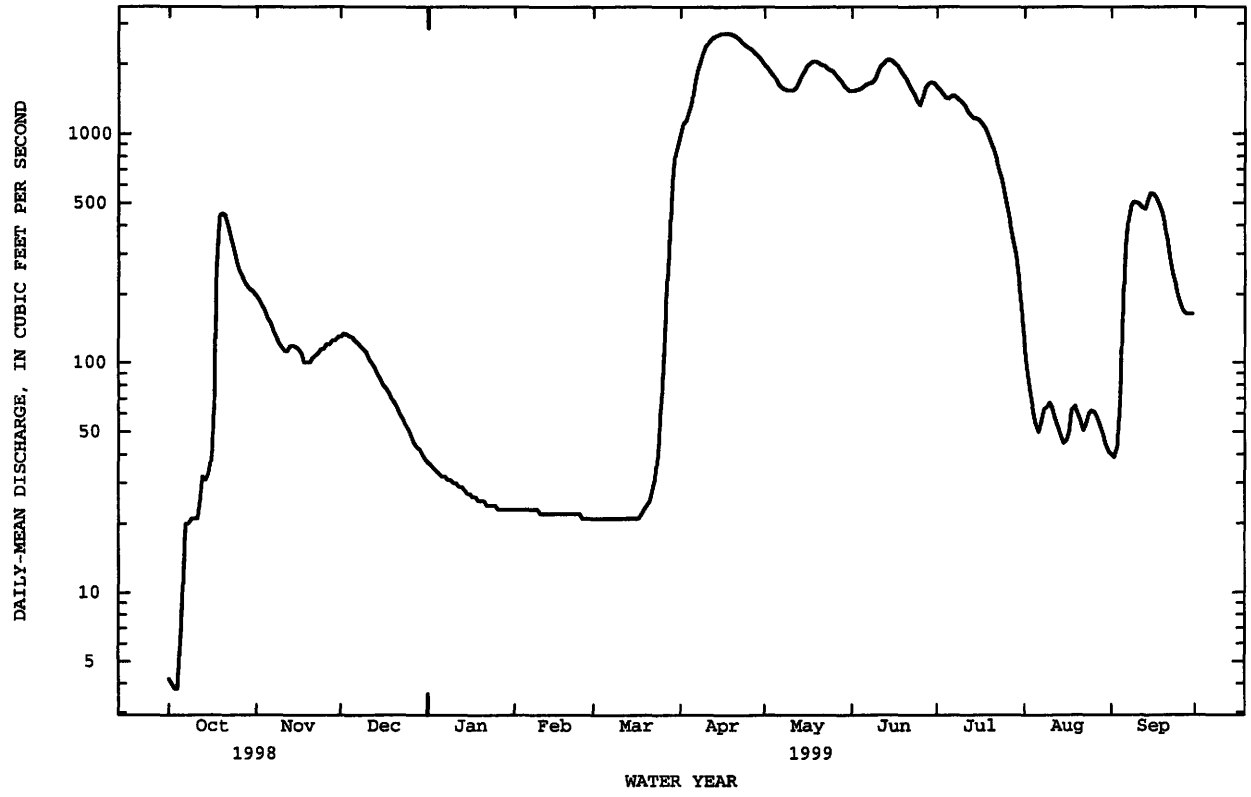
05107500 ROSEAU RIVER AT ROSS, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1928 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	134	93.6	31.8	16.1	13.6	84.8	885	928	504	303	121	131
MAX	974	512	107	66.5	99.2	551	3234	4583	2258	1494	1352	1041
(WY)	1942	1957	1978	1997	1998	1946	1966	1950	1970	1968	1968	1968
MIN	1.91	1.63	.27	.001	.000	2.76	32.1	29.5	6.83	1.39	.84	.38
(WY)	1991	1977	1977	1977	1977	1989	1991	1988	1980	1980	1961	1990

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1928 - 1999	
ANNUAL TOTAL	116816.0		231606.4			
ANNUAL MEAN	320		635		271[a]	
HIGHEST ANNUAL MEAN					725	1950
LOWEST ANNUAL MEAN					28.9	1934
HIGHEST DAILY MEAN	1640	May 21	2720	Apr 17	6510	May 12 1950
LOWEST DAILY MEAN	3.8	Oct 3	3.8	Oct 3,4	.00[b]	Aug 29 1961
ANNUAL SEVEN-DAY MINIMUM	3.9	Sep 18	7.5	Oct 1	.00	Jan 3 1977
INSTANTANEOUS PEAK FLOW			2730	Apr 16	6560	May 12 1950
INSTANTANEOUS PEAK STAGE			15.15	Apr 16	18.25	May 12 1950
INSTANTANEOUS LOW FLOW			3.6	Oct 3	.00[c]	Aug 29 1961
ANNUAL RUNOFF (AC-FT)	231700		459400		196400	
ANNUAL RUNOFF (CFSM)	.29		.58		.25	
ANNUAL RUNOFF (INCHES)	3.99		7.90		3.38	
10 PERCENT EXCEEDS	925		1960		870	
50 PERCENT EXCEEDS	125		125		40	
90 PERCENT EXCEEDS	14		22		6.0	

a Median of annual mean discharges is 239 ft^3/s.
b Several days in 1961, 1977, and 1980.
c Many days, several years.



05112000 ROSEAU RIVER BELOW STATE DITCH 51, NEAR CARIBOU, MN

LOCATION.--Lat 48°58'54", long 96°27'46", in SE¼SW¼ sec. 34, T.164 N., R.45 W., Kittson County, Hydrologic Unit 09020314, on left bank 400 ft downstream from State ditch 51 (known locally as Caribou cutoff ditch) and 0.6 mi west of Caribou.

DRAINAGE AREA.--1,420 mi^2.

PERIOD OF RECORD.--April to October 1917, April 1920 to current year (no winter records in water years 1931, 1932, 1934-36, 1938-40, 1944-72). Published as "at Caribou," prior to April 1929; as "below Cutoff ditch, near Caribou" April 1929 to September 1936. Records published for both sites April 1929 to September 1930. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WSP 1308: 1938(M). WSP 1508: 1917(M), 1920, 1932(M), 1934-35(M). WSP 1913: 1954(M).

GAGE.--Water-stage recorder. Datum of gage is 1,002.31 ft above sea level (levels by Geodetic Survey of Canada). Prior to Apr. 1, 1929, nonrecording gage at site at Caribou 0.6 mi upstream at datum 0.95 ft lower.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Satellite telemeter at station. Some regulation from wildlife management impoundments several miles upstream of gage. Occasionally, at high stages, there is some natural diversion of flow above station to headwaters of Two Rivers.

COOPERATION.--Red Lake Watershed Management Board.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of 1916 is reported to have reached a stage of about 15.5 ft at former site.

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	24	233	e144	e42	e29	e27	e800	2430	2070	1970	346	47
2	24	228	e140	e41	e29	e27	e820	2390	2050	1950	246	45
3	26	293	e140	e40	e29	e27	e840	2350	2030	1940	187	44
4	26	316	e138	e39	e29	e27	e900	2320	2060	1930	148	51
5	31	302	e135	e38	e29	e27	e950	2340	2050	1920	124	65
6	37	286	e132	e37	e28	e27	e1050	2330	2030	1890	106	129
7	33	276	e130	e36	e28	e27	e1170	2300	2050	1860	104	294
8	31	263	e128	e35	e28	e27	e1700	2260	2030	1840	100	401
9	41	246	e125	e34	e28	e27	2110	2210	2030	1870	106	480
10	40	233	e122	e34	e28	e27	2170	2190	2070	1860	123	522
11	44	e235	e119	e33	e28	e27	2240	2220	2050	1830	120	535
12	53	e230	e117	e32	e28	e27	2300	2200	2040	1800	108	535
13	44	e250	e115	e32	e28	e28	2370	2180	2020	1770	97	518
14	50	e290	e112	e31	e28	e28	2420	2150	2010	1780	85	515
15	55	e280	e108	e30	e28	e28	2450	2140	2020	1770	76	542
16	55	e240	e105	e30	e28	e28	2470	2120	2030	1750	77	582
17	64	e200	e100	e29	e28	e29	2490	2100	2040	1710	75	597
18	87	e180	e95	e29	e28	e29	2520	2080	2050	1680	73	592
19	251	e150	e90	e29	e28	e30	2540	2060	2060	1650	78	572
20	423	e160	e85	e29	e27	e31	2560	2060	2070	1610	84	537
21	472	e200	e80	e29	e27	e35	2580	2050	2080	1580	82	491
22	480	e195	e75	e29	e27	e37	2580	2090	2080	1540	75	420
23	453	e190	e70	e29	e27	e37	2580	2150	2130	1490	91	353
24	409	e180	e65	e29	e27	e37	2580	2150	2130	1420	93	297
25	364	e170	e60	e29	e27	e39	2570	2150	2090	1350	88	256
26	322	e165	e56	e29	e27	e45	2560	2140	2120	1260	87	222
27	288	e160	e53	e29	e27	e100	2540	2120	2100	1150	83	196
28	267	e155	e50	e29	e27	e200	2520	2100	2040	1020	74	184
29	257	e150	e48	e29	---	e350	2490	2080	2010	871	64	185
30	248	e147	e46	e29	---	e590	2470	2070	2000	683	57	182
31	240	---	e44	e29	---	e760	---	2090	---	495	50	---
TOTAL	5239	6603	3027	999	780	2785	62340	67620	61640	49239	3307	10389
MEAN	169	220	97.6	32.2	27.9	89.8	2078	2181	2055	1588	107	346
MAX	480	316	144	42	29	760	2580	2430	2130	1970	346	597
MIN	24	147	44	29	27	27	800	2050	2000	495	50	44
AC-FT	10390	13100	6000	1980	1550	5520	123700	134100	122300	97670	6560	20610
CFSM	.12	.16	.07	.02	.02	.06	1.46	1.54	1.45	1.12	.08	.24
IN.	.14	.17	.08	.03	.02	.07	1.63	1.77	1.61	1.29	.09	.27

e Estimated

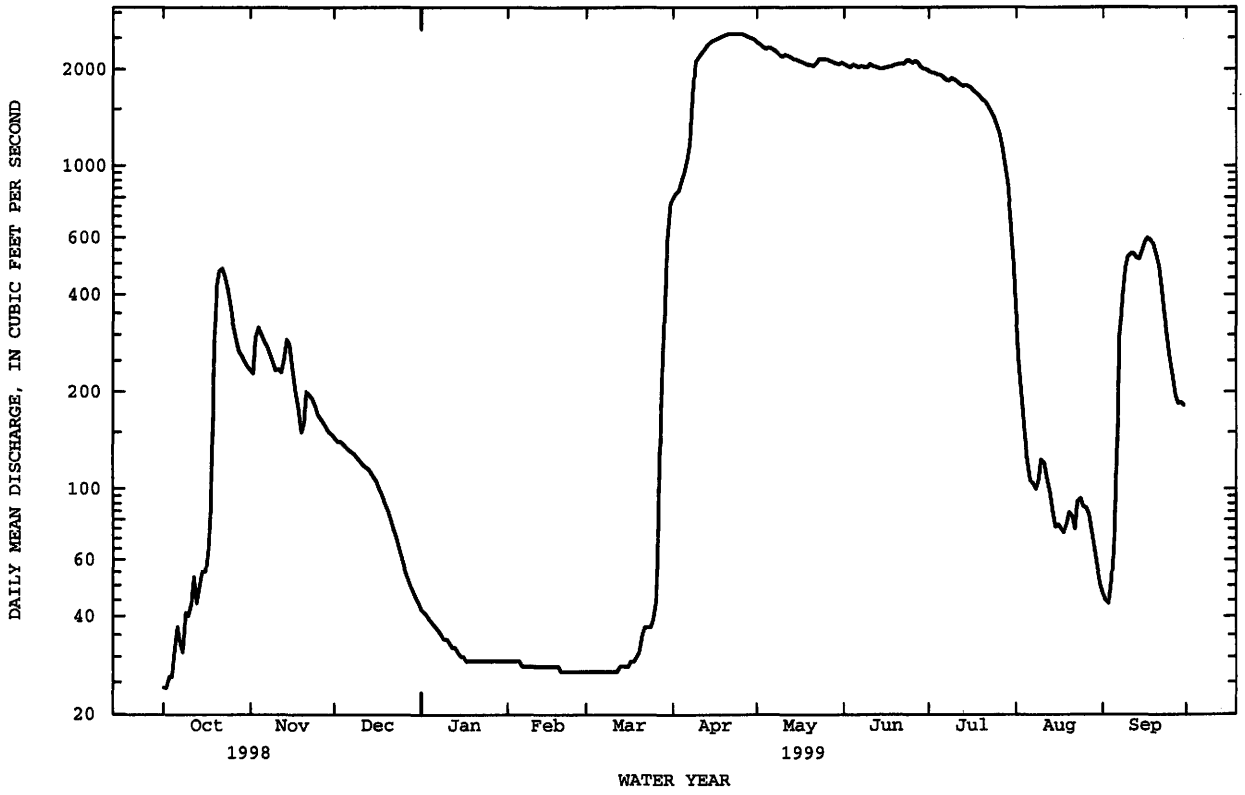
05112000 ROSEAU RIVER BELOW STATE DITCH 51, NEAR CARIBOU, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1917 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	172	138	54.2	27.0	22.4	130	833	971	615	421	157	178
MAX	1302	712	303	134	75.4	793	2168	3029	2588	1653	1582	1451
(WY)	1942	1995	1995	1927	1997	1995	1966	1950	1970	1968	1993	1968
MIN	.12	.26	.53	.090	.060	1.57	38.2	26.9	6.70	.65	2.09	.30
(WY)	1991	1991	1991	1991	1991	1989	1981	1988	1980	1980	1936	1990

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1917 - 1999	
ANNUAL TOTAL	157226		273968			
ANNUAL MEAN	431		751		321	
HIGHEST ANNUAL MEAN					751	1999
LOWEST ANNUAL MEAN					35.9	1977
HIGHEST DAILY MEAN	1590	May 29	2580	Apr 21-24	4020	May 19 1950
LOWEST DAILY MEAN	17	Sep 17	24	Oct 1,2	.00[a]	Sep 15 1990
ANNUAL SEVEN-DAY MINIMUM	18	Sep 12	27	Feb 20	.04	Sep 12 1990
INSTANTANEOUS PEAK FLOW			2590	Apr 22	4080	May 19 1950
INSTANTANEOUS PEAK STAGE			9.60	Apr 22	11.81	May 19 1950
INSTANTANEOUS LOW FLOW			24[b]	Oct 1	.00[a]	Aug 13 1936
ANNUAL RUNOFF (AC-FT)	311900		543400		232400	
ANNUAL RUNOFF (CFSM)	.30		.53		.23	
ANNUAL RUNOFF (INCHES)	4.12		7.18		3.07	
10 PERCENT EXCEEDS	1210		2150		1230	
50 PERCENT EXCEEDS	195		187		80	
90 PERCENT EXCEEDS	24		28		9.1	

a Many days, several years.
b Rising stage.



05124480 KAWISHIWI RIVER NEAR ELY, MN

LOCATION.--Lat 47°55'22", long 91°32'06", in SE¼SE¼ sec. 24, T.63 N., R.10 W., Lake County, Hydrologic Unit 09030001, in Superior National Forest, on left bank upstream from rapids, 2 mi upstream from South Kawishiwi River, 2.2 mi southwest of Fernberg Lookout Tower and 14 mi east of Ely.

DRAINAGE AREA.--254 mi^2.

PERIOD OF RECORD.--June 1966 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 1,450 ft above sea level, from topographic map.

REMARKS.--Records good.

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	24	99	168	200	107	72	90	581	379	205	471	126
2	23	98	171	194	107	72	95	569	377	210	435	124
3	23	96	173	191	105	71	99	556	372	211	403	127
4	22	94	177	187	102	71	107	539	360	223	373	148
5	22	93	198	183	100	70	114	523	360	282	344	145
6	23	93	219	179	97	68	127	513	357	333	323	136
7	23	93	225	174	95	67	134	507	363	414	306	133
8	23	94	230	169	94	66	151	497	366	504	289	149
9	23	95	232	164	92	66	174	481	371	599	274	154
10	23	102	235	161	90	65	197	476	368	630	268	157
11	22	113	237	156	e89	63	218	465	367	630	252	157
12	23	114	237	154	e88	62	239	456	362	614	274	157
13	22	116	237	149	e87	62	261	440	351	635	277	162
14	22	122	235	146	86	61	288	424	334	620	256	166
15	23	125	235	143	85	60	327	409	316	598	242	165
16	34	127	233	143	e84	59	368	408	308	628	235	163
17	64	129	231	140	e83	e58	404	406	292	617	225	161
18	81	136	234	140	e82	e58	434	391	278	606	218	159
19	87	146	234	137	82	e57	464	376	266	595	211	157
20	92	149	233	134	81	e57	488	388	250	583	200	153
21	94	149	234	130	79	e57	509	404	237	567	191	145
22	94	149	233	126	78	e57	531	405	235	549	183	141
23	94	152	229	123	77	e57	553	419	238	565	175	139
24	94	154	227	120	78	e57	571	423	227	608	168	135
25	97	154	223	118	77	57	586	419	216	641	162	142
26	99	155	220	115	76	57	594	415	209	649	156	228
27	100	156	217	e114	74	57	600	412	210	635	151	260
28	100	158	215	e113	74	67	603	403	203	618	143	286
29	100	159	216	e111	---	72	595	391	202	588	134	312
30	101	164	209	e110	---	73	589	378	205	549	127	331
31	101	---	204	109	---	79	---	382	---	512	128	---
TOTAL	1773	3784	6801	4533	2449	1975	10510	13856	8979	16218	7594	5118
MEAN	57.2	126	219	146	87.5	63.7	350	447	299	523	245	171
MAX	101	164	237	200	107	79	603	581	379	649	471	331
MIN	22	93	168	109	74	57	90	376	202	205	127	124
AC-FT	3520	7510	13490	8990	4860	3920	20850	27480	17810	32170	15060	10150
CFSM	.23	.50	.86	.58	.34	.25	1.38	1.76	1.18	2.06	.96	.67
IN.	.26	.55	1.00	.66	.36	.29	1.54	2.03	1.32	2.38	1.11	.75

e Estimated

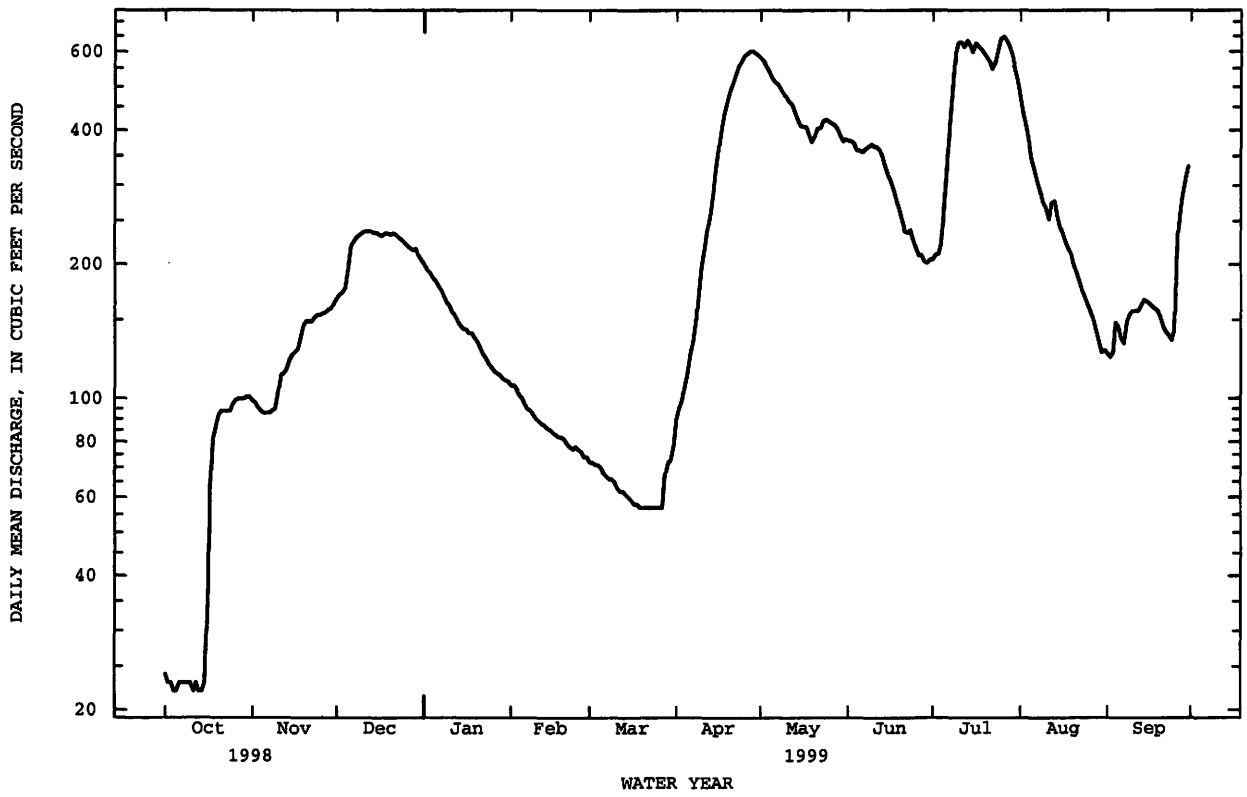
05124480 KAWISHIWI RIVER NEAR ELY, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1966 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	146	161	135	92.8	67.7	56.4	240	652	378	213	144	136
MAX	881	684	345	163	107	85.2	785	1133	1070	523	758	698
(WY)	1978	1971	1983	1984	1971	1969	1976	1979	1970	1999	1988	1988
MIN	12.1	9.43	7.25	5.32	4.77	5.87	8.95	13.3	115	65.1	36.0	18.5
(WY)	1977	1977	1977	1977	1977	1977	1977	1977	1977	1998	1998	1976

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1966 - 1999	
ANNUAL TOTAL	40120		83590			
ANNUAL MEAN	110		229		203	
HIGHEST ANNUAL MEAN					313	1971
LOWEST ANNUAL MEAN					81.3	1998
HIGHEST DAILY MEAN	455	Apr 26	649	Jul 26	1710	Apr 24 1976
LOWEST DAILY MEAN	18	Jan 16	22[a]	Oct 4	4.5[b]	Jan 31 1977
ANNUAL SEVEN-DAY MINIMUM	18	Feb 1	23	Oct 8	4.6	Jan 29 1977
INSTANTANEOUS PEAK FLOW			658	Jul 26	1720	Apr 24 1976
INSTANTANEOUS PEAK STAGE			4.80	Jul 26	5.92	Apr 24 1976
INSTANTANEOUS LOW FLOW			20	Oct 5	4.5	Jan 30 1977
ANNUAL RUNOFF (AC-FT)	79580		165800		147100	
ANNUAL RUNOFF (CFSM)	.43		.90		.80	
ANNUAL RUNOFF (INCHES)	5.88		12.24		10.86	
10 PERCENT EXCEEDS	278		517		510	
50 PERCENT EXCEEDS	59		166		107	
90 PERCENT EXCEEDS	19		66		36	

a Also occurred Oct. 5, 11, 13, and 14.
b Occurred Jan. 31 to Feb. 2, 1977.



05127000 KAWISHIWI RIVER NEAR WINTON, MN

LOCATION.--Lat 47°56'05", long 91°45'50", in NE¼NW¼ sec. 20, T.63 N., R.11 W., Lake County, Hydrologic Unit 09030001, Superior National Forest, at power plant of Minnesota Power Co., just upstream from Fall Lake, and 1.8 mi east of Winton.

DRAINAGE AREA.--1,229 mi^2.

PERIOD OF RECORD.--June 1905 to June 1907, October 1912 to September 1919 (fragmentary), September 1923 to current year. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WDR MN-77-1: Drainage area.

REMARKS.--No estimated daily discharges. Records good. Daily discharge computed from power plant records. Flow regulated by power plant and by Camp Six, Bald Eagle, Gabbro, Little Gabbro, Birch, White Iron, South Farm, and Garden Lakes.

COOPERATION.--Records collected by Minnesota Power Co., under general supervision of the Geological Survey, in connection with a Federal Energy Regulatory Commission project.

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	60	1840	901	794	483	339	823	2650	2000	839	1410	491
2	60	1190	901	794	463	324	884	2260	1720	858	1400	372
3	60	794	902	794	409	295	840	2030	1630	898	1030	349
4	60	794	902	794	398	280	786	2030	1630	1240	794	689
5	60	795	902	774	398	280	798	2030	1630	2560	859	889
6	60	794	902	687	398	271	842	2030	1630	3260	900	888
7	237	702	981	655	398	245	902	2030	1630	4020	900	888
8	429	696	1170	656	398	231	1070	2030	1640	4370	900	824
9	428	591	1290	656	392	136	1420	2020	1640	4680	900	647
10	335	235	1410	656	320	214	1640	1910	1640	5620	900	563
11	60	656	1410	656	254	254	1640	1630	1630	5600	900	618
12	60	814	1410	626	273	226	1890	1890	1630	5630	1120	797
13	60	841	1410	607	303	264	2030	2140	1630	5680	1410	796
14	61	831	1410	607	311	282	2030	2210	1630	5420	1400	868
15	61	669	1410	578	330	282	2160	2260	1630	5270	1400	1070
16	188	305	1410	558	330	498	2450	2440	1200	5720	1090	1640
17	403	637	1120	558	330	795	2450	2720	898	5380	508	1430
18	490	607	904	558	330	794	2660	2800	898	4820	468	1280
19	458	858	904	566	330	615	2750	2790	899	4470	588	1280
20	449	902	904	558	330	313	2820	2780	898	4090	796	1040
21	470	902	903	558	342	235	2960	2600	898	3570	796	913
22	715	902	903	485	332	264	2950	2280	898	2850	576	1160
23	905	1050	903	507	339	299	2900	2480	898	2490	711	1160
24	905	1240	903	507	339	310	2970	2780	884	2780	586	1160
25	1470	1080	903	507	339	321	2980	2780	784	2760	523	1140
26	1850	1080	903	503	339	335	3090	2780	701	2580	597	1120
27	1830	1080	903	485	339	335	3190	2780	796	2100	545	1930
28	1830	1080	903	485	339	416	3170	2780	796	1370	612	2280
29	1830	1080	903	485	---	458	3010	2770	796	1360	589	2250
30	1840	969	845	485	---	458	2720	2770	802	1290	622	2300
31	1840	---	793	384	---	574	---	2510	---	1280	595	---
TOTAL	19564	26014	32318	18523	9886	10943	62825	73990	37986	104855	26425	32832
MEAN	631	867	1043	598	353	353	2094	2387	1266	3382	852	1094
MAX	1850	1840	1410	794	483	795	3190	2800	2000	5720	1410	2300
MIN	60	235	793	384	254	136	786	1630	701	839	468	349
AC-FT	38810	51600	64100	36740	19610	21710	124600	146800	75350	208000	52410	65120
CFSM	.51	.71	.85	.49	.29	.29	1.70	1.94	1.03	2.75	.69	.89
IN.	.59	.79	.98	.56	.30	.33	1.90	2.24	1.15	3.17	.80	.99
+	90.0	-55.9	-39.9	-219	-77.7	-97.2	487	-22.7	23.4	-2.91	-29.6	48.3
MEAN ‡	721	811	1003	379	275	256	2581	2364	1290	3380	823	1143
CFSM ‡	.59	.66	.82	.31	.22	.21	2.10	1.92	1.05	2.75	.67	.93
IN ‡	.68	.74	.95	.36	.23	.24	2.34	2.21	1.17	3.17	.77	1.04

CAL. YR.98 TOTAL 264,126 MEAN 724 MAX 3040 MIN 29 MEAN ‡ 733 CFSM ‡ .60 IN ‡ 8.10
WTR. YR 99 TOTAL 456,161 MEAN 1250 MAX 5720 MIN 60 MEAN ‡ 1258 CFSM ‡ 1.02 IN ‡ 13.90

+ Change in contents, equivalent in cubic feet per second, in Camp Six, Bald Eagle, Gabbro, Little Gabbro, Birch, White Iron, Farm, South Farm, and Garden Lakes.
‡ Adjusted for change in reservoir contents.

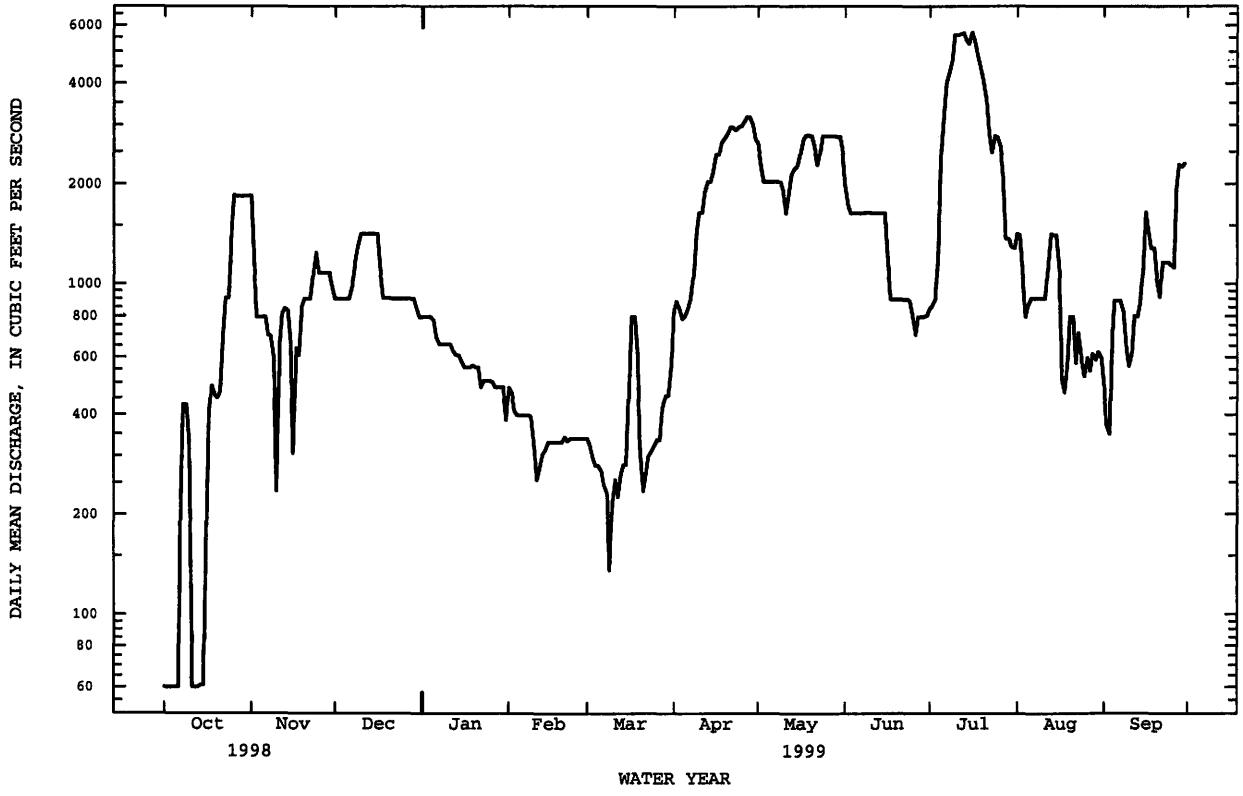
05127000 KAWISHIWI RIVER NEAR WINTON, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1905 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	884	759	596	455	350	378	1216	3114	1920	1179	685	738
MAX	4277	3572	1422	862	770	844	5020	9278	5661	3382	3775	3149
(WY)	1947	1971	1983	1978	1927	1945	1945	1950	1968	1999	1988	1928
MIN	66.5	8.97	76.1	80.3	74.5	103	19.3	111	519	217	51.7	38.1
(WY)	1924	1924	1977	1977	1977	1924	1924	1924	1980	1961	1919	1919

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1905 - 1999	
ANNUAL TOTAL	264126		456161			
ANNUAL MEAN	724		1250		1033	
HIGHEST ANNUAL MEAN					1967	1950
LOWEST ANNUAL MEAN					240	1924
HIGHEST DAILY MEAN	3040	Apr 28	5720	Jul 16	16000	May 18 1950
LOWEST DAILY MEAN	29	Aug 28	60	Oct 1-6,11-13	.00[a]	Aug 24 1905
ANNUAL SEVEN-DAY MINIMUM	30	Aug 28	85	Oct 1	.00	Oct 13 1923
ANNUAL RUNOFF (AC-FT)	523900		904800		748600	
ANNUAL RUNOFF (CFSM)	.59		1.02		.84	
ANNUAL RUNOFF (INCHES)	7.99		13.81		11.42	
10 PERCENT EXCEEDS	1840		2770		2440	
50 PERCENT EXCEEDS	453		898		595	
90 PERCENT EXCEEDS	60		312		194	

a Many days, several years.



05127500 BASSWOOD RIVER NEAR WINTON, MN
(International Gaging Station)

LOCATION.--Lat 48°04'57", long 91°39'09", in SE¼SE¼ sec. 30, T.65 N., R.10 W., Lake County, Hydrologic Unit 09030001, in Superior National Forest, on island in Jackfish Bay of Basswood Lake, used to determine discharge at outlet [lat 48°06'21", long 91°38'51", in sec. 19, T.65 N., R.10 W., on international boundary 14 mi northeast of Winton].

DRAINAGE AREA.--1,740 mi^2, approximately (above outlet of Basswood Lake).

PERIOD OF RECORD.--March to June 1924, September 1925 to March 1928, January 1930 to current year. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WSP 955: Drainage area. WSP 1145: 1935, 1937.

GAGE.--Water-stage recorder. Datum of gage is 1,296.80 ft above sea level, 1928 datum, (levels by Geodetic Survey of Canada). Prior to Oct. 27, 1938, nonrecording gages at several sites in vicinity of gage, at datum 3.0 ft higher. Oct. 28, 1938 to Sept. 30, 1966, water-stage recorder at datum 3.0 ft higher.

REMARKS.--Records good. Satellite telemeter at station. Some regulation by power plant on Kawishiwi River at Winton, and by many lakes located upstream from station.

COOPERATION.--This station is one of the international gaging stations maintained by the United States under agreement with Canada.

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	151	739	1100	1320	830	597	680	3690	3240	1540	3330	1160
2	147	767	1100	1300	824	589	726	3660	3180	1500	3170	1150
3	144	776	1110	1270	811	585	776	3620	3090	1500	3050	1170
4	139	783	1130	1260	801	581	855	3530	3000	1560	2900	1260
5	137	790	1200	1240	785	573	929	3440	2910	1740	2730	1230
6	142	797	1230	1210	769	566	1030	3390	2840	1840	2600	1210
7	137	802	1260	1200	763	556	1100	3350	2820	2020	2480	1210
8	136	804	1270	1170	747	546	1190	3270	2770	2320	2370	1190
9	135	810	1280	1150	732	541	1280	3220	2710	2700	2270	1180
10	136	838	1320	1120	729	533	1420	3220	2640	3050	2170	1170
11	139	837	1340	1090	717	518	1550	3150	2590	3420	2070	1160
12	141	829	1370	1080	710	509	1700	3100	2530	3770	2130	1140
13	140	836	1400	1070	703	502	1860	3010	2450	4270	2150	1150
14	140	853	1420	1050	688	493	2010	2950	2380	4610	2120	1160
15	143	862	1430	1030	674	487	2200	2920	2330	4880	2110	1160
16	175	869	1450	1010	675	476	2380	2940	2270	5170	2090	1180
17	222	857	1470	998	671	494	2530	2960	2200	5290	2060	1210
18	233	879	1470	989	666	537	2670	2970	2110	5380	1990	1250
19	246	890	1470	986	653	558	2810	3010	2020	5400	1890	1270
20	260	904	1450	969	641	570	2970	3110	1930	5350	1810	1300
21	273	920	1440	958	634	576	3110	3180	1850	5250	1740	1310
22	285	924	1430	943	629	573	3250	3220	1810	5120	1680	1300
23	296	929	1410	921	617	568	3390	3240	1810	4950	1620	1300
24	318	961	1390	906	623	557	3490	3230	1740	4730	1550	1320
25	348	969	1380	892	616	550	3550	3220	1680	4590	1500	1350
26	389	995	1370	879	612	544	3600	3220	1630	4410	1440	1590
27	443	1020	1350	879	604	542	3640	3230	1650	4280	1400	1670
28	517	1040	1360	879	600	588	3660	3240	1600	4160	1320	1750
29	599	1060	1360	869	---	610	3690	3240	1550	3940	1270	1870
30	651	1070	1350	854	---	622	3710	3230	1570	3750	1230	1970
31	697	---	1330	841	---	643	---	3270	---	3520	1190	---
TOTAL	8059	26410	41440	32333	19524	17184	67756	100030	68900	116010	63430	39340
MEAN	260	880	1337	1043	697	554	2259	3227	2297	3742	2046	1311
MAX	697	1070	1470	1320	830	643	3710	3690	3240	5400	3330	1970
MIN	135	739	1100	841	600	476	680	2920	1550	1500	1190	1140
AC-FT	15990	52380	82200	64130	38730	34080	134400	198400	136700	230100	125800	78030
CFSM	.15	.51	.77	.60	.40	.32	1.30	1.85	1.32	2.15	1.18	.75
IN.	.17	.56	.89	.69	.42	.37	1.45	2.14	1.47	2.48	1.36	.84

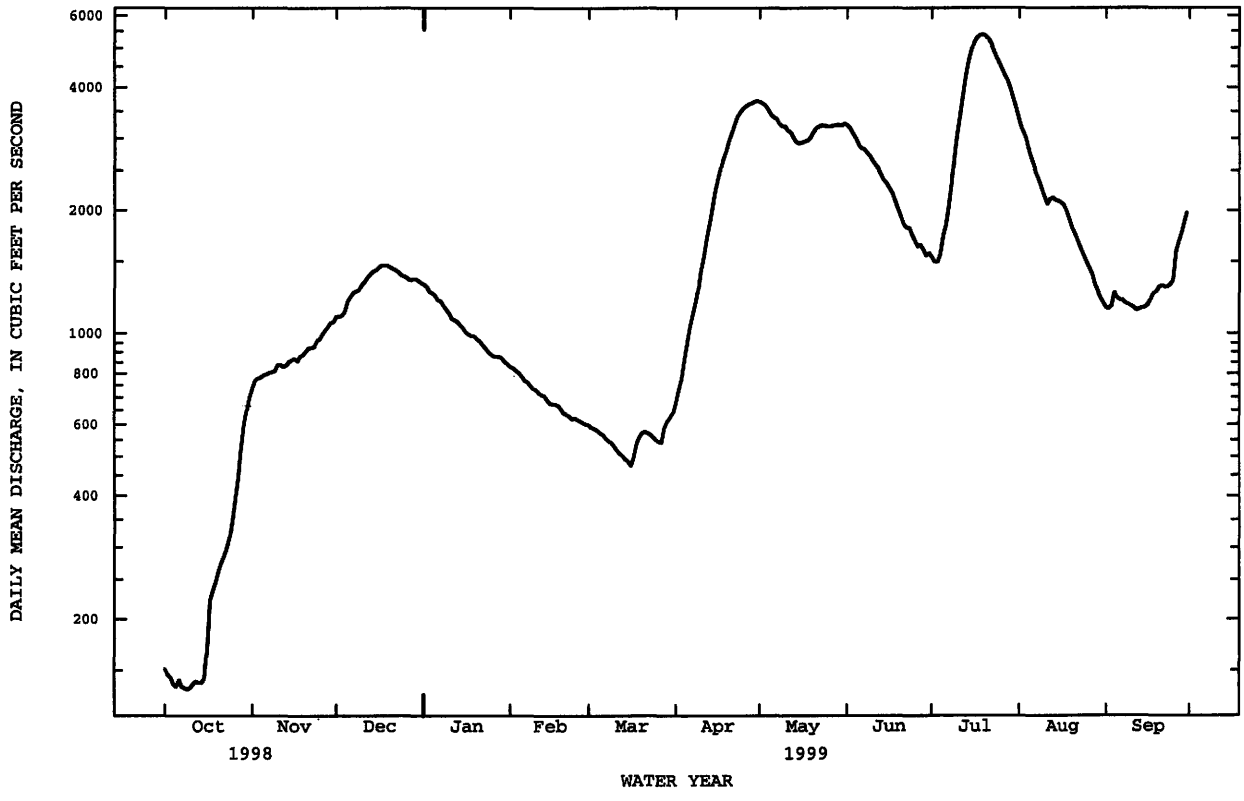
05127500 BASSWOOD RIVER NEAR WINTON, MN--Continued
(International Gaging Station)

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	1069	1012	882	731	601	573	1230	3726	2853	1844	1116	984
MAX	5320	3879	2510	1475	1229	1143	5069	9114	7332	4453	3487	5034
(WY)	1978	1971	1983	1966	1966	1966	1945	1950	1950	1944	1944	1988
MIN	65.1	60.2	76.2	86.2	95.0	135	269	225	696	512	278	120
(WY)	1977	1977	1977	1977	1977	1977	1977	1977	1980	1980	1998	1976

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1931 - 1999	
ANNUAL TOTAL	269984		600416			
ANNUAL MEAN	740		1645		1398	
HIGHEST ANNUAL MEAN					2643	1950
LOWEST ANNUAL MEAN					557	1958
HIGHEST DAILY MEAN	2570	Apr 26	5400	Jul 19	15200	May 24 1950
LOWEST DAILY MEAN	135	Oct 9	135	Oct 9	58	Nov 3 1976
ANNUAL SEVEN-DAY MINIMUM	137	Oct 4	137	Oct 4	58	Nov 7 1976
INSTANTANEOUS PEAK FLOW			5420	Jul 18	15600	May 24 1950
INSTANTANEOUS PEAK STAGE			6.09	Jul 18	9.94a	May 24 1950
INSTANTANEOUS LOW FLOW			133	Oct 5	55	Nov 18 1976
ANNUAL RUNOFF (AC-FT)	535500		1191000		1013000	
ANNUAL RUNOFF (CFSM)	.43		.95		.80	
ANNUAL RUNOFF (INCHES)	5.77		12.84		10.92	
10 PERCENT EXCEEDS	1670		3340		3240	
50 PERCENT EXCEEDS	394		1260		868	
90 PERCENT EXCEEDS	178		535		371	

a Present datum.



05128000 NAMAKAN RIVER AT OUTLET OF LAC LA CROIX, ONTARIO
(International Gaging Station)

LOCATION.--Lat 48°21'14", long 92°13'01", at Campbell's Camp, on Lac La Croix Lake, used to determine discharge at outlet [Lat 48°23'00", long 92°10'40", 2.5 mi east of Campbell's Camp].

DRAINAGE AREA.--5,170 mi^2.

PERIOD OF RECORD.--September 1921 to January 1922, April 1922 to current year, in reports of Geological Survey. Monthly discharge only for some periods, published in WSP 1308. August 1921 to current year, in reports of Water Survey of Canada.

GAGE.--Water-stage recorder. Gage readings have been reduced to elevations, United States and Canada Boundary Survey datum. Prior to October 1933, nonrecording gages at various sites on Lac la Croix. October 1933 to Mar. 13, 1963, nonrecording gage at present site and datum.

REMARKS.--Records furnished by Water Survey of Canada. Satellite telemeter at station.

COOPERATION.--This station is one of the international stations maintained by Canada under agreement with the United States.

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	689	915	1880	2620	2220	1880	1890	7770	8830	5540	8300	4480
2	692	929	1920	2620	2210	1860	1930	7880	8760	5440	8190	4450
3	689	939	1940	2610	2190	1850	1970	7980	8720	5370	8050	4450
4	685	946	1970	2610	2180	1840	2060	8050	8650	5330	7880	4560
5	692	964	2030	2600	2160	1820	2130	8090	8580	5370	7730	4450
6	689	978	2040	2590	2140	1810	2240	8120	8510	5230	7590	4410
7	675	996	2100	2580	2130	1800	2330	8160	8400	5190	7450	4340
8	685	1020	2130	2570	2120	1780	2440	8160	8330	5230	7310	4270
9	678	1040	2180	2550	2110	1780	2590	8160	8230	5300	7170	4240
10	678	1080	2210	2550	2090	1770	2750	8300	8120	5330	6920	4170
11	678	1110	2250	2530	2070	1750	2960	8260	8050	5330	6750	4170
12	664	1170	2270	2520	2050	1740	3190	8260	7910	5330	6670	4130
13	675	1230	2310	2510	2040	1730	3430	8190	7700	5620	6530	4100
14	678	1260	2340	2490	2030	1720	3670	8120	7560	5760	6360	4100
15	678	1300	2360	2490	2010	1710	3960	8020	7420	5970	6320	4100
16	699	1350	2380	2460	2020	1700	4200	8050	7310	6180	6290	4060
17	749	1380	2400	2450	2020	1710	4450	8090	7170	6460	6180	4030
18	745	1450	2430	2430	2010	1750	4730	8050	7030	6750	6070	3990
19	749	1490	2450	2430	1990	1750	4980	8120	6890	7030	6000	3960
20	763	1550	2490	2420	1970	1740	5260	8230	6780	7310	5900	3920
21	773	1590	2520	2400	1960	1730	5540	8300	6640	7560	5790	3880
22	780	1610	2530	2380	1950	1720	5830	8400	6530	7800	5690	3850
23	788	1620	2550	2360	1920	1700	6070	8550	6430	8020	5580	3850
24	802	1690	2560	2340	1930	1690	6320	8650	6250	8160	5440	3810
25	819	1680	2560	2330	1920	1680	6570	8690	6180	8370	5330	3810
26	830	1730	2570	2310	1920	1680	6850	8760	6040	8370	5230	3880
27	837	1770	2590	2300	1900	1670	7100	8760	5930	8510	5090	3920
28	855	1790	2600	2290	1890	1750	7270	e8830	5830	8580	4940	3960
29	883	1820	2620	2270	---	1800	7450	e8830	5690	8580	4840	3990
30	872	1830	2620	2250	---	1820	7630	e8860	5650	8550	4730	3960
31	893	---	2620	2240	---	1840	---	8860	---	8400	4590	---
TOTAL	23062	40227	72420	76100	57150	54570	129790	257550	220120	205970	196910	123290
MEAN	744	1341	2336	2455	2041	1760	4326	8308	7337	6644	6352	4110
MAX	893	1830	2620	2620	2220	1880	7630	8860	8830	8580	8300	4560
MIN	664	915	1880	2240	1890	1670	1890	7770	5650	5190	4590	3810
AC-FT	45740	79790	143600	150900	113400	108200	257400	510900	436600	408500	390600	244500
CFSM	.14	.26	.45	.47	.39	.34	.84	1.61	1.42	1.29	1.23	.79
IN.	.17	.29	.52	.55	.41	.39	.93	1.85	1.58	1.48	1.42	.89

e Estimated

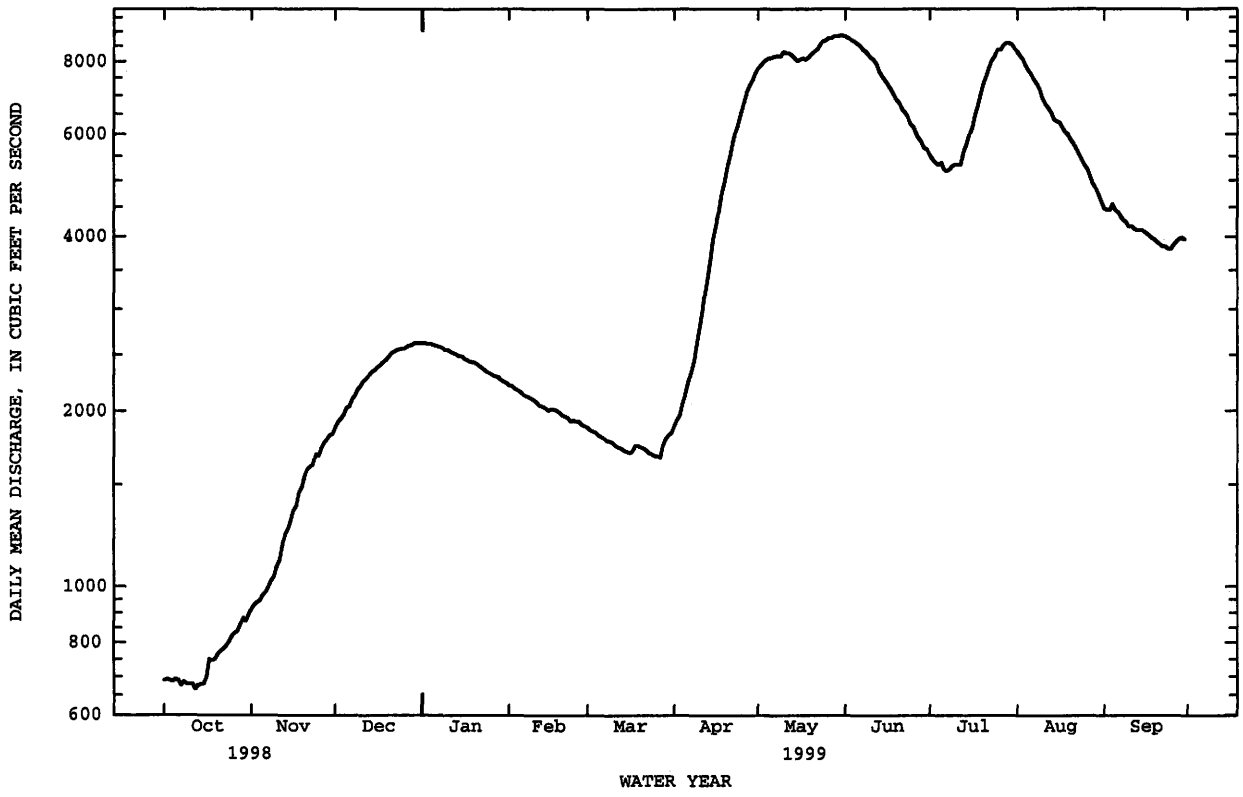
05128000 NAMAKAN RIVER AT OUTLET OF LAC LA CROIX, ONTARIO--Continued
(International Gaging Station)

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1921 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	3034	2895	2598	2196	1892	1680	2581	7670	7971	6095	4055	3157
MAX	14200	10610	7189	4568	3432	2996	9071	16900	22120	15930	11200	13140
(WY)	1978	1978	1972	1978	1966	1966	1945	1938	1950	1968	1944	1988
MIN	744	624	567	547	540	535	614	899	1475	1263	1123	774
(WY)	1999	1977	1977	1977	1924	1924	1977	1977	1924	1924	1998	1998

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1921 - 1999	
ANNUAL TOTAL	580284		1457159			
ANNUAL MEAN	1590		3992		3837	
HIGHEST ANNUAL MEAN					7270	1950
LOWEST ANNUAL MEAN					964	1924
HIGHEST DAILY MEAN	3510	May 14	8860[a]	May 30,31	28200[b]	May 31 1950
LOWEST DAILY MEAN	664	Oct 12	664	Oct 12	535	Feb 4 1924
ANNUAL SEVEN-DAY MINIMUM	676	Oct 9	676	Oct 9	535	Feb 4 1924
INSTANTANEOUS PEAK FLOW			8930	May 31	28200	May 31 1950
INSTANTANEOUS PEAK STAGE			1186.84	May 31	1193.30[b]	May 31 1950
INSTANTANEOUS LOW FLOW			636	Oct 12	535[c]	Feb 1 1924
ANNUAL RUNOFF (AC-FT)	1151000		2890000		2780000	
ANNUAL RUNOFF (CFSM)	.31		.77		.74	
ANNUAL RUNOFF (INCHES)	4.18		10.48		10.08	
10 PERCENT EXCEEDS	2840		8160		8330	
50 PERCENT EXCEEDS	1180		2600		2670	
90 PERCENT EXCEEDS	765		972		1180	

a Estimated May 30.
b Occurred May 31 to June 2, 1950.
c Many days in 1924.



05129115 VERMILION RIVER NEAR CRANE LAKE, MN

LOCATION.--Lat 48°15'53", long 92°33'57", in NE¼NE¼ sec. 30, T.67 N., R.17 W., St. Louis County, Hydrologic Unit 09030002, in Superior National Forest, on left bank 350 ft downstream from bridge on Forest Route 491, 3.5 mi upstream from mouth, and 3.5 mi west of city of Crane Lake.

DRAINAGE AREA.-- 905 mi^2.

PERIOD OF RECORD.--August 1979 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 1,180 ft above sea level, from topographic map.

REMARKS.--Records good except those for estimated daily discharges, which are fair.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of April 1979 reached a stage of 15.15 ft, from high-water mark, discharge about 4,600 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	56	346	502	e325	e215	e180	1030	1410	1400	749	1230	698
2	51	340	527	e320	e215	e180	1170	1350	1350	795	1190	682
3	50	333	544	e315	e210	e180	1260	1300	1300	825	1140	709
4	47	317	547	e310	e210	e180	1340	1250	1250	854	1100	946
5	45	300	559	e300	e205	e175	1500	1210	1210	975	1050	1120
6	58	288	588	e290	e205	e175	1650	1210	1180	1230	1010	1160
7	63	281	602	e285	e200	e175	1770	1230	1150	1430	995	1140
8	64	275	602	e285	e200	173	1940	1220	1110	1530	967	1120
9	64	270	595	e280	e200	175	2210	1200	1080	1610	937	1080
10	61	274	575	e275	e196	176	2510	1210	1050	1660	919	1040
11	62	e280	553	e270	e195	176	2690	1310	1010	1650	890	996
12	69	e285	536	e265	e190	174	2660	1380	980	1610	904	971
13	67	e292	517	e260	e190	172	2590	1420	928	1620	1010	976
14	66	e302	501	e255	e190	172	2500	1410	869	1640	1100	981
15	69	e312	e471	e252	e185	170	2400	1360	824	1660	1160	983
16	108	329	e455	e250	e185	176	2320	1310	786	1680	1220	972
17	311	331	e440	e249	e185	190	2230	1320	751	1710	1180	952
18	565	336	e430	e248	e180	190	2160	1370	720	1710	1130	928
19	608	346	e420	e247	e180	191	2090	1380	692	1680	1110	897
20	601	354	e410	e246	e180	194	2030	1470	666	1640	1060	855
21	578	359	e400	e245	e180	192	1960	1660	641	1590	1010	835
22	541	363	e390	e243	e180	190	1890	1730	622	1550	962	809
23	498	373	e380	e240	e180	190	1830	1800	611	1530	925	782
24	453	383	e370	e235	e180	186	1770	1870	589	1480	894	756
25	419	395	e360	e230	e180	182	1710	1870	546	1440	868	740
26	408	402	e350	e230	e180	181	1640	1830	528	1410	844	761
27	397	409	e345	e225	e180	196	1590	1750	579	1370	820	796
28	383	414	e345	e225	e180	239	1540	1670	657	1350	788	835
29	372	423	e340	e225	---	414	1500	1580	706	1320	754	864
30	373	459	e330	e220	---	710	1450	1490	727	1300	732	884
31	360	---	e325	e220	---	849	---	1440	---	1270	723	---
TOTAL	7867	10171	14309	8065	5356	7103	56930	45010	26512	43868	30622	27268
MEAN	254	339	462	260	191	229	1898	1452	884	1415	988	909
MAX	608	459	602	325	215	849	2690	1870	1400	1710	1230	1160
MIN	45	270	325	220	180	170	1030	1200	528	749	723	682
AC-FT	15600	20170	28380	16000	10620	14090	112900	89280	52590	87010	60740	54090
CFSM	.28	.37	.51	.29	.21	.25	2.10	1.60	.98	1.56	1.09	1.00
IN.	.32	.42	.59	.33	.22	.29	2.34	1.85	1.09	1.80	1.26	1.12

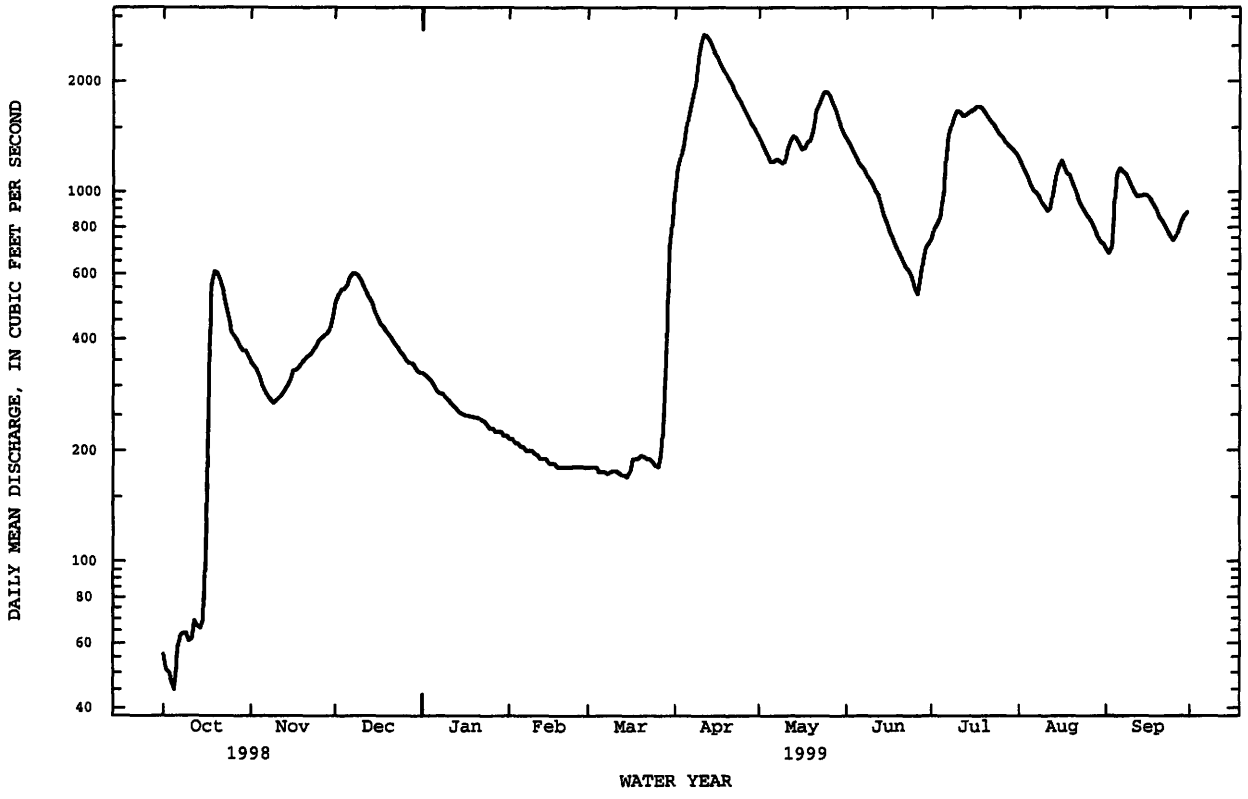
e Estimated

05129115 VERMILION RIVER NEAR CRANE LAKE, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1979 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	567	539	419	293	241	297	1186	1402	934	807	498	483
MAX	1436	1138	872	476	374	574	2030	2496	1840	1609	1612	1880
(WY)	1996	1983	1983	1996	1997	1995	1997	1996	1985	1985	1988	1988
MIN	110	152	116	97.8	94.1	89.5	627	507	205	113	60.0	69.1
(WY)	1998	1988	1988	1988	1988	1988	1987	1980	1980	1980	1980	1998

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1979 - 1999	
ANNUAL TOTAL	121962		283081			
ANNUAL MEAN	334		776		641	
HIGHEST ANNUAL MEAN					922	1996
LOWEST ANNUAL MEAN					280	1998
HIGHEST DAILY MEAN	993	Apr 9	2690	Apr 11	4300	Apr 25 1985
LOWEST DAILY MEAN	45	Oct 5	45	Oct 5	38	Aug 13 1980
ANNUAL SEVEN-DAY MINIMUM	52	Sep 30	53	Oct 1	40	Aug 10 1980
INSTANTANEOUS PEAK FLOW			2710	Apr 11	4360	Apr 25 1985
INSTANTANEOUS PEAK STAGE			12.67	Apr 11	15.20	Apr 25 1985
INSTANTANEOUS LOW FLOW			44	Oct 5	38	Aug 13 1980
ANNUAL RUNOFF (AC-FT)	241900		561500		464700	
ANNUAL RUNOFF (CFSM)	.37		.86		.71	
ANNUAL RUNOFF (INCHES)	5.01		11.64		9.63	
10 PERCENT EXCEEDS	620		1640		1440	
50 PERCENT EXCEEDS	317		602		432	
90 PERCENT EXCEEDS	71		180		156	



05129290 GOLD PORTAGE OUTLET FROM KABETOGAMA LAKE NEAR RAY, MN

LOCATION.--Lat 48°31'28", long 93°04'29", in SW¼NE¼ sec. 30, T.70 N., R.21 W., St. Louis County, Hydrologic Unit 09030003, on right bank in bay at head of Gold Portage Outlet from Kabetogama Lake, 9.8 mi northeast of Ray.

PERIOD OF RECORD.--October 1982 to September 1993, October 1993 to September 1994 (peak gage height and discharge only), October 1997 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 1,100 ft above sea level, adjustment of 1912 (U.S. Army Corp of Engineers benchmark), water surface transfer.

REMARKS.--Records good. Flow completely regulated by outlet dam on Namakan Lake.

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	128	157	121	16	.00	.00	.00	4.9	319	558	619	610
2	133	158	118	15	.00	.00	.00	5.7	321	556	618	627
3	133	155	113	13	.00	.00	.00	7.2	332	560	611	652
4	136	153	112	12	.00	.00	.00	8.8	346	563	601	671
5	142	152	109	11	.00	.00	.00	9.9	345	546	598	666
6	135	151	101	9.7	.00	.00	.00	12	357	532	599	667
7	123	153	103	9.0	.00	.00	.00	14	360	542	599	675
8	131	152	99	7.9	.00	.00	.00	16	371	567	600	656
9	129	153	96	7.1	.00	.00	.00	20	385	568	607	645
10	127	146	88	6.0	.00	.00	.00	31	388	568	597	640
11	132	139	81	5.5	.00	.00	.00	36	398	573	612	650
12	120	152	74	4.6	.00	.00	.00	41	402	584	632	648
13	121	160	68	4.2	.00	.00	.00	47	390	614	631	633
14	129	157	63	3.8	.00	.00	.00	51	393	625	635	634
15	126	158	56	3.3	.00	.00	.00	54	407	639	642	641
16	129	163	52	2.5	.00	.00	.00	59	416	630	633	639
17	139	163	47	2.2	.00	.00	.12	64	425	644	637	643
18	135	169	44	1.3	.00	.00	.43	70	445	650	646	634
19	140	160	39	1.2	.00	.00	.87	85	461	654	656	615
20	146	161	36	.77	.00	.00	1.2	101	474	655	653	612
21	152	162	33	.68	.00	.00	1.5	116	487	655	647	581
22	152	156	32	.34	.00	.00	1.8	143	498	654	641	598
23	153	146	29	.00	.00	.00	2.0	161	493	655	634	586
24	154	153	27	.00	.00	.00	2.2	181	489	645	635	584
25	160	139	25	.00	.00	.00	2.4	200	514	661	636	578
26	157	137	24	.00	.00	.00	2.7	224	526	630	636	576
27	155	135	22	.00	.00	.00	3.4	244	528	642	622	579
28	157	132	20	.00	.00	.00	3.8	259	542	646	609	571
29	165	129	19	.00	---	.00	4.1	273	547	644	619	575
30	155	119	18	.00	---	.00	4.5	284	566	643	622	549
31	156	---	17	.00	---	.00	---	301	---	618	621	---
TOTAL	4350	4520	1886	137.09	0.00	0.00	31.02	3123.5	12925	18921	19348	18635
MEAN	140	151	60.8	4.42	.000	.000	1.03	101	431	610	624	621
MAX	165	169	121	16	.00	.00	4.5	301	566	661	656	675
MIN	120	119	17	.00	.00	.00	.00	4.9	319	532	597	549
AC-FT	8630	8970	3740	272	.00	.00	62	6200	25640	37530	38380	36960

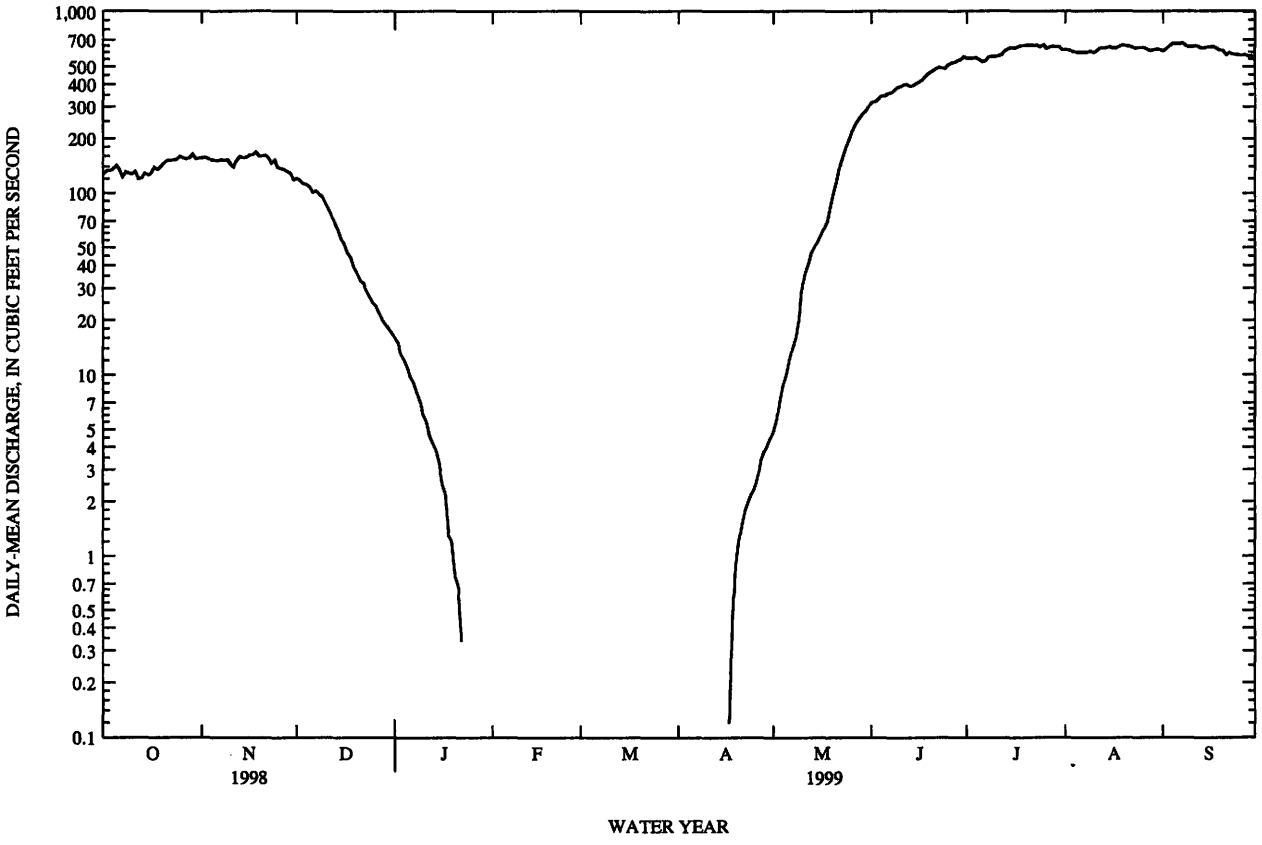
05129290 GOLD PORTAGE OUTLET FROM KABETOGAMA LAKE NEAR RAY, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1983 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	377	196	77.8	15.4	.95	.000	.35	112	367	567	571	536
MAX	530	267	149	45.1	7.34	.002	1.66	307	583	683	686	787
(WY)	1986	1990	1992	1990	1990	1990	1985	1986	1985	1985	1988	1988
MIN	140	115	16.5	1.10	.000	.000	.000	.000	96.0	323	288	181
(WY)	1999	1988	1988	1988	1983	1983	1983	1987	1987	1998	1998	1998

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1983 - 1999	
ANNUAL TOTAL	41899.75		83876.61			
ANNUAL MEAN	115		230		236	
HIGHEST ANNUAL MEAN					280	1986
LOWEST ANNUAL MEAN					141	1998
HIGHEST DAILY MEAN	341	Jul 20	675	Sep 7	876	Sep 22 1988
LOWEST DAILY MEAN	.00	Feb 3	.00	Jan 23 to Apr 16	.00[a]	Jan 21 1983
ANNUAL SEVEN-DAY MINIMUM	.00	Feb 3	.00	Jan 23	.00	Jan 21 1983
INSTANTANEOUS PEAK FLOW			691	Sep 4	897	Sep 21 1988
INSTANTANEOUS PEAK STAGE			18.48	Jul 25	19.23	Sep 21 1988
ANNUAL RUNOFF (AC-FT)	83110		166400		171200	
10 PERCENT EXCEEDS	305		635		593	
50 PERCENT EXCEEDS	113		129		147	
90 PERCENT EXCEEDS	.00		.00		.00	

a Many days each year.



05129400 RAINY LAKE NEAR FORT FRANCES, ONTARIO
(International Gaging Station)

LOCATION.--Lat 48°38'30", long 93°20'00", at Five Mile dock, approximately 5 mi northeast of city of Fort Frances.

PERIOD OF RECORD.--January 1910 to September 1917 and October 1934 to current year, in reports of Geological Survey. August 1911 to current year, in reports of Water Survey of Canada. Prior to October 1949, published as "at Ranier, Minn.", and as "at Fort Frances, Ontario" October 1949 to September 1964.

GAGE.--Water-stage recorder. Datum of gage is sea level (United States and Canadian Boundary Survey). January 1910 to December 1949, nonrecording gage 3 mi northeast at Ranier, Minn., at same datum. January 1950 to October 1964, water-stage recorder on Government dock at Pither's Point at Fort Frances, and supplementary gage in town pumping station, 0.5 mi south, used during winter months, at same datum.

REMARKS.-- Records furnished by Water Survey of Canada.

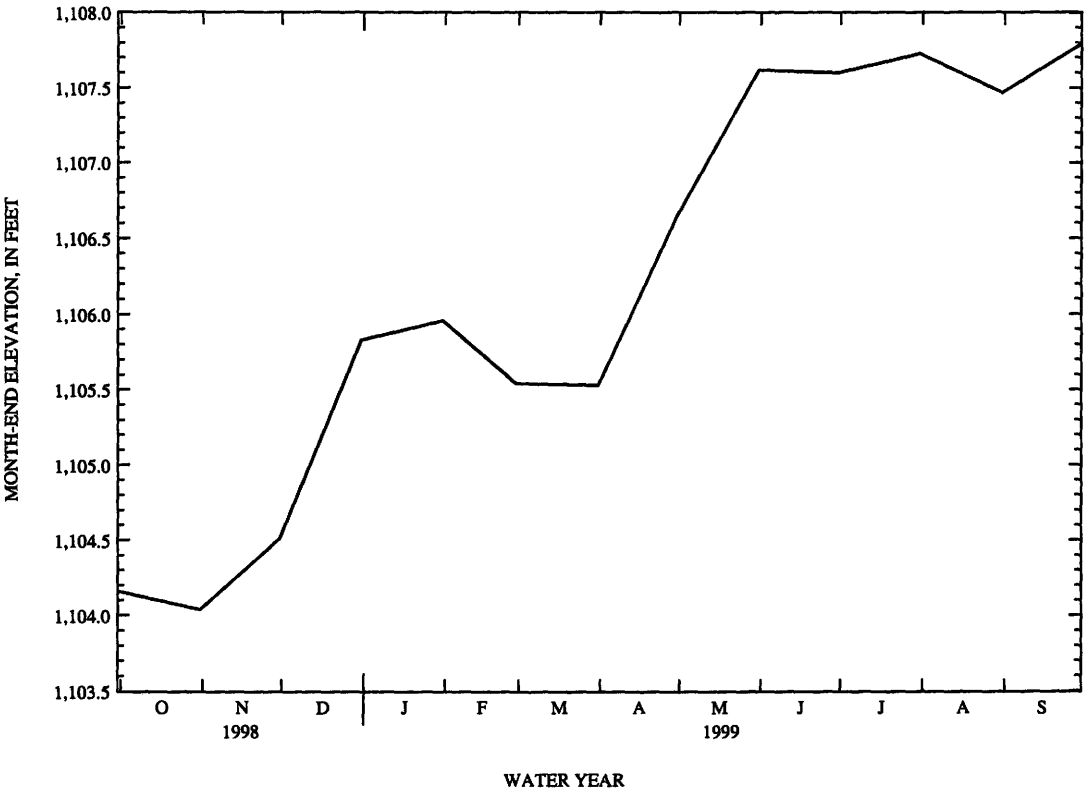
COOPERATION.--This station is one of the international gaging stations maintained by Canada under agreement with the United States.

EXTREMES FOR PERIOD OF RECORD.--Maximum elevation observed, 1,112.97 ft, July 5, 1950; minimum observed, 1,101.26 ft, Apr. 17, 1923, Apr. 2, 1930.

EXTREMES FOR CURRENT YEAR.--Maximum elevation, 1,108.28 ft, July 15; maximum daily, 1108.09 ft, July 15, 16; minimum elevation, 1,103.91 ft, Oct 14; minimum daily, 1103.95 ft, Oct. 13.

MONTH-END ELEVATION, IN SEA LEVEL, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

Oct. 31	1104.04	Apr. 30	1106.65
Nov. 30	1104.51	May 31	1107.62
Dec. 31	1105.83	June 30	1107.60
Jan. 31	1105.96	July 31	1107.73
Feb. 28	1105.54	Aug. 31	1107.47
Mar. 31	1105.53	Sep. 30	1107.79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MONTH-END ELEVATION, IN FEET
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WATER YEAR

05130500 STURGEON RIVER NEAR CHISHOLM, MN

LOCATION.--Lat 47°40'25", long 92°54'00", in NE¼NW¼ sec. 20, T.60 N., R.20 W., St. Louis County, Hydrologic Unit 09030005, on left bank 1,000 ft upstream from County Highway 65 bridge, 0.6 mi downstream from East Branch Sturgeon River, and 11.5 mi north of Chisholm.

DRAINAGE AREA.--180 mi^2.

PERIOD OF RECORD.--August 1942 to current year.

REVISED RECORDS.--WSP 1438: 1946.

GAGE.--Water-stage recorder. Datum of gage is 1,305.7 ft above sea level. Prior to Aug. 24, 1944, nonrecording gage at site 1,000 ft downstream at different datum. Aug. 25, 1944 to Sept. 30, 1975 at present site at datum 1.00 ft higher.

REMARKS.--Records good except those for estimated daily discharges, which are fair.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 500 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Apr 2	0230	729	4.32	Jul 7	0330	*2,400	*6.68
Apr 7	1800	857	4.57	Jul 18	1830	572	3.98

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	36	163	e175	e61	e34	e33	618	154	125	282	176	118
2	35	153	e180	e59	e34	e33	625	144	119	323	161	122
3	35	142	e180	e56	e34	e33	575	137	107	321	146	145
4	36	134	e180	e54	e34	e33	600	132	91	303	134	243
5	37	127	e190	e51	e34	e32	731	133	89	906	122	270
6	49	119	e210	e48	e35	e32	806	157	92	1840	123	260
7	55	114	e235	e45	e35	e31	840	212	94	2280	121	248
8	57	110	e235	e43	e35	e31	825	244	90	1740	117	228
9	72	106	e225	e40	e35	e31	780	248	84	1410	113	208
10	75	e110	e205	e38	e35	e31	709	275	87	1080	117	193
11	63	e115	e180	e37	e35	e31	622	302	82	889	113	180
12	60	e120	e165	e35	e35	e31	540	388	76	720	135	177
13	55	130	e145	e34	e35	e31	476	446	69	585	240	177
14	51	130	e140	e33	e35	e32	426	439	61	476	279	174
15	56	127	e130	e33	e35	e32	394	395	56	393	296	173
16	136	125	e124	e33	e35	e33	375	353	55	464	278	165
17	246	122	e118	e33	e35	e34	357	347	50	494	238	158
18	335	111	e112	e33	e35	e35	337	357	45	558	315	151
19	375	102	e106	e33	e35	e37	320	344	41	542	365	146
20	366	e105	e100	e33	e34	e39	297	327	38	453	347	138
21	311	e115	e96	e33	e34	e41	280	321	35	371	287	135
22	253	e120	e91	e34	e34	e44	260	320	43	308	240	130
23	209	e125	e87	e34	e34	e47	244	308	71	262	213	127
24	183	e130	e83	e34	e34	e50	229	289	109	225	188	124
25	179	e135	e79	e34	e33	55	217	265	121	210	175	124
26	200	e140	e76	e34	e32	62	203	237	112	259	165	177
27	207	e140	e73	e34	e32	79	190	201	173	257	165	204
28	205	e140	e71	e34	e33	193	181	179	195	259	182	235
29	194	e140	e68	e34	---	339	175	157	197	236	144	224
30	184	e150	e65	e34	---	437	165	138	209	214	134	194
31	173	---	e63	e34	---	552	---	131	---	193	126	---
TOTAL	4528	3800	4187	1205	960	2554	13397	8080	2816	18853	5955	5348
MEAN	146	127	135	38.9	34.3	82.4	447	261	93.9	608	192	178
MAX	375	163	235	61	35	552	840	446	209	2280	365	270
MIN	35	102	63	33	32	31	165	131	35	193	113	118
AC-FT	8980	7540	8300	2390	1900	5070	26570	16030	5590	37390	11810	10610
CFSM	.81	.70	.75	.22	.19	.46	2.48	1.45	.52	3.38	1.07	.99
IN.	.94	.79	.87	.25	.20	.53	2.77	1.67	.58	3.90	1.23	1.11

e Estimated

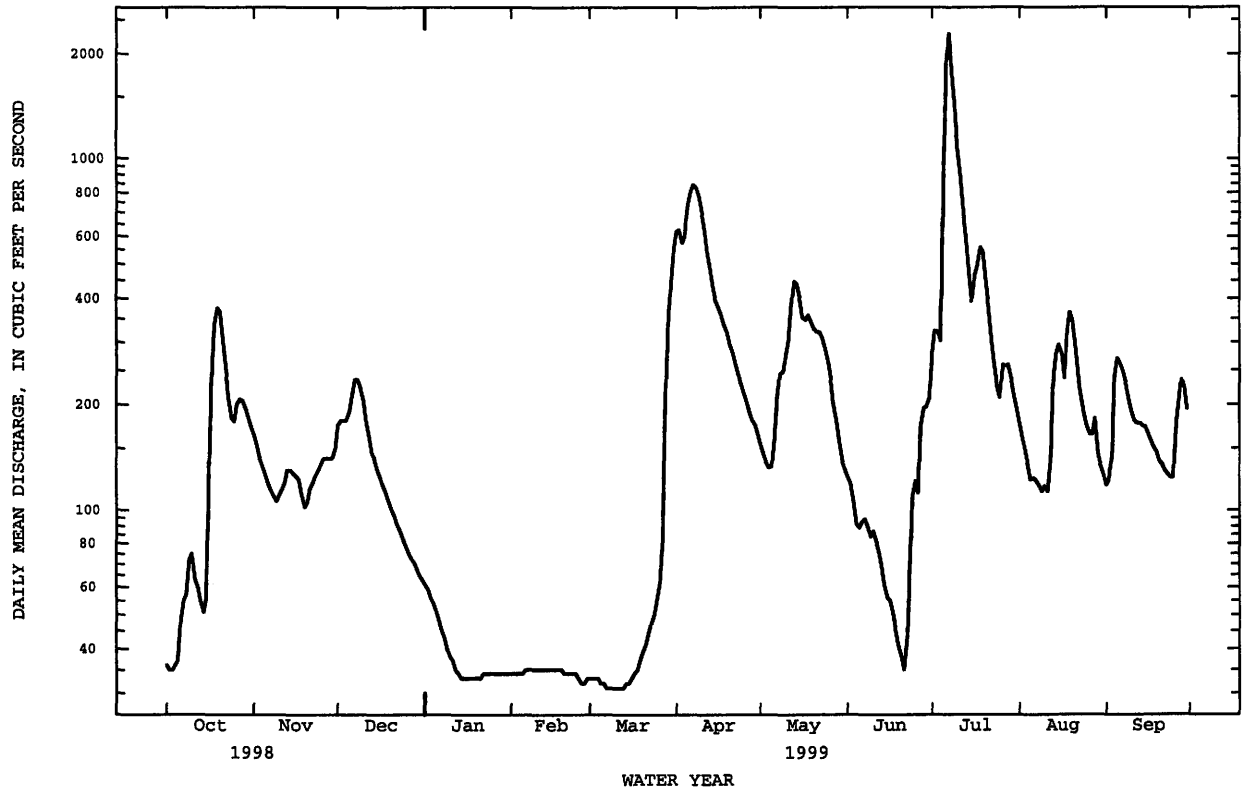
05130500 STURGEON RIVER NEAR CHISHOLM, MN--Continued

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

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	122	94.6	49.4	29.4	23.9	51.2	369	300	181	128	73.1	93.5
MAX	600	264	135	66.0	47.7	337	868	1451	528	623	268	424
(WY)	1996	1978	1999	1966	1984	1945	1948	1950	1944	1993	1988	1977
MIN	7.85	8.90	4.82	3.98	4.54	10.0	41.0	22.9	14.7	5.99	12.6	4.60
(WY)	1977	1977	1977	1977	1977	1957	1977	1977	1988	1988	1961	1976

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1942 - 1999	
ANNUAL TOTAL	32089		71683			
ANNUAL MEAN	87.9		196		126	
HIGHEST ANNUAL MEAN					218	1996
LOWEST ANNUAL MEAN					63.1	1977
HIGHEST DAILY MEAN	375	Oct 19	2280	Jul 7	3530	May 8 1950
LOWEST DAILY MEAN	18	Sep 12	31a	Mar 7-13	2.5	Jul 30 1988
ANNUAL SEVEN-DAY MINIMUM	20	Sep 7	31	Mar 7	3.0	Jul 24 1988
INSTANTANEOUS PEAK FLOW			2400	Jul 7	3630	May 7 1950
INSTANTANEOUS PEAK STAGE			6.68	Jul 7	7.41b	May 7 1950
ANNUAL RUNOFF (AC-FT)	63650		142200		91590	
ANNUAL RUNOFF (CFSM)	.49		1.09		.70	
ANNUAL RUNOFF (INCHES)	6.63		14.81		9.54	
10 PERCENT EXCEEDS	194		390		297	
50 PERCENT EXCEEDS	62		134		59	
90 PERCENT EXCEEDS	26		34		18	

a Estimated.
b Present datum.



05131448 WOOD DUCK CREEK NEAR NETT LAKE, MN

LOCATION.-- Lat 48°09'24", long 93°08'20", in SW¼SW¼ sec. 35, T.66 N., R.22 W., Koochiching County, Hydrologic Unit 09030005, at bridge on Tribal Service Road, 2.9 miles above mouth at Nett Lake, and 3.5 miles northwest of the town of Nett Lake.

PERIOD OF RECORD.-- October 1995 to current year.

GAGE.-- Water-stage recorder. Elevation of gage 1,275 ft above sea level (from topographic map).

REMARKS.-- Records good except those for estimated daily discharges, which are poor.

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	.00	5.7	e13	e.86	e.00	e.00	e94	31	14	6.2	12	2.4
2	.00	e5.6	e17	e.76	e.00	e.00	e102	28	12	7.0	10	2.4
3	.00	e5.3	e16	e.66	e.00	e.00	e96	26	9.6	8.3	9.7	6.6
4	.00	e5.0	e15	e.58	e.00	e.00	e102	24	7.9	13	9.0	43
5	.00	e4.8	e19	e.50	e.00	e.00	e113	22	8.4	22	8.5	86
6	.53	4.4	e24	e.43	e.00	e.00	e160	22	9.4	51	8.4	106
7	.54	4.0	e32	e.36	e.00	e.00	e210	25	13	62	9.2	100
8	.23	3.8	e26	e.32	e.00	e.00	281	27	13	50	9.0	78
9	.03	3.9	e19	e.28	e.00	e.00	282	27	11	46	9.6	62
10	.00	4.6	e15	e.24	e.00	e.00	240	49	12	53	9.1	60
11	.01	5.6	e12	e.21	e.00	e.00	223	89	12	52	9.3	56
12	.41	e5.6	e9.0	e.18	e.00	e.00	196	151	11	40	19	51
13	.57	e5.6	e6.7	e.15	e.00	e.00	176	165	11	30	45	55
14	.81	e5.8	e5.8	e.13	e.00	e.00	158	136	9.5	26	37	60
15	.92	e5.8	e5.1	e.10	e.00	e.00	144	105	7.8	22	40	61
16	2.1	e5.8	e4.5	e.08	e.00	e.00	140	85	7.2	26	52	56
17	4.9	e5.8	e4.1	e.06	e.00	e.00	128	63	6.4	27	41	50
18	6.0	5.8	e3.7	e.04	e.00	e.00	120	45	5.9	24	32	45
19	8.1	6.3	e3.4	e.02	e.00	e.00	117	34	5.6	21	27	40
20	6.4	e6.3	e3.2	e.00	e.00	e.00	107	34	5.2	18	23	35
21	5.1	e6.3	e2.8	e.00	e.00	e.00	99	54	5.1	15	18	32
22	4.9	6.3	e2.6	e.00	e.00	e.00	93	84	5.5	13	14	29
23	5.7	6.5	e2.4	e.00	e.00	e.00	82	97	5.2	12	11	26
24	5.3	6.6	e2.1	e.00	e.00	e.00	72	101	4.5	10	9.4	25
25	6.0	7.1	e1.9	e.00	e.00	e.00	63	89	4.3	9.8	7.9	23
26	7.0	7.4	e1.7	e.00	e.00	e.00	55	65	4.3	11	6.6	38
27	6.4	7.5	e1.5	e.00	e.00	e.60	50	47	4.0	11	5.4	55
28	6.3	7.7	e1.3	e.00	e.00	e5.0	45	35	3.9	11	4.2	57
29	6.1	8.2	e1.2	e.00	---	e25	39	26	4.0	18	3.7	56
30	6.0	11	e1.1	e.00	---	e52	35	20	4.9	18	3.4	45
31	6.2	---	e1.0	e.00	---	e74	---	17	---	14	3.0	---
TOTAL	96.55	180.1	273.1	5.96	0.00	156.60	3822	1823	237.6	747.3	506.4	1441.4
MEAN	3.11	6.00	8.81	.19	.000	5.05	127	58.8	7.92	24.1	16.3	48.0
MAX	8.1	11	32	.86	.00	74	282	165	14	62	52	106
MIN	.00	3.8	1.0	.00	.00	.00	35	17	3.9	6.2	3.0	2.4
AC-FT	192	357	542	12	.00	311	7580	3620	471	1480	1000	2860
CFSM	.10	.19	.28	.01	.00	.16	4.01	1.85	.25	.76	.51	1.51
IN.	.11	.21	.32	.01	.00	.18	4.47	2.13	.28	.87	.59	1.69

e Estimated

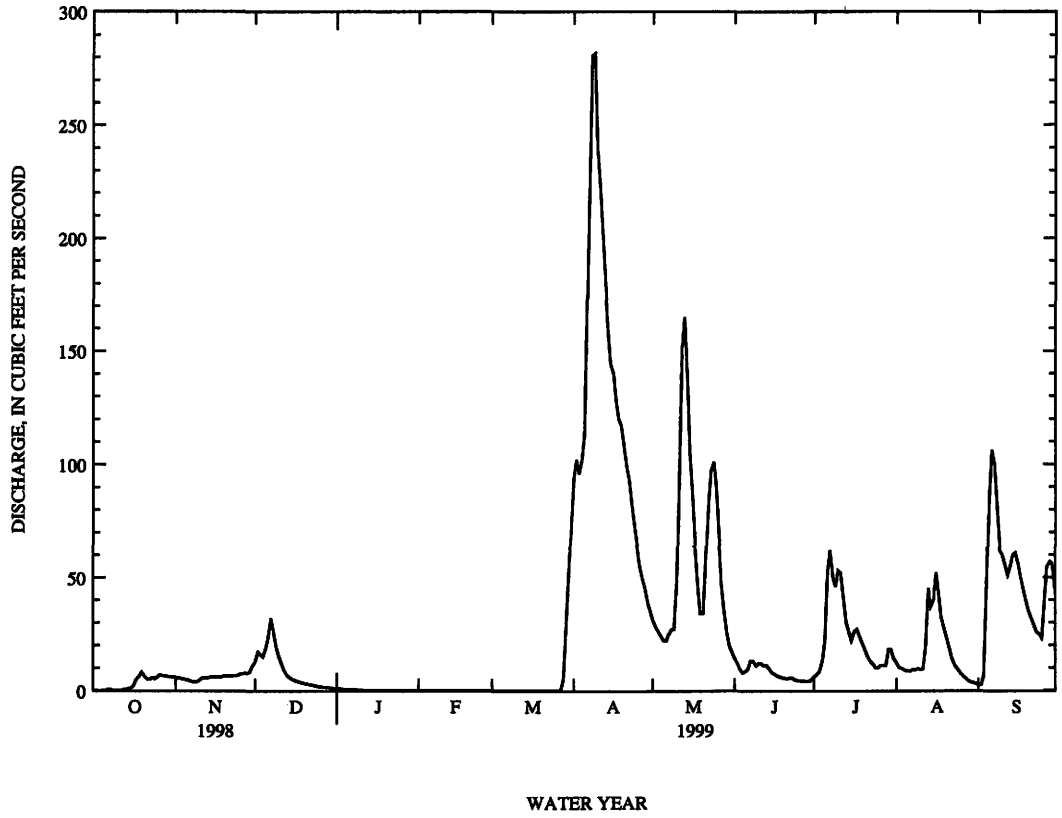
05131448 WOOD DUCK CREEK NEAR NETT LAKE, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1996 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	26.5	20.1	7.72	2.82	2.52	5.52	96.6	65.6	8.46	21.3	15.8	18.0
MAX	65.4	37.9	11.7	6.18	4.61	10.9	127	136	11.3	32.5	45.0	48.0
(WY)	1996	1997	1997	1997	1998	1998	1999	1996	1997	1996	1996	1999
MIN	3.11	6.00	3.05	.19	.000	2.25	45.9	18.4	6.78	5.50	.83	.042
(WY)	1999	1999	1998	1999	1999	1996	1998	1998	1998	1998	1998	1998

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1996 - 1999	
ANNUAL TOTAL	3439.02		9290.01			
ANNUAL MEAN	9.42		25.5		24.3	
HIGHEST ANNUAL MEAN					37.4	1996
LOWEST ANNUAL MEAN					9.77	1998
HIGHEST DAILY MEAN	60	Apr 14	282	Apr 9	282	Apr 9 1999
LOWEST DAILY MEAN	.00	Sep 8	.00	Oct 1[a]	.00	Sep 8 1998[b]
ANNUAL SEVEN-DAY MINIMUM	.00	Sep 8	.00	Jan 20	.00	Sep 8 1998
INSTANTANEOUS PEAK FLOW			300	Apr 9	322	May 1 1996
INSTANTANEOUS PEAK STAGE			11.13	Apr 9	12.88[c]	Apr 7 1997
INSTANTANEOUS LOW FLOW			.00	Oct 1[a]	.00	Sep 7 1998[b]
ANNUAL RUNOFF (AC-FT)	6820		18430		17590	
ANNUAL RUNOFF (CFSM)	.30		.80		.76	
ANNUAL RUNOFF (INCHES)	4.02		10.87		10.37	
10 PERCENT EXCEEDS	25		80		57	
50 PERCENT EXCEEDS	5.0		6.7		7.8	
90 PERCENT EXCEEDS	.22		.00		.60	

a Many days.
b Many days in 1998 and 1999.
c From highwater mark, backwater from ice.



05131450 NETT LAKE AT NETT LAKE, MN

LOCATION.-- Lat 48°06'57", long 93°05'58", in NE¼SE¼ sec. 13, T.65 N., R.22 W., Koochiching County, Hydrologic Unit 09030005, on Boise de Forte Indian Reservation at Nett Lake town boat ramp.

PERIOD OF RECORD.-- June 1998 to current year (no winter record).

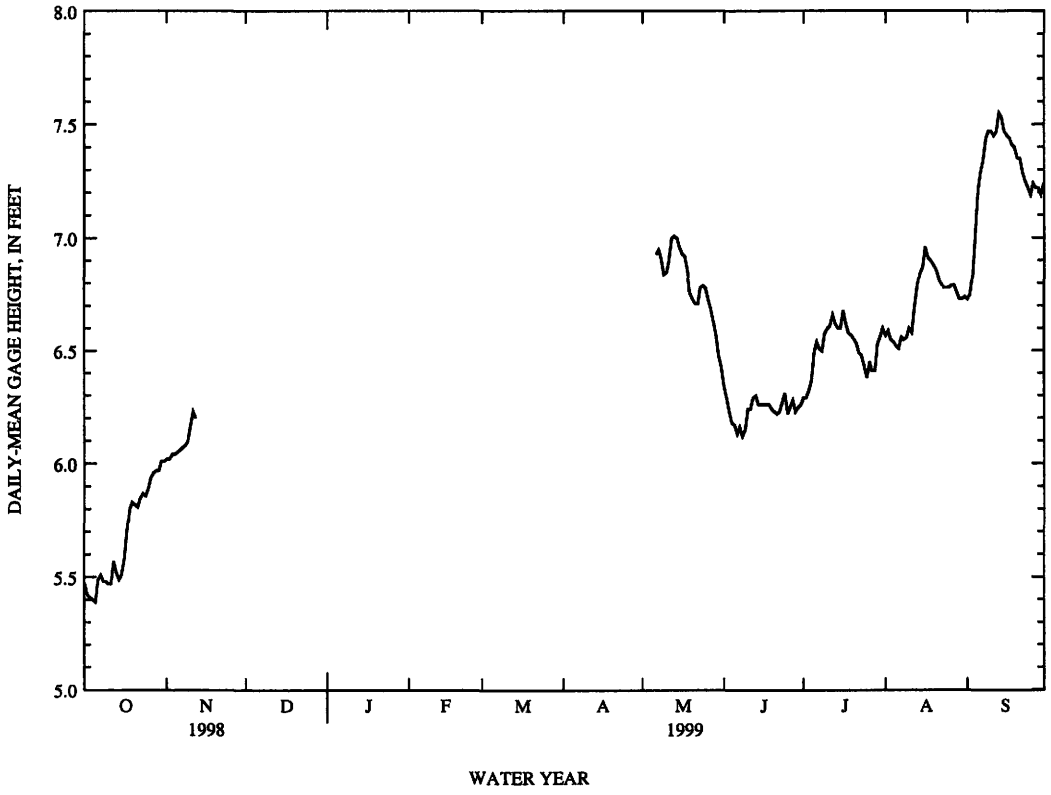
GAGE.-- Water-stage recorder. Datum of gage 1,253.12 ft above sea level (levels by Boise de Forte Indian Reservation Surveys).

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 7.60 ft., Sept. 13, 1999; maximum daily, 7.55 ft., Sept. 13, 1999; minimum gage height, 5.29 ft, Sept. 19, 1998; minimum daily, 5.37 ft, Sept. 19, 1998.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 7.60 ft, Sept. 13; maximum daily, 7.55 ft, Sept. 13; minimum gage height, 5.34 ft, Oct. 5; minimum daily, 5.39 ft, Oct. 5.

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	5.47	6.02	---	---	---	---	---	---	6.34	6.29	6.57	6.73
2	5.42	6.02	---	---	---	---	---	---	6.29	6.29	6.59	6.75
3	5.41	6.04	---	---	---	---	---	---	6.23	6.32	6.55	6.83
4	5.40	6.04	---	---	---	---	---	---	6.18	6.37	6.54	7.03
5	5.39	6.05	---	---	---	---	---	---	6.17	6.49	6.52	7.21
6	5.49	6.06	---	---	---	---	---	6.93	6.13	6.54	6.51	7.29
7	5.51	6.07	---	---	---	---	---	6.95	6.16	6.51	6.56	7.34
8	5.48	6.08	---	---	---	---	---	6.91	6.12	6.50	6.55	7.44
9	5.48	6.10	---	---	---	---	---	6.84	6.15	6.58	6.56	7.47
10	5.47	6.16	---	---	---	---	---	6.85	6.24	6.60	6.60	7.47
11	5.47	6.23	---	---	---	---	---	6.90	6.24	6.61	6.58	7.45
12	5.57	6.20	---	---	---	---	---	7.00	6.29	6.66	6.69	7.47
13	5.52	---	---	---	---	---	---	7.01	6.30	6.62	6.79	7.55
14	5.49	---	---	---	---	---	---	7.00	6.26	6.60	6.84	7.53
15	5.51	---	---	---	---	---	---	6.96	6.26	6.60	6.87	7.47
16	5.58	---	---	---	---	---	---	6.93	6.26	6.68	6.96	7.45
17	5.70	---	---	---	---	---	---	6.92	6.26	6.62	6.91	7.44
18	5.80	---	---	---	---	---	---	6.85	6.26	6.58	6.90	7.41
19	5.83	---	---	---	---	---	---	6.76	6.24	6.57	6.88	7.40
20	5.82	---	---	---	---	---	---	6.73	6.23	6.55	6.86	7.35
21	5.81	---	---	---	---	---	---	6.71	6.22	6.53	6.82	7.35
22	5.85	---	---	---	---	---	---	6.71	6.23	6.49	6.80	7.29
23	5.87	---	---	---	---	---	---	6.78	6.27	6.48	6.78	7.25
24	5.86	---	---	---	---	---	---	6.79	6.31	6.43	6.78	7.22
25	5.89	---	---	---	---	---	---	6.78	6.22	6.38	6.78	7.19
26	5.94	---	---	---	---	---	---	6.73	6.25	6.45	6.79	7.24
27	5.96	---	---	---	---	---	---	6.69	6.28	6.41	6.79	7.22
28	5.97	---	---	---	---	---	---	6.63	6.23	6.41	6.76	7.22
29	5.97	---	---	---	---	---	---	6.57	6.25	6.53	6.73	7.19
30	6.01	---	---	---	---	---	---	6.48	6.26	6.56	6.73	7.24
31	6.01	---	---	---	---	---	---	6.43	---	6.60	6.74	---
MEAN	5.68	---	---	---	---	---	---	---	6.24	6.51	6.72	7.28
MAX	6.01	---	---	---	---	---	---	---	6.34	6.68	6.96	7.55
MIN	5.39	---	---	---	---	---	---	---	6.12	6.29	6.51	6.73


8.0
7.5
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DAILY-MEAN GAGE HEIGHT, IN FEET
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1998
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WATER YEAR

05131455 NETT LAKE RIVER NEAR NETT LAKE, MN

LOCATION.--Lat 48°06'36", long 93°11'12", in NE¼NE¼ sec. 20, T.65 N., R.22 W., Koochiching County, Hydrologic Unit 09030005, downstream from dam at outlet of Nett Lake, 4 miles west of the town of Nett Lake.

DRAINAGE AREA.--128 mi^2.

PERIOD OF RECORD.--October 1995 to current year.

GAGE.--Water-stage recorder. Elevation of gage 1,270 ft above sea level (from topographic map).

REMARKS.--Records fair except those for estimated periods, which are poor. Regulation from Nett Lake Dam upstream of gage.

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	.00	.00	e.46	e1.5	e1.5	e1.3	e24	346	307	7.3	1.2	3.5
2	.00	.00	e.56	e1.5	e1.5	e1.3	e30	314	273	7.7	1.6	3.9
3	.00	.00	e.70	e1.5	e1.5	e1.3	e40	306	262	13	1.8	9.8
4	.00	.00	e.82	e1.5	e1.5	e1.3	e52	300	232	18	2.2	35
5	.00	.00	e1.1	e1.5	e1.5	e1.2	75	292	221	20	2.3	43
6	.00	.00	e1.3	e1.5	e1.5	e1.2	e90	260	230	15	2.3	59
7	.00	.00	e1.5	e1.5	e1.5	e1.2	e110	235	218	25	1.6	83
8	.00	.00	e1.5	e1.5	e1.5	e1.2	e140	206	104	43	1.8	98
9	.00	.00	e1.6	e1.5	e1.5	e1.2	170	204	3.5	85	1.8	101
10	.00	.00	e1.6	e1.5	1.6	e1.2	259	282	3.5	144	2.7	109
11	.00	.00	e1.6	e1.5	e1.5	e1.2	362	266	5.9	142	2.3	122
12	.00	.00	e1.5	e1.5	e1.5	e1.2	708	437	4.0	133	58	126
13	.00	e.01	e1.5	e1.5	e1.5	e1.2	1470	617	3.5	156	98	201
14	.00	e.01	1.5	e1.5	e1.5	e1.2	1390	590	4.6	148	98	296
15	.00	e.02	e1.5	e1.5	e1.5	e1.3	952	561	4.9	138	101	300
16	.00	e.02	e1.5	e1.5	e1.5	e1.3	215	543	5.6	129	134	295
17	.00	e.02	e1.5	e1.5	e1.4	e1.3	226	505	4.9	137	248	274
18	.00	e.03	e1.5	e1.5	e1.4	e1.3	213	468	4.5	139	242	259
19	.00	e.03	e1.5	e1.5	e1.4	e1.4	548	466	5.1	128	230	240
20	.00	e.04	e1.5	e1.5	e1.4	e1.5	940	447	5.1	113	214	235
21	.00	e.05	e1.5	e1.5	e1.4	e1.5	869	428	4.9	108	204	205
22	.00	e.07	e1.5	e1.5	e1.4	e1.7	793	454	4.5	107	187	203
23	.00	e.09	e1.5	e1.5	e1.4	e2.0	710	457	3.4	102	110	190
24	.55	e.10	e1.5	e1.5	e1.4	e2.6	639	463	3.2	98	4.1	175
25	3.2	e.14	e1.5	e1.5	e1.4	e3.1	583	451	4.5	102	3.8	165
26	2.2	e.15	e1.5	e1.5	e1.3	4.6	550	427	3.9	48	4.1	163
27	.94	e.20	e1.5	e1.5	e1.3	e5.8	507	408	3.6	.79	4.5	176
28	.00	e.24	e1.5	e1.5	e1.3	e7.8	463	376	4.5	1.6	3.3	168
29	.00	e.30	e1.5	e1.5	---	e10	415	345	3.6	2.9	2.8	165
30	.00	e.36	e1.5	e1.5	---	e14	380	320	6.1	1.5	2.2	127
31	.00	---	e1.5	e1.5	---	e18	---	340	---	1.0	3.5	---
TOTAL	6.89	1.88	42.74	46.5	40.6	96.4	13923	12114	1944.3	2313.79	1973.9	4630.2
MEAN	.22	.063	1.38	1.50	1.45	3.11	464	391	64.8	74.6	63.7	154
MAX	3.2	.36	1.6	1.5	1.6	18	1470	617	307	156	248	300
MIN	.00	.00	.46	1.5	1.3	1.2	24	204	3.2	.79	1.2	3.5
AC-FT	14	3.7	85	92	81	191	27620	24030	3860	4590	3920	9180
CFSM	.00	.00	.01	.01	.01	.02	3.63	3.05	.51	.58	.50	1.21
IN.	.00	.00	.01	.01	.01	.03	4.05	3.52	.57	.67	.57	1.35

e Estimated

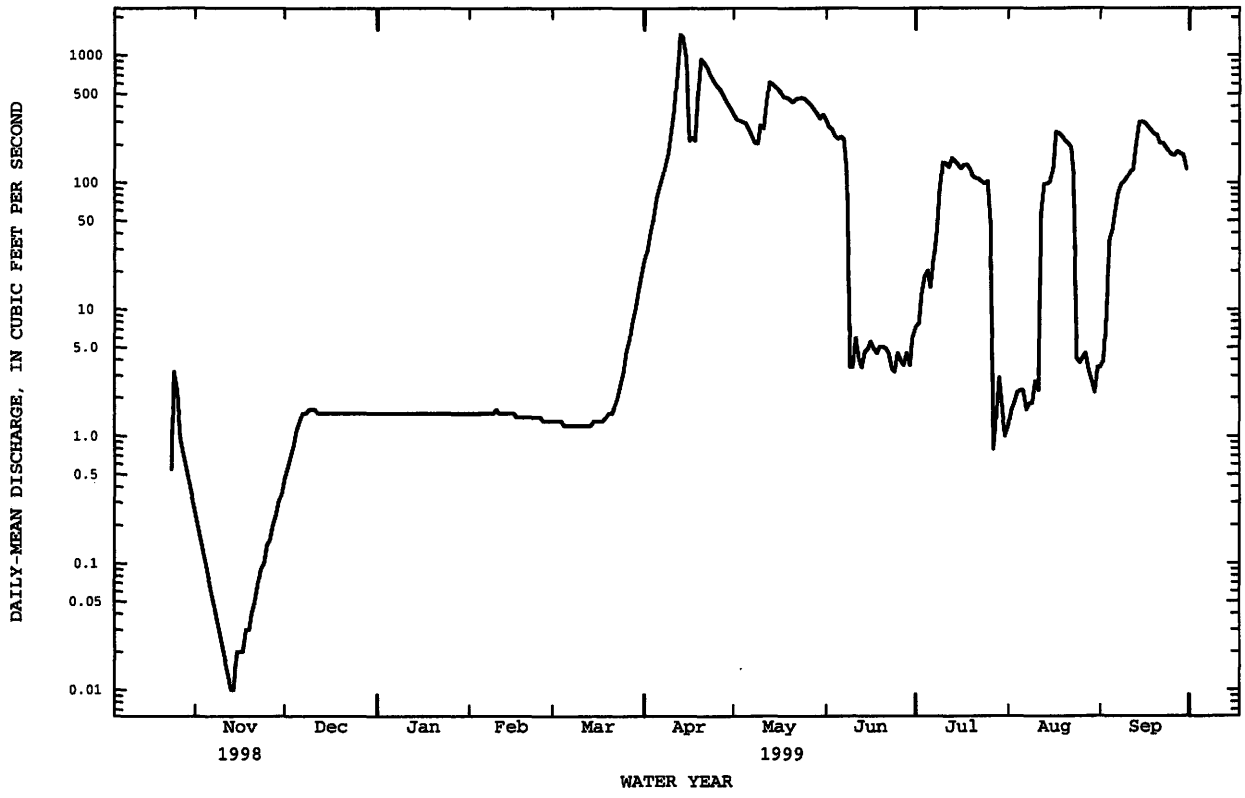
05131455 NETT LAKE RIVER NEAR NETT LAKE, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1996 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	57.6	86.7	51.7	29.8	21.8	23.5	313	366	73.9	63.3	16.7	41.7
MAX	153	202	114	54.3	37.3	40.1	464	512	116	94.8	63.7	154
(WY)	1996	1997	1997	1997	1996	1998	1999	1996	1998	1997	1999	1999
MIN	.22	.063	1.38	1.50	1.45	3.11	202	143	25.4	1.41	.059	.000
(WY)	1999	1999	1999	1999	1999	1999	1998	1998	1997	1996	1998	1998

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1996 - 1999	
ANNUAL TOTAL	18763.80		37134.20			
ANNUAL MEAN	51.4		102		95.7	
HIGHEST ANNUAL MEAN					118	1997
LOWEST ANNUAL MEAN					52.6	1998
HIGHEST DAILY MEAN	364	Apr 28	1470	Apr 13	1470	Apr 13 1999
LOWEST DAILY MEAN	.00	Aug 2	.00[a]	Oct 1	.00[b]	Jun 21 1996
ANNUAL SEVEN-DAY MINIMUM	.00	Sep 5	.00	Oct 1	.00	Aug 13 1996
INSTANTANEOUS PEAK FLOW			1490	Apr 13	1490	Apr 13 1999
INSTANTANEOUS PEAK STAGE			7.26	Apr 13	7.26	Apr 13 1999
ANNUAL RUNOFF (AC-FT)	37220		73660		69360	
ANNUAL RUNOFF (CFSM)	.40		.79		.75	
ANNUAL RUNOFF (INCHES)	5.45		10.79		10.16	
10 PERCENT EXCEEDS	170		342		266	
50 PERCENT EXCEEDS	11		2.2		25	
90 PERCENT EXCEEDS	.00		.00		.04	

a Occurred many days.
b Many days in 1996, 1998, and 1999.



05131500 LITTLE FORK RIVER AT LITTLEFORK, MN

LOCATION.--Lat 48°23'45", long 93°32'57", in NE¼SE¼ sec. 9, T.68 N., R.25 W., Koochiching County, Hydrologic Unit 09030005, on right bank at town of Littlefork, 0.9 mi upstream from bridge on State Highway 217, 2.8 mi upstream from Beaver Creek, and 19 mi upstream from mouth.

DRAINAGE AREA.--1,680 mi^2.

PERIOD OF RECORD.--June to November 1909, April to November 1910, April 1911 to June 1917, September 1917, October 1917 to March 1919 (gage heights only), June 1928 to current year.

REVISED RECORDS.--WSP 955: Drainage area. WSP 1508: 1913, 1916, 1928-32, 1934. WRD MN-74: 1963.

GAGE.--Water-stage recorder. Datum of gage is 1,083.59 ft above sea level. June 23, 1909 to March 4, 1917, nonrecording gage and July 21, 1937 to October 23, 1979, water-stage recorder at site 1.2 mi downstream at datum 10.53 ft lower; March 5 to September 30, 1917, and June 22, 1928 to July 20, 1937, non-recording gage at site 1.18 mi downstream at datum 10.53 ft lower.

REMARKS.--Records good except those for estimated daily discharges, which are fair.

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	114	1040	e990	e270	e148	e140	e3100	1540	1410	1450	1390	552
2	116	949	e1190	e260	e149	e140	e4000	1430	1320	1560	1130	539
3	122	863	e1350	e245	e149	e140	e5000	1330	1230	1800	940	723
4	122	786	e1300	e235	e149	e140	e5600	1230	1130	1920	802	1480
5	117	716	e1250	e225	e149	e139	e5900	1170	1060	2190	703	3300
6	130	660	e1200	e210	e149	e137	e6500	1170	1060	7040	624	3610
7	131	619	e1270	e200	e150	e135	e8300	1280	1190	10200	577	3450
8	137	579	e1400	e185	e150	e133	e10700	1560	1370	10200	544	2970
9	147	550	e1200	e175	e151	e133	e12000	1770	1390	8890	541	2460
10	169	543	e1100	e170	e151	e133	10700	2050	1460	7740	525	2150
11	193	e520	e980	e160	e151	e133	7840	3290	1590	6870	529	2010
12	202	e470	e880	e155	e151	e133	5730	4660	1530	5750	552	1840
13	202	e470	e810	e152	e151	e133	5260	6010	1390	4730	988	1790
14	211	e530	e750	e150	e150	e133	5260	5990	1150	4020	2270	1940
15	216	e580	e700	e150	e150	e134	5130	5250	941	3410	2610	2340
16	221	e600	e650	e149	e150	e136	4760	4480	776	2910	2590	2270
17	266	e580	e580	e149	e149	e138	4270	4000	660	2820	2220	2000
18	691	e500	e530	e149	e149	e140	3760	3950	582	2680	1860	1740
19	2050	e410	e500	e149	e149	e145	3470	3800	522	2440	1730	1530
20	2460	e430	e460	e149	e148	e150	3170	3720	468	2180	2300	1400
21	2400	e480	e430	e149	e147	e155	3130	3920	425	1970	2430	1280
22	2160	e540	e410	e149	e145	e163	3230	4020	400	1750	2150	1170
23	1880	e620	e390	e149	e143	e170	3000	3960	374	1500	1790	1070
24	1610	e680	e370	e148	e141	e180	2730	4080	355	1290	1520	987
25	1370	e730	e350	e148	e139	e190	2480	4040	343	1120	1280	921
26	1230	e770	e340	e148	e138	e200	2290	3610	342	1040	1040	947
27	1360	e790	e330	e148	e138	e220	2110	3030	358	1010	e884	1380
28	1440	e820	e315	e148	e139	e300	1940	2540	503	1000	e779	1760
29	1370	e850	e305	e148	---	e600	1790	2140	1510	1080	e711	2080
30	1250	e900	e290	e148	---	e1200	1650	1810	1590	1440	e647	1980
31	1140	---	e280	e148	---	e2500	---	1580	---	1560	594	---
TOTAL	25227	19575	22900	5318	4123	8623	144800	94410	28429	105560	39250	53669
MEAN	814	652	739	172	147	278	4827	3045	948	3405	1266	1789
MAX	2460	1040	1400	270	151	2500	12000	6010	1590	10200	2610	3610
MIN	114	410	280	148	138	133	1650	1170	342	1000	525	539
AC-FT	50040	38830	45420	10550	8180	17100	287200	187300	56390	209400	77850	106500
CFSM	.48	.39	.44	.10	.09	.17	2.87	1.81	.56	2.03	.75	1.06
IN.	.56	.43	.51	.12	.09	.19	3.21	2.09	.63	2.34	.87	1.19

e Estimated

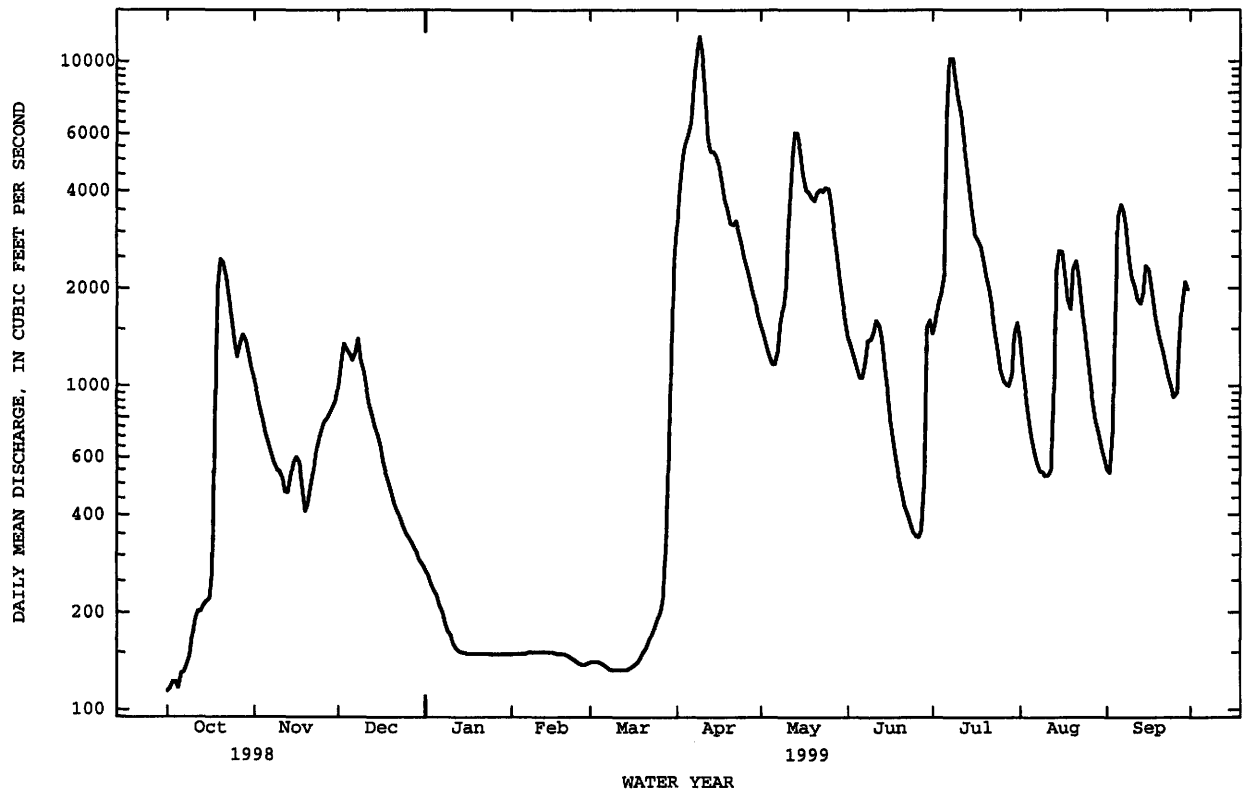
05131500 LITTLE FORK RIVER AT LITTLEFORK, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	902	715	318	149	114	283	3206	2869	1736	1010	553	741
MAX	4450	3044	972	477	270	3022	8421	12190	5490	3643	2679	5189
(WY)	1996	1972	1983	1966	1969	1945	1966	1950	1944	1944	1988	1977
MIN	43.4	60.8	52.6	43.5	42.2	50.2	292	173	182	75.4	34.3	29.2
(WY)	1977	1977	1977	1931	1963	1940	1977	1977	1988	1988	1936	1976

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1909 - 1999	
ANNUAL TOTAL	250841		551884			
ANNUAL MEAN	687		1512		1065	
HIGHEST ANNUAL MEAN					1912	1966
LOWEST ANNUAL MEAN					306	1931
HIGHEST DAILY MEAN	4290	May 17	12000[a]	Apr 9	25000	Apr 18 1916
LOWEST DAILY MEAN	72	Sep 15	114[b]	Oct 1	21	Aug 26 1936
ANNUAL SEVEN-DAY MINIMUM	75	Sep 12	122	Oct 1	22	Aug 21 1936
INSTANTANEOUS PEAK FLOW					25000[c]	Apr 18 1916
INSTANTANEOUS PEAK STAGE			19.79[d]	Apr 9	37.00[c]	Apr 18 1916
INSTANTANEOUS LOW FLOW			111[b]	Oct 1	21	Aug 26 1936
ANNUAL RUNOFF (AC-FT)	497500		1095000		771300	
ANNUAL RUNOFF (CFSM)	.41		.90		.63	
ANNUAL RUNOFF (INCHES)	5.55		12.22		8.61	
10 PERCENT EXCEEDS	1700		3930		2800	
50 PERCENT EXCEEDS	417		884		367	
90 PERCENT EXCEEDS	116		148		86	

a Estimated, backwater from ice.
b Rising stage.
c Also occurred May 11, 1950, site and datum then in use.
d Backwater from ice.



05132000 BIG FORK RIVER AT BIG FALLS, MN

LOCATION.--Lat 48°11'45", long 93°48'25", in SW¼SE¼ sec.35, T.155 N., R.25 W., Koochiching County, Hydrologic Unit 09030006, on left bank at town of Big Falls, 700 ft downstream from falls, 0.3 mi downstream from bridge on U.S. Highway 71, and 4.8 mi upstream from Sturgeon River.

DRAINAGE AREA.--1480 mi^2.

PERIOD OF RECORD.--August to November 1909, April to November 1910, April 1911 to September 1912 (gage heights and discharge measurements only), June 1928 to September 1979, October 1979 to September 1982 (annual maximum only), October 1982 to September 1993, October 1993 to September 1994 (annual maximum only) and October 1997 to current year.

REVISED RECORDS.--WSP 1308:1935 (M).

GAGE.--Water-stage recorder. Datum of gage is 1,144.71 ft above sea level. Prior to June 10, 1911, non-recording gage at railroad bridge about 0.4 mi upstream at different datum. June 10, 1911 to Sept. 30, 1912, and June 22, 1928 to Dec. 17, 1937, non-recording gage at site 200 ft upstream at same datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Prior to 1971, a powerplant, located 0.3 mi upstream, caused some diurnal fluctuation at low flows.

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	202	551	740	e280	e195	e190	e1700	1340	1410	556	1010	822
2	201	551	826	e270	e195	e190	e2500	1280	1320	536	929	845
3	201	e550	824	e260	e195	e190	e3500	1210	1250	533	854	1000
4	192	e540	809	e250	e195	e190	e3800	1160	1190	603	797	1870
5	191	e540	770	e245	e195	e190	e3760	1140	1130	829	746	2770
6	205	e530	e800	e240	e195	e190	e4000	1230	1230	3170	705	3050
7	203	e520	e850	e230	e195	e190	e5200	1460	1390	3920	690	3120
8	210	e510	e820	e225	e195	e190	e6400	1850	1560	4010	705	2820
9	221	486	e860	e220	e195	e190	5740	2170	1590	3970	757	2420
10	224	469	e890	e215	e195	e190	4970	2600	1530	3690	794	2190
11	222	430	e750	e210	e195	e190	4520	3770	1540	3300	781	2020
12	225	e400	e670	e205	e195	e190	4040	5100	1480	2880	832	1900
13	230	e280	e620	e205	e195	e190	3590	6930	1320	2440	1440	1860
14	228	e330	e590	e205	e195	e190	3270	7600	1170	2070	2160	1900
15	240	e370	e560	e200	e195	e190	2980	6870	1060	1790	2220	1890
16	271	e400	e530	e200	e195	e190	2750	5670	956	1640	2100	1840
17	333	e420	e510	e200	e195	e190	2630	4750	869	1590	1840	1750
18	494	e400	e480	e200	e195	e190	2520	4070	805	1480	1630	1630
19	721	e380	e460	e200	e195	e190	2410	3500	734	1350	1700	1570
20	796	e430	e440	e200	e195	e195	2300	3150	696	1230	1660	1470
21	792	e490	e420	e200	e195	e195	2190	2970	661	1120	1470	1380
22	743	493	e410	e200	e195	e195	2110	2720	620	1030	1310	1300
23	682	530	e390	e200	e195	e195	2020	2680	603	971	1200	1240
24	629	628	e380	e195	e190	e200	1900	2600	585	913	1220	1180
25	597	650	e360	e195	e190	e200	1830	2440	569	864	1280	1140
26	579	689	e350	e195	e190	e210	1760	2270	549	903	1220	1230
27	582	668	e340	e195	e190	e225	1660	2070	555	1050	1120	1600
28	577	663	e330	e195	e190	e250	1580	1870	561	1200	1060	1800
29	582	662	e320	e195	---	e330	1490	1700	570	1240	971	1760
30	582	693	e310	e195	---	e560	1410	1590	571	1220	888	1640
31	566	---	e300	e195	---	e900	---	1500	---	1120	852	---
TOTAL	12721	15253	17709	6620	5435	7265	90530	91260	30074	53218	36941	53007
MEAN	410	508	571	214	194	234	3018	2944	1002	1717	1192	1767
MAX	796	693	890	280	195	900	6400	7600	1590	4010	2220	3120
MIN	191	280	300	195	190	190	1410	1140	549	533	690	822
AC-FT	25230	30250	35130	13130	10780	14410	179600	181000	59650	105600	73270	105100
CFSM	.28	.34	.39	.14	.13	.16	2.04	1.99	.68	1.16	.81	1.19
IN.	.32	.38	.45	.17	.14	.18	2.28	2.29	.76	1.34	.93	1.33

e Estimated

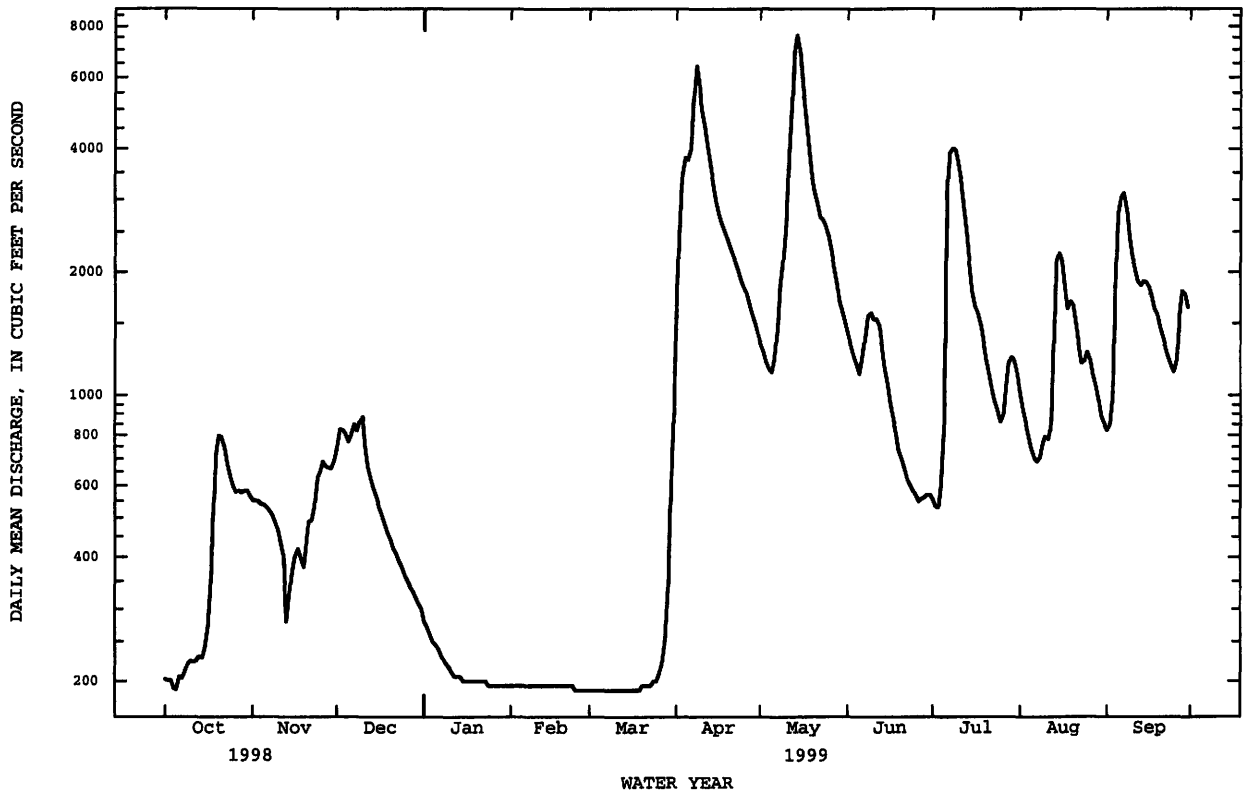
05132000 BIG FORK RIVER AT BIG FALLS, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	659	528	285	173	138	249	1912	2004	1162	655	410	572
MAX	2247	2034	685	399	335	1928	5186	7496	2890	2321	1799	2989
(WY)	1970	1972	1970	1969	1969	1945	1966	1950	1974	1944	1978	1937
MIN	38.3	44.5	31.6	22.2	22.9	32.9	175	138	180	46.0	26.7	22.4
(WY)	1932	1935	1935	1935	1935	1940	1931	1931	1934	1931	1934	1934

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1909 - 1999	
ANNUAL TOTAL	217986		420033			
ANNUAL MEAN	597		1151		729	
HIGHEST ANNUAL MEAN					1362	1950
LOWEST ANNUAL MEAN					92.0	1931
HIGHEST DAILY MEAN	3380	May 19	7600	May 14	14800	May 9 1950
LOWEST DAILY MEAN	136	Aug 22	190a	Feb 24 to Mar 19	14	Jan 10 1940
ANNUAL SEVEN-DAY MINIMUM	139	Aug 18	190	Feb 24	18	Jan 22 1935
INSTANTANEOUS PEAK FLOW			7680	May 14	14800	May 8 1950
INSTANTANEOUS PEAK STAGE			11.24b	Apr 7	17.08	May 8 1950
INSTANTANEOUS LOW FLOW			188	Oct 4	7.0	Aug 7 1939
ANNUAL RUNOFF (AC-FT)	432400		833100		528300	
ANNUAL RUNOFF (CFSM)	.40		.78		.49	
ANNUAL RUNOFF (INCHES)	5.48		10.56		6.69	
10 PERCENT EXCEEDS	1210		2730		1820	
50 PERCENT EXCEEDS	424		705		325	
90 PERCENT EXCEEDS	175		195		80	

a Estimated.
b Backwater from ice.



05133500 RAINY RIVER AT MANITOU RAPIDS, MN
(International Gaging Station)

LOCATION.--Lat 48°38'04", long 93°54'47", in NW¼SE¼ sec. 36, T.160 N., R.26 W., Koochiching County, Hydrologic Unit 09030004, on left bank at Manitou Rapids, 4 mi west of Indus.

DRAINAGE AREA.--19,400 mi^2 (approximately).

PERIOD OF RECORD.--July 1928 to current year. Monthly discharge only for some periods, published in WSP 1308. October 1911 to October 1924 (gage heights only) at site near Birchdale in files of U.S. Army Corps of Engineers. Published as "near Birchdale" 1932-34.

GAGE.--Water-stage recorder. Datum of gage is 1,062.48 ft above sea level. Prior to Nov. 10, 1934, nonrecording gage at site near Birchdale, 7 mi. downstream at different datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Satellite telemeter at station. Diurnal fluctuation caused by power plant at International Falls. Some regulation at low and medium flows by Rainy and Namakan Lakes.

COOPERATION.--This station is one of the international gaging stations maintained by the United States under agreement with Canada.

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	3840	5160	5070	e3900	e8500	e5000	15600	18300	26500	16000	18500	6770
2	3830	5010	5150	e3800	e8500	e5200	18100	18100	26000	15900	18300	6610
3	3810	4870	5360	e3720	e7930	e5200	19000	17900	25600	16000	17300	8800
4	3790	4760	5550	e3650	e7580	e5200	19800	17600	25400	16100	15700	12800
5	3800	4670	5600	e3600	e7020	e5150	20900	17000	25200	16900	15000	16400
6	3880	4580	e5580	e3570	e6930	e5150	24200	16600	25100	18100	14700	18200
7	3860	4440	e5600	e3550	e6200	e4800	26800	16900	25100	23600	14500	16500
8	3880	4380	e5700	e3700	e6400	e4600	28400	17300	25200	26500	14400	19200
9	3780	4340	e5700	e3500	e6600	e4550	33100	17300	25300	27100	14300	19300
10	3780	4240	e5600	e4200	e7000	e5200	37700	19400	25700	28600	14200	19400
11	3830	4430	e5500	e4500	e7200	e5150	34200	24300	26700	28400	14200	19100
12	3860	4240	e5450	e4450	e7400	e5150	31200	30600	27100	27100	13900	18600
13	3940	e4200	e5200	e4400	e7300	e5180	29500	38200	26800	29300	14500	18800
14	3940	e4150	e5000	e6200	e7000	e5200	28900	40700	26200	27900	15800	20300
15	3940	e4120	e4900	e6500	e7300	5210	28200	39500	23700	29000	17500	21000
16	3990	e4100	e4800	e6700	e7650	6020	27600	37100	22300	31300	18300	21200
17	4150	e4080	e4700	e5400	e7730	6280	27000	34300	20600	32600	18400	21000
18	4300	e4080	e4350	e5500	e7370	7020	26100	32000	18200	32600	18000	21400
19	4750	e4100	e4300	e7450	e6200	7400	25300	30100	17500	32000	17400	21300
20	6180	e4120	e4270	e7560	e6300	6460	24600	27700	17300	31100	17200	20900
21	6920	e4140	e4250	e7400	e4500	5410	24100	27100	17000	28800	17500	19200
22	6950	e4180	e4230	e7800	e4600	5130	23800	28000	15700	25800	17500	17200
23	6800	e4200	e4210	e7870	e6000	4920	23300	28900	15300	24500	17100	16100
24	6490	e4330	e4150	e6720	e6400	4780	21800	30200	15200	22800	16600	15800
25	6160	e4500	e4080	e7940	e6000	4760	21000	30100	15200	22100	16300	15500
26	5890	e4650	e4030	e8600	e5700	5500	20500	30300	15100	21500	16200	15300
27	5710	e4750	e4000	e9240	e5500	5810	20000	29600	15100	20300	14900	15500
28	5640	e4830	e3980	e8780	e4900	7000	18600	28700	15000	19800	13000	16100
29	5510	e4870	e3970	e8960	---	10200	16500	27700	15300	18700	12000	16800
30	5360	4980	e3960	e8700	---	14100	17800	26900	16000	18300	10900	16900
31	5310	---	e3950	e8400	---	16100	---	26800	---	18400	8060	---
TOTAL	147870	133500	148190	186260	187710	192830	733600	825200	636400	747100	482160	511980
MEAN	4770	4450	4780	6008	6704	6220	24450	26620	21210	24100	15550	17070
MAX	6950	5160	5700	9240	8500	16100	37700	40700	27100	32600	18500	21400
MIN	3780	4080	3950	3500	4500	4550	15600	16600	15000	15900	8060	6610
AC-FT	293300	264800	293900	369400	372300	382500	1455000	1637000	1262000	1482000	956400	1016000
CFSM	.25	.23	.25	.31	.35	.32	1.26	1.37	1.09	1.24	.80	.88
IN.	.28	.26	.28	.36	.36	.37	1.41	1.58	1.22	1.43	.92	.98

e Estimated

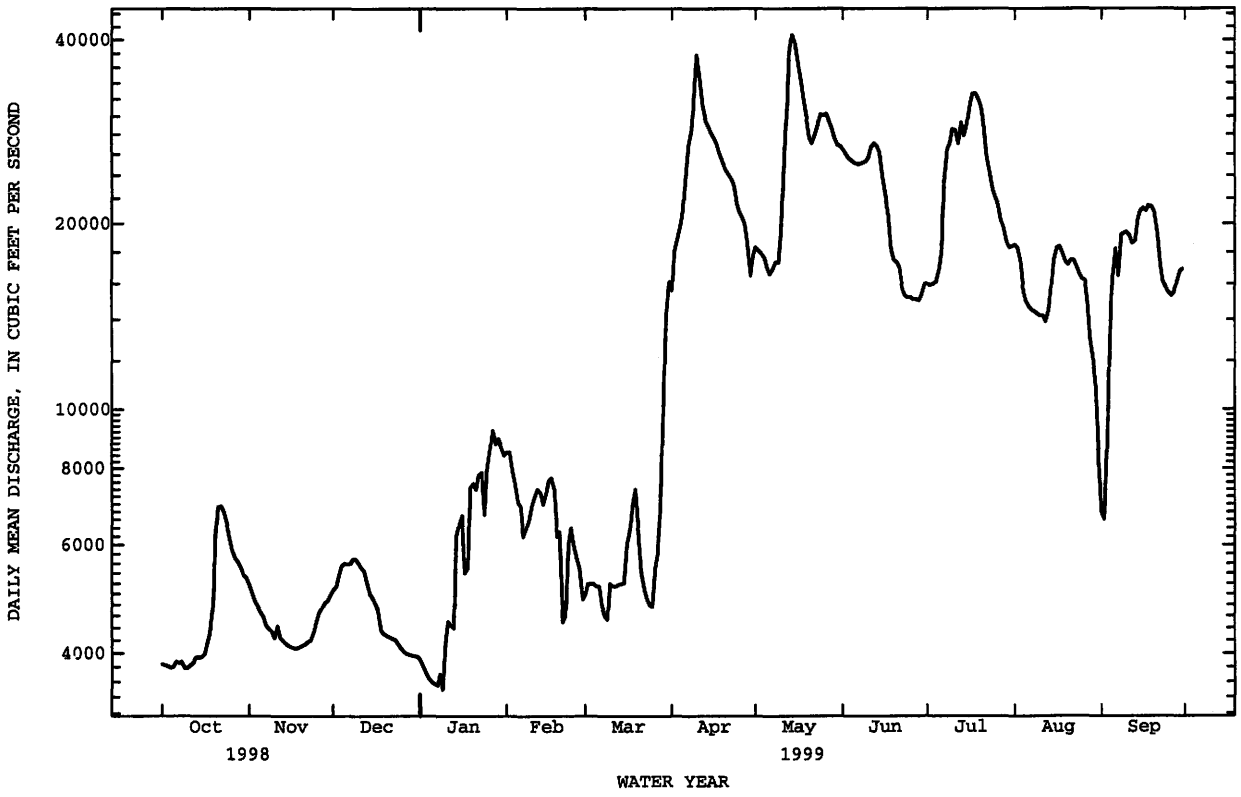
05133500 RAINY RIVER AT MANITOU RAPIDS, MN--Continued
(International Gaging Station)

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

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	11860	11310	10190	9151	8736	8975	15600	19650	19860	16580	11400	11130
MAX	42410	37280	27790	18430	17240	16640	38100	52880	49480	47970	33700	30620
(WY)	1942	1972	1972	1972	1969	1945	1966	1950	1950	1950	1944	1988
MIN	4728	3796	3190	2900	3129	2926	4378	4106	3676	3483	3422	3746
(WY)	1981	1977	1930	1931	1931	1931	1977	1977	1980	1980	1980	1998

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1929 - 1999	
ANNUAL TOTAL	2326230		4932800			
ANNUAL MEAN	6373		13510		12880	
HIGHEST ANNUAL MEAN					23260	1950
LOWEST ANNUAL MEAN					4470	1931
HIGHEST DAILY MEAN	18600	May 18	40700	May 14	71300	May 11 1950
LOWEST DAILY MEAN	3400	Sep 11	3500a	Jan 9	928	Dec 26 1929
ANNUAL SEVEN-DAY MINIMUM	3580	Sep 9	3610	Jan 3	1500	Dec 24 1929
INSTANTANEOUS PEAK FLOW			41100	May 14	71600	May 12 1950
INSTANTANEOUS PEAK STAGE			14.64	May 14	21.04	May 12 1950
ANNUAL RUNOFF (AC-FT)	4614000		9784000		9334000	
ANNUAL RUNOFF (CFSM)	.33		.70		.66	
ANNUAL RUNOFF (INCHES)	4.46		9.46		9.02	
10 PERCENT EXCEEDS	9390		27600		25400	
50 PERCENT EXCEEDS	5750		9240		10300	
90 PERCENT EXCEEDS	3860		4110		5000	

a Estimated.



05140520 LAKE OF THE WOODS AT WARROAD, MN
(International gaging station)

LOCATION.--Lat 48°54'15", long 95°18'57", in SW¼SE¼ sec.29, T. 163 N., R. 36 W., Roseau County, Hydrologic Unit 09030009, on left bank of Warroad River in Warroad, 300 ft downstream from Canadian National railroad bridge, 1000 ft downstream from bridge on State Highway 11, and 4000 ft upstream from mouth of Warroad River.

DRAINAGE AREA.--27,200 mi^2.

PERIOD OF RECORD.--April to September 1978, month-end elevations only. October 1978 to September 1985, daily-mean elevations; October 1985 to December 1994 and October 1997 to current year, daily-mean gage heights. Records collected prior to April 1978 are in reports of the Water Survey of Canada.

GAGE.--Water-stage recorder. Datum at gage is 1,000.00 ft above sea level, Lake of the Woods datum.

REMARKS.--Runoff conditions of the Warroad River can affect water levels at this station. Water level subject to fluctuation caused by changes in direction and velocity of wind and resulting seiches.

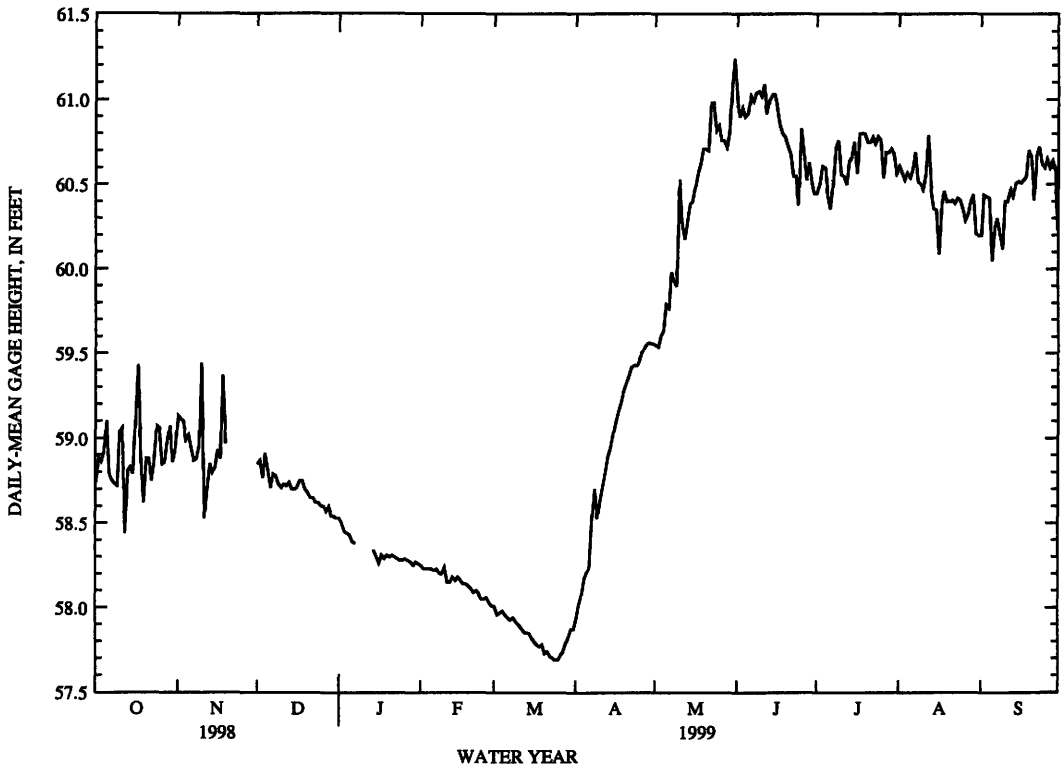
COOPERATION.--This station is one of the international gaging stations maintained by the United States under agreement with Canada.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 62.38 ft, July 5, 1989; maximum daily, 61.84 ft, Sept. 12, 1978; minimum (recorded), 55.94 ft, Sept. 4, 1980; minimum daily (recorded), 56.52 ft, Apr. 15, 1981.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 61.75 ft, June 25; maximum daily, 61.24 ft, May 31; minimum gage height, 57.65 ft, Mar.22; minimum daily, 57.69 ft, Mar. 24,25.

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	58.74	59.13	58.85	58.53	58.25	58.01	57.93	59.55	60.98	60.45	60.61	60.20
2	58.89	59.11	58.87	58.50	58.23	57.96	58.01	59.54	60.90	60.51	60.57	60.44
3	58.86	59.10	58.77	58.45	58.23	57.97	58.07	59.61	60.95	60.61	60.53	60.43
4	58.92	58.99	58.91	58.44	58.23	57.98	58.17	59.64	60.90	60.60	60.57	60.42
5	59.10	59.02	58.80	58.43	58.23	57.96	58.21	59.79	60.92	60.44	60.54	60.05
6	58.79	58.94	58.71	58.39	58.22	57.94	58.24	59.77	61.02	60.36	60.59	60.24
7	58.75	58.87	58.79	58.38	58.23	57.93	58.51	59.98	60.99	60.50	60.69	60.30
8	58.73	58.88	58.78	---	58.20	57.94	58.70	59.93	61.04	60.72	60.52	60.21
9	58.72	58.96	58.73	---	58.20	57.92	58.53	59.90	61.05	60.76	60.50	60.12
10	59.04	59.44	58.71	---	58.24	57.90	58.63	60.53	61.02	60.56	60.47	60.40
11	59.06	58.53	58.73	---	58.15	57.88	58.71	60.28	61.09	60.55	60.57	60.40
12	58.44	58.70	58.72	---	58.15	57.86	58.80	60.18	60.92	60.50	60.79	60.47
13	58.81	58.85	58.74	---	58.18	57.85	58.89	60.28	61.00	60.64	60.46	60.43
14	58.83	58.80	58.70	58.34	58.16	57.85	58.94	60.39	61.03	60.66	60.36	60.51
15	58.79	58.83	58.70	58.30	58.18	57.82	59.02	60.40	61.03	60.75	60.35	60.52
16	59.09	58.93	58.71	58.26	58.16	57.80	59.10	60.49	60.96	60.57	60.09	60.51
17	59.43	58.88	58.75	58.31	58.14	57.78	59.16	60.57	60.85	60.80	60.38	60.53
18	58.89	59.37	58.75	58.29	58.14	57.77	59.21	60.63	60.80	60.80	60.46	60.55
19	58.62	58.97	58.70	58.31	58.13	57.78	59.28	60.71	60.78	60.80	60.40	60.70
20	58.88	---	58.68	58.30	58.11	57.73	59.33	60.71	60.73	60.75	60.40	60.66
21	58.88	---	58.65	58.31	58.09	57.74	59.37	60.70	60.68	60.75	60.41	60.41
22	58.75	---	58.65	58.30	58.10	57.71	59.42	60.98	60.55	60.78	60.39	60.67
23	58.86	---	58.62	58.29	58.08	57.70	59.43	60.98	60.55	60.74	60.42	60.72
24	59.07	---	58.62	58.28	58.05	57.69	59.43	60.82	60.38	60.78	60.41	60.62
25	59.06	---	58.60	58.28	58.05	57.69	59.46	60.85	60.83	60.76	60.36	60.60
26	58.85	---	58.60	58.29	58.06	57.72	59.51	60.76	60.67	60.54	60.29	60.65
27	58.86	---	58.57	58.28	58.03	57.74	59.54	60.76	60.53	60.69	60.33	60.60
28	58.99	---	58.60	58.27	58.01	57.79	59.56	60.72	60.63	60.69	60.40	60.64
29	59.07	---	58.54	58.25	---	57.82	59.56	60.81	60.50	60.71	60.44	60.59
30	58.86	---	58.54	58.27	---	57.87	59.56	61.07	60.45	60.68	60.21	60.23
31	58.93	---	58.53	58.26	---	57.87	---	61.24	---	60.57	60.20	---
MEAN	58.89	---	58.70	---	58.15	57.84	58.94	60.41	60.82	60.65	60.44	60.46
MAX	59.43	---	58.91	---	58.25	58.01	59.56	61.24	61.09	60.80	60.79	60.72
MIN	58.44	---	58.53	---	58.01	57.69	57.93	59.54	60.38	60.36	60.09	60.05


61.5
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DAILY-MEAN GAGE HEIGHT, IN FEET
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WATER YEAR

05140521 LAKE OF THE WOODS AT SPRINGSTEEL ISLAND NEAR WARROAD, MN

LOCATION.--Lat 48°56'45", long 95°18'24", in SW¼SW¼ sec. 9, T. 163 N., R. 36 W., Roseau County, Hydrologic Unit 09030009, at Springsteel Resort on Springsteel Island, 2.8 mi north of Warroad.

DRAINAGE AREA.--27,200 mi^2.

PERIOD OF RECORD.--June 1985 to current year.

GAGE.--Water-stage recorder. Datum at gage is 1,000.00 ft above sea level, Lake of the Woods datum.

REMARKS.--Satellite telemeter at station. Water level subject to fluctuation caused by changes in direction and velocity of wind and resulting seiches.

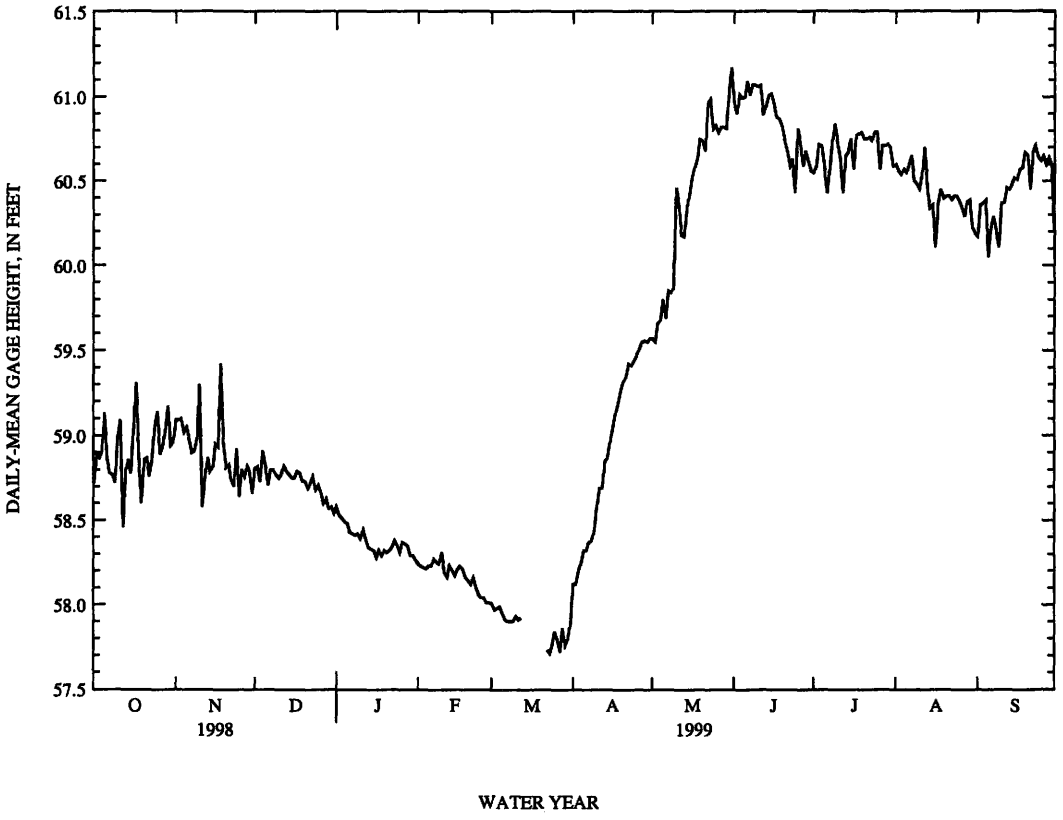
EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 62.24 ft, July 5, 1989; maximum daily, 61.81 ft, July 6, 7, 1985; minimum, 57.22 ft, Nov. 22, 1990; minimum daily, 57.43 ft, Mar. 18, 19, 20, 1988.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 61.53 ft, June 25; maximum daily, 61.17 ft, May 31; minimum, 57.60 ft, Mar. 23; minimum daily, 57.71 ft, Mar. 23.

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	58.72	59.09	58.81	58.58	58.24	58.01	58.12	59.57	60.96	60.55	60.60	60.17
2	58.89	59.09	58.82	58.53	58.23	57.97	58.12	59.55	60.90	60.59	60.56	60.36
3	58.87	59.10	58.73	58.51	58.22	57.98	58.19	59.66	61.01	60.72	60.54	60.37
4	58.91	59.02	58.91	58.49	58.21	57.99	58.25	59.68	60.99	60.71	60.57	60.39
5	59.13	59.05	58.82	58.48	58.23	57.95	58.32	59.80	61.00	60.59	60.55	60.05
6	58.86	58.98	58.71	58.43	58.23	57.91	58.32	59.69	61.09	60.43	60.60	60.23
7	58.78	58.90	58.80	58.42	58.27	57.90	58.37	59.85	61.01	60.56	60.65	60.29
8	58.77	58.91	58.80	58.41	58.25	57.90	58.38	59.84	61.07	60.74	60.50	60.20
9	58.72	58.98	58.77	58.42	58.24	57.90	58.44	59.87	61.07	60.84	60.48	60.11
10	58.99	59.30	58.75	58.39	58.31	57.93	58.58	60.46	61.06	60.73	60.45	60.37
11	59.09	58.58	58.77	58.44	58 19	57.91	58.69	60.37	61.07	60.64	60.54	60.37
12	58.46	58.75	58.82	58.39	58 16	57.92	58.69	60.18	60.89	60.43	60.70	60.46
13	58.79	58.87	58.79	58.34	58.23	---	58.85	60.17	60.95	60.65	60.43	60.45
14	58.86	58.79	58.77	58.33	58.20	---	58.87	60.34	61.01	60.67	60.34	60.48
15	58.78	58.82	58.75	58.32	58.17	---	58.96	60.41	61.02	60.75	60.36	60.52
16	59.03	58.95	58.75	58.28	58.21	---	59.05	60.52	60.96	60.57	60.11	60.51
17	59.31	58.93	58.79	58.32	58.23	---	59.13	60.58	60.88	60.77	60.38	60.57
18	58.86	59.42	58.78	58.29	58.21	---	59.19	60.64	60.87	60.78	60.45	60.58
19	58.60	58.96	58.73	58.32	58.16	---	59.26	60.75	60.83	60.79	60.40	60.67
20	58.86	58.81	58.73	58.31	58.14	---	59.32	60.74	60.75	60.75	60.41	60.65
21	58.87	58.83	58.69	58.32	58.12	---	59.35	60.68	60.68	60.75	60.41	60.45
22	58.76	58.74	58.72	58.34	58.16	57.73	59.42	60.97	60.59	60.76	60.39	60.67
23	58.87	58.70	58.76	58.38	58.10	57.71	59.41	60.99	60.63	60.74	60.41	60.71
24	59.06	58.92	58.68	58.35	58.06	57.76	59.44	60.81	60.43	60.79	60.41	60.64
25	59.14	58.64	58.71	58.31	58.04	57.84	59.47	60.83	60.81	60.79	60.38	60.62
26	58.89	58.80	58.66	58.37	58.04	57.79	59.51	60.79	60.72	60.57	60.35	60.65
27	58.93	58.76	58.60	58.36	58.01	57.72	59.55	60.82	60.59	60.71	60.29	60.60
28	59.04	58.82	58.63	58.35	58.01	57.86	59.56	60.82	60.68	60.71	60.38	60.64
29	59.17	58.79	58.57	58.29	---	57.76	59.55	60.81	60.61	60.72	60.39	60.60
30	58.94	58.66	58.58	58.29	---	57.80	59.57	61.01	60.56	60.70	60.22	60.21
31	58.96	---	58.54	58.26	---	57.89	---	61.17	---	60.59	60.19	---
MEAN	58.90	58.90	58.73	58.37	58.17	---	58.93	60.40	60.86	60.68	60.43	60.45
MAX	59.31	59.42	58.91	58.58	58.31	---	59.57	61.17	61.09	60.84	60.70	60.71
MIN	58.46	58.58	58.54	58.26	58.01	---	58.12	59.55	60.43	60.43	60.11	60.05

05140521 LAKE OF THE WOODS AT SPRINGSTEEL ISLAND NEAR WARROAD, MN-Continued



05200510 MISSISSIPPI RIVER NEAR BEMIDJI, MN

LOCATION.--Lat 47°29'00", long 94°43'40", in SE¼SW¼ sec. 3, T.146 N., R.32 W., Beltrami County, Hydrologic Unit 07010101, 3.5 mi east of Bemidji on right bank 100 ft upstream of County Highway 12 and 400 ft downstream from Stump Lake dam.

DRAINAGE AREA.--610 mi^2 (approximately).

PERIOD OF RECORD.--September 1987 to current year (no winter records).

GAGE.--Water-stage recorder. Elevation of gage is 1,315 ft above sea level (from topographic map).

REMARKS.--Records good.

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	271	374	295	---	---	---	315	198	770	306	598	684
2	271	367	294	---	---	---	449	194	764	261	579	689
3	272	431	296	---	---	---	532	245	737	270	523	742
4	270	467	---	---	---	---	554	299	719	353	474	781
5	252	454	---	---	---	---	865	436	735	508	483	792
6	214	470	---	---	---	---	942	539	748	678	470	781
7	86	495	---	---	---	---	1050	547	760	773	466	832
8	42	480	---	---	---	---	1030	541	739	743	449	915
9	40	458	---	---	---	---	1040	530	723	747	424	921
10	40	457	---	---	---	---	1050	567	761	734	396	915
11	41	499	---	---	---	---	1070	597	752	717	351	903
12	53	452	---	---	---	308	1090	672	748	700	336	915
13	53	425	---	---	---	308	1100	799	741	688	358	996
14	46	422	---	---	---	307	1100	914	728	676	358	1010
15	46	407	---	---	---	244	1110	1010	800	658	358	989
16	54	396	---	---	---	101	1100	1000	803	700	366	989
17	89	389	---	---	---	91	1090	1010	793	700	366	996
18	116	378	---	---	---	90	1080	1020	786	689	362	989
19	128	405	---	---	---	90	1060	1000	780	679	366	996
20	120	385	---	---	---	91	1060	986	773	679	366	927
21	123	367	---	---	---	91	1000	1070	764	668	369	879
22	132	361	---	---	---	92	968	1080	753	668	373	821
23	174	365	---	---	---	92	961	1100	790	658	453	832
24	203	352	---	---	---	92	941	1080	741	643	537	838
25	209	331	---	---	---	92	913	1070	673	603	551	832
26	225	295	---	---	---	92	756	1050	657	653	673	838
27	358	294	---	---	---	92	528	1030	681	658	694	742
28	367	294	---	---	---	93	482	1000	648	643	679	593
29	357	294	---	---	---	158	449	906	634	638	673	541
30	380	298	---	---	---	242	372	781	536	628	668	428
31	377	---	---	---	---	315	---	728	---	613	673	---
TOTAL	5409	11862	---	---	---	---	26057	23999	22037	19332	14792	25106
MEAN	174	395	---	---	---	---	869	774	735	624	477	837
MAX	380	499	---	---	---	---	1110	1100	803	773	694	1010
MIN	40	294	---	---	---	---	315	194	536	261	336	428
AC-FT	10730	23530	---	---	---	---	51680	47600	43710	38350	29340	49800
CFSM	.29	.65	---	---	---	---	1.42	1.27	1.20	1.02	.78	1.37
IN.	.33	.72	---	---	---	---	1.59	1.46	1.34	1.18	.90	1.53

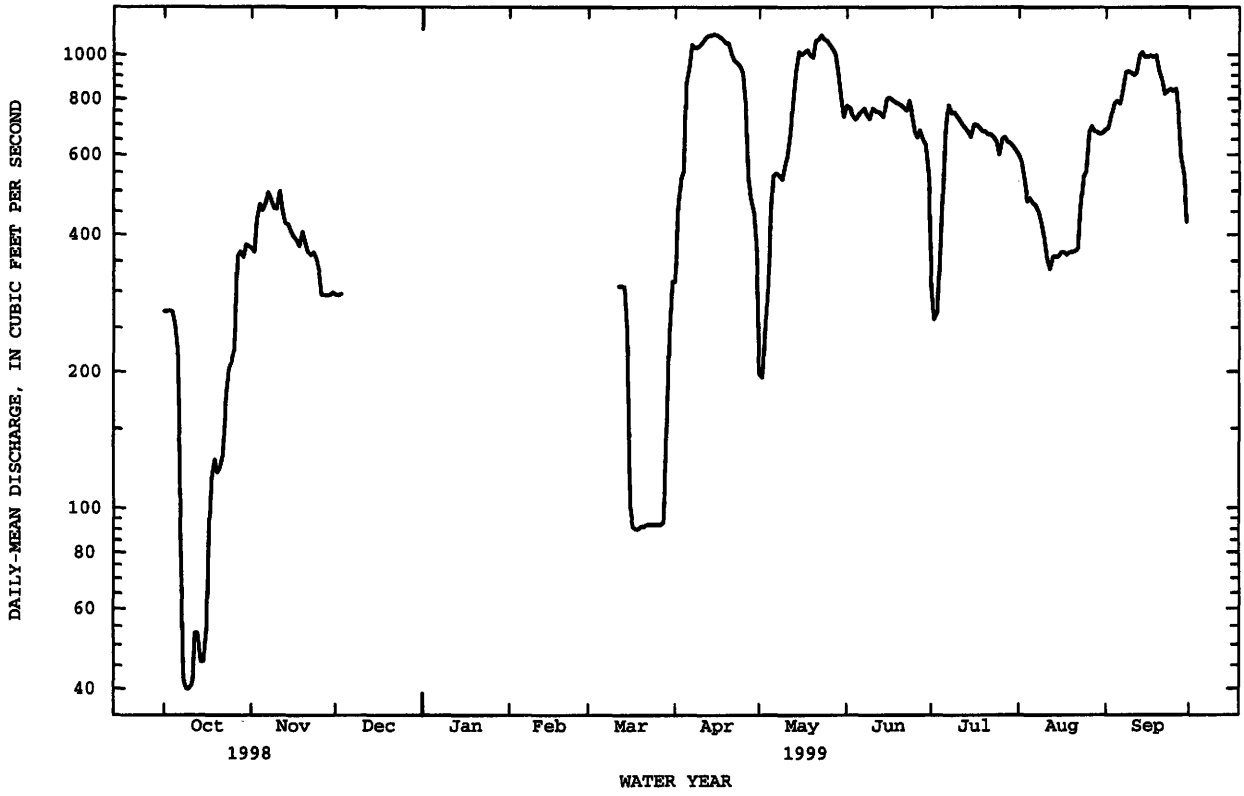
05200510 MISSISSIPPI RIVER NEAR BEMIDJI, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1987 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	178	395	---	---	---	244	424	450	277	319	216	249
MAX	311	395	---	---	---	247	889	774	735	912	477	837
(WY)	1995	1999	---	---	---	1998	1997	1999	1999	1997	1999	1999
MIN	75.5	395	---	---	---	242	148	181	104	62.2	61.9	62.3
(WY)	1991	1999	---	---	---	1996	1992	1992	1988	1988	1989	1990

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1987 - 1999	
HIGHEST DAILY MEAN	715	May 23	1110	Apr 15	1320	Jul 14 1997
LOWEST DAILY MEAN	40a	Oct 9, 10	40a	Oct 9, 10	22a	Jul 12 1988
INSTANTANEOUS PEAK FLOW			1240	Apr 5	1820	Jul 11 1997
INSTANTANEOUS PEAK STAGE			5.34	Apr 5	5.98	Jul 11 1997
INSTANTANEOUS LOW FLOW			2.4	Oct 5		

a Minimum observed.



05211000 MISSISSIPPI RIVER AT GRAND RAPIDS, MN

LOCATION.--Lat 47°13'56", long 93°31'48", in SW¼NW¼ sec. 21, T.55 N., R.25 W., Itasca County, Hydrologic Unit 07010103, on left bank, in super-calendar room of Blandin Paper Mill in Grand Rapids, 400 ft downstream from Blandin Dam, 400 ft upstream from bridge on U.S. Highway 169, 2.5 mi upstream from Prairie River, and at mile 1,182 upstream from Ohio River.

DRAINAGE AREA.--3,370 mi^2 (approximately).

PERIOD OF RECORD.--October 1883 to current year. Monthly discharge only for some periods, published in WSP 1308. Published as "at Pokegama Dam near Grand Rapids" 1942-44.

GAGE.--Water-stage recorder. Datum of gage is 1,242.03 ft above sea level. See WSP 1914 for history of changes prior to Jan. 17, 1951.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Flow regulated by Winnibigoshish Lake, Leech Lake, Pokegama Lake, and occasionally at low flow by power plant at Blandin Dam. Backwater from Prairie River occurs at times in most years.

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	375	2330	2610	e1980	1780	1900	573	1470	2550	2550	2750	2650
2	544	2290	2590	e1990	1700	1880	919	1490	2480	2370	2640	2700
3	431	2270	2600	e2000	1710	1910	1150	1490	2500	2180	2670	2740
4	568	2190	2600	e2010	1880	2030	1350	1360	2470	2030	2660	2900
5	548	2160	2600	e2020	2130	2150	1450	1570	2580	2360	2640	2990
6	868	2080	2610	e2040	2110	2140	1730	1730	2530	2440	2610	3020
7	742	2100	2650	e2060	2020	2110	2020	1910	2650	2300	2540	3020
8	747	2050	2790	e2060	1990	2120	2050	2170	2780	2480	2450	3000
9	779	2030	2740	e2060	1920	2120	2010	2170	2850	3010	2640	2960
10	777	2050	2710	e2060	1880	2110	2000	2330	2870	3420	2650	3020
11	764	2130	2660	e2060	1840	2110	2020	2730	2930	3600	2740	3030
12	767	2000	2640	e2060	1930	2100	1960	2850	2870	3640	2880	3030
13	739	2070	2600	e2060	e1940	2110	1880	2500	2860	3540	3120	3010
14	741	2120	2580	e2060	e1950	2080	1880	1450	2790	3430	3410	2970
15	810	2080	2500	e2060	1960	1940	1810	1050	2720	3180	3450	2900
16	938	2090	e2050	e2060	1860	1800	1800	1370	2660	3150	3450	2870
17	1280	2110	e1730	e2060	1890	1750	1740	2320	2540	2980	3590	2730
18	1190	2250	e1760	e2060	1890	1530	1720	2770	2540	2830	3710	2780
19	1260	2480	e1800	e2050	1790	1310	1710	2910	2510	2680	3720	2760
20	1400	2400	e1810	e2060	1610	1320	1730	3360	2480	2400	3710	2640
21	1770	2350	e1840	2090	1490	1310	1710	3650	2490	2170	3700	2630
22	1910	2330	e1870	2080	1350	1170	1720	3730	2520	2290	3590	2590
23	2030	2440	e1900	2020	1240	939	1700	3660	2460	2410	3630	2540
24	2120	2580	e1920	1960	1250	786	1750	3330	2280	2620	3600	2440
25	2100	2540	e1940	1900	1260	636	1720	3130	2170	2690	3600	2430
26	2070	2530	e1950	1850	1380	511	1700	3150	2170	2940	3390	2500
27	2150	2540	e1950	1860	1730	500	1560	2980	2200	3030	3210	2610
28	2120	2520	e1980	1850	1910	541	1500	2860	2150	3000	3150	2570
29	2100	2490	e1970	1860	---	561	1450	2770	2200	2960	3050	2570
30	2200	2520	e1960	1860	---	501	1420	2670	2430	2910	2860	2510
31	2380	---	e1960	1830	---	456	---	2600	---	2800	2710	---
TOTAL	39218	68120	69870	62030	49390	46431	49732	75530	76230	86390	96520	83110
MEAN	1265	2271	2254	2001	1764	1498	1658	2436	2541	2787	3114	2770
MAX	2380	2580	2790	2090	2130	2150	2050	3730	2930	3640	3720	3030
MIN	375	2000	1730	1830	1240	456	573	1050	2150	2030	2450	2430
AC-FT	77790	135100	138600	123000	97970	92100	98640	149800	151200	171400	191400	164800
CFSM	.38	.67	.67	.59	.52	.44	.49	.72	.75	.83	.92	.82
IN.	.43	.75	.77	.68	.55	.51	.55	.83	.84	.95	1.07	.92

e Estimated

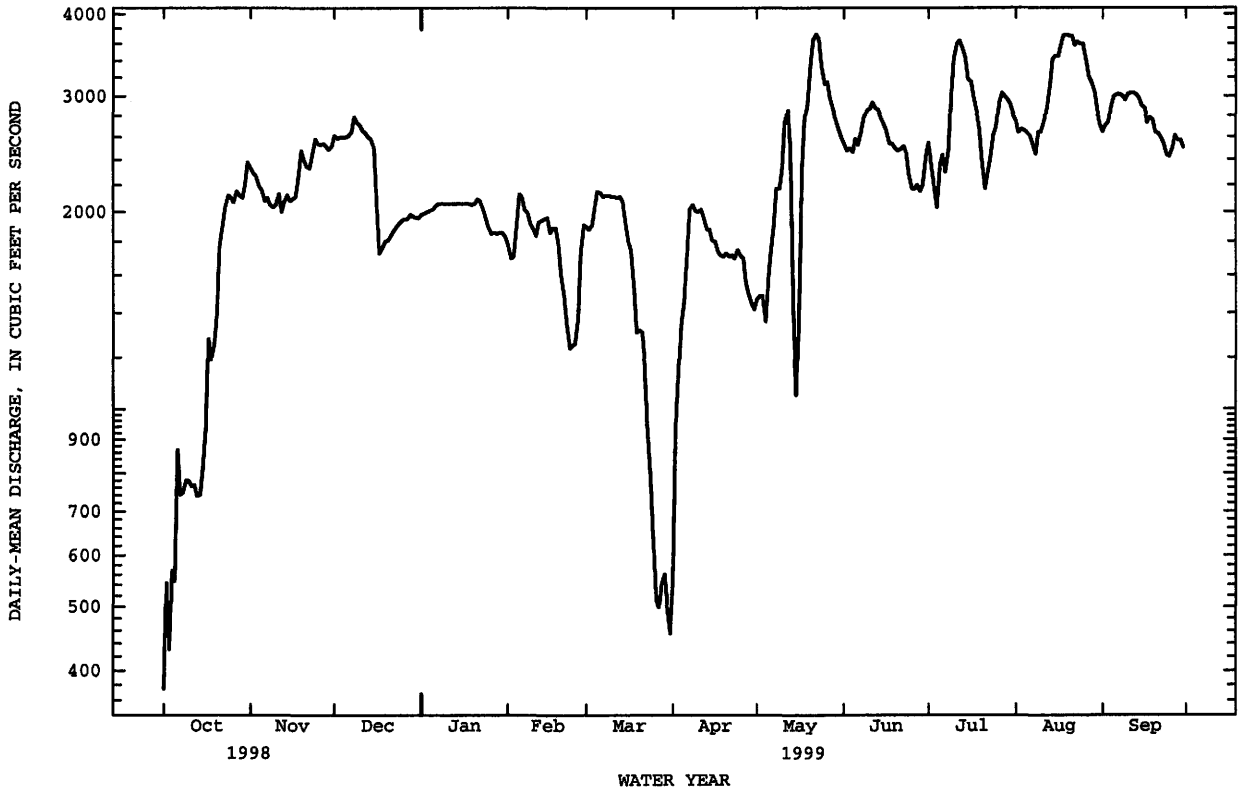
05211000 MISSISSIPPI RIVER AT GRAND RAPIDS, MN--Continued

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

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	1445	1612	1515	1507	1505	1401	1226	1326	1354	1449	1296	1264
MAX	2865	2528	2595	2410	2729	2762	3442	3026	3271	3363	3711	3542
(WY)	1986	1997	1997	1952	1945	1945	1945	1979	1962	1962	1950	1950
MIN	187	174	186	168	177	198	247	32.5	206	125	98.3	195
(WY)	1977	1977	1977	1977	1977	1977	1959	1949	1988	1961	1961	1976

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1942 - 1999	
ANNUAL TOTAL	465100		802571			
ANNUAL MEAN	1274		2199		1408[a]	
HIGHEST ANNUAL MEAN					2269	1997
LOWEST ANNUAL MEAN					277	1977
HIGHEST DAILY MEAN	2790	Dec 8	3730	May 22	4610	Apr 17 1969
LOWEST DAILY MEAN	223	Aug 17	375	Oct 1	.00[b]	Oct 2 1948
ANNUAL SEVEN-DAY MINIMUM	313	Sep 15	520	Mar 26	24	May 9 1949
INSTANTANEOUS PEAK FLOW			4060	Aug 21	12500[c]	Sep 3 1948
INSTANTANEOUS PEAK STAGE			12.29	Jul 11	15.20[d]	Sep 3 1948
INSTANTANEOUS LOW FLOW			313[e]	Oct 1		
ANNUAL RUNOFF (AC-FT)	922500		1592000		1020000	
ANNUAL RUNOFF (CFSM)	.38		.65		.42	
ANNUAL RUNOFF (INCHES)	5.13		8.86		5.68	
10 PERCENT EXCEEDS	2140		3020		2390	
50 PERCENT EXCEEDS	1300		2120		1420	
90 PERCENT EXCEEDS	394		1300		371	

a Average based on 116 years of record is 1220 ft^3/s; median of annual mean discharges is 1160 ft^3/s.
b Many days, several years.
c From rating curve extended above 4500 ft^3/s.
d From floodmark; caused by dam failure.
e Result of regulation.



05227500 MISSISSIPPI RIVER AT AITKIN, MN

LOCATION.--Lat 46°32'26", long 93°42'26", in SW¼NW¼ sec. 24, T.47 N., R.27 W., Aitkin County, Hydrologic Unit 07010104, on right bank upstream side of highway bridge at north edge of Aitkin, 1 mi downstream from Ripple River and at mile 1,055.9 upstream from Ohio River.

DRAINAGE AREA.--6,140 mi^2 (approximately).

PERIOD OF RECORD.--March 1945 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,182.41 ft above sea level (levels by U.S. Army Corps of Engineers). Mar. 1, 1945 to Mar. 14, 1961, nonrecording gage, and Mar. 15, 1961 to Sept. 30, 1967, water-stage recorder at same site at datum 3.0 ft higher. Diversion channel: Non-recording gage and crest-stage gage. Datum of gage is 1,182.02 ft above sea level. Apr. 9, 1955 to Apr. 10, 1956, nonrecording gage at site 4 mi downstream at different datum. Apr. 11, 1956 to Sept. 30, 1967, non-recording gage at same site at datum 3.0 ft higher.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Flow regulated by Winnibigoshish Lake, Leech Lake, Pokegama Lake, and Sandy Lake. Water diverted at medium and high stages into Aitkin diversion channel 6.5 mi above station, bypasses station and returns to river 15.5 mi below station. Diversion began Apr. 2, 1955. These records include flow in diversion channel. Gage height telemeter and U.S. Army Corps of Engineers satellite telemeter at station.

EXTREMES FOR CURRENT YEAR.--Main channel: Maximum discharge, 5080 ft^3/s, May 17; maximum gage height, 14.06 ft, May 18. Diversion channel: Maximum discharge, 4480 ft^3/s, May 17, gage height 14.00 ft.

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	838	4180	4140	e2200	e2050	e1700	2380	3720	6680	2960	6030	6220
2	853	4180	4180	e2200	e2020	e1820	2590	3540	6330	3020	5910	6120
3	866	4170	4220	e2200	e2000	e1920	2660	3380	6080	3100	5900	6000
4	852	4130	4280	e2210	e2000	e2000	2990	3260	5950	3280	5770	6080
5	915	4040	4350	e2220	e2000	e2070	3640	3200	5880	3390	5500	6200
6	935	3940	4380	e2230	e2000	e2150	4270	3200	5870	3460	5280	6250
7	959	3850	4430	e2240	e2010	e2200	4950	3380	5830	3570	5170	6240
8	1010	3770	4400	e2250	e2040	e2240	5800	3900	5640	3810	5070	6240
9	1170	3690	4340	e2260	e2060	e2280	6410	4400	5280	4130	4930	6250
10	1280	3700	4290	e2270	e2090	e2300	6730	4720	5110	4470	4860	6270
11	1300	3660	4340	e2270	e2100	e2320	7020	5610	4760	4840	4830	6220
12	1310	3500	4550	e2250	e2130	e2340	7150	7030	4610	5200	4950	6240
13	1320	3450	4480	e2250	e2150	e2360	7260	8420	4480	5490	5540	6300
14	1290	3500	4400	e2250	e2160	e2400	7350	8990	4390	5820	6030	6290
15	1270	3540	4340	e2250	e2180	e2400	7440	9090	4260	6070	6130	6200
16	1290	3560	4200	e2250	e2200	e2450	7410	9270	4130	6580	6140	6080
17	1450	3540	e3850	e2250	e2210	e2490	7310	9570	4030	6940	6120	5940
18	1850	3530	e3350	e2250	e2200	e2510	7180	9230	3880	7120	6180	5780
19	2590	3580	e3000	e2250	e2200	e2530	7020	8940	3730	7180	6480	5610
20	3110	3600	e2400	e2250	e2170	e2510	6820	8680	3610	7130	6610	5430
21	3480	3510	e1950	e2260	e2110	e2480	6630	8490	3480	7090	6590	5230
22	3690	3610	e2020	e2260	e2050	e2430	6380	8430	3410	6900	6610	4990
23	3920	3800	e2120	e2260	e1960	e2380	6080	8460	3370	6800	6670	4790
24	4150	3940	e2140	e2270	e1880	e2300	5680	8520	3360	6590	6710	4630
25	4220	4020	e2160	e2280	e1780	e2230	5370	8500	3340	6330	6700	4510
26	4240	4070	e2160	e2260	e1700	e2170	5130	8380	3270	6230	6650	4660
27	4300	4120	e2160	e2230	e1650	e2130	4910	8210	3160	6210	6610	5110
28	4310	4140	e2150	e2200	e1660	e2090	4640	7970	3030	6220	6590	5550
29	4280	4100	e2170	e2140	---	e2070	4360	7620	3010	6260	6550	5830
30	4260	4120	e2170	e2120	---	2070	4030	7310	2990	6240	6460	5960
31	4220	---	e2180	e2100	---	2190	---	6990	---	6160	6360	---
TOTAL	71528	114540	105300	69180	56760	69530	167590	210410	132950	168590	185930	173220
MEAN	2307	3818	3397	2232	2027	2243	5586	6787	4432	5438	5998	5774
MAX	4310	4180	4550	2280	2210	2530	7440	9570	6680	7180	6710	6300
MIN	838	3450	1950	2100	1650	1700	2380	3200	2990	2960	4830	4510
AC-FT	141900	227200	208900	137200	112600	137900	332400	417300	263700	334400	368800	343600
CFSM	.38	.62	.55	.36	.33	.37	.91	1.11	.72	.89	.98	.94
IN.	.43	.69	.64	.42	.34	.42	1.02	1.27	.81	1.02	1.13	1.05

e Estimated

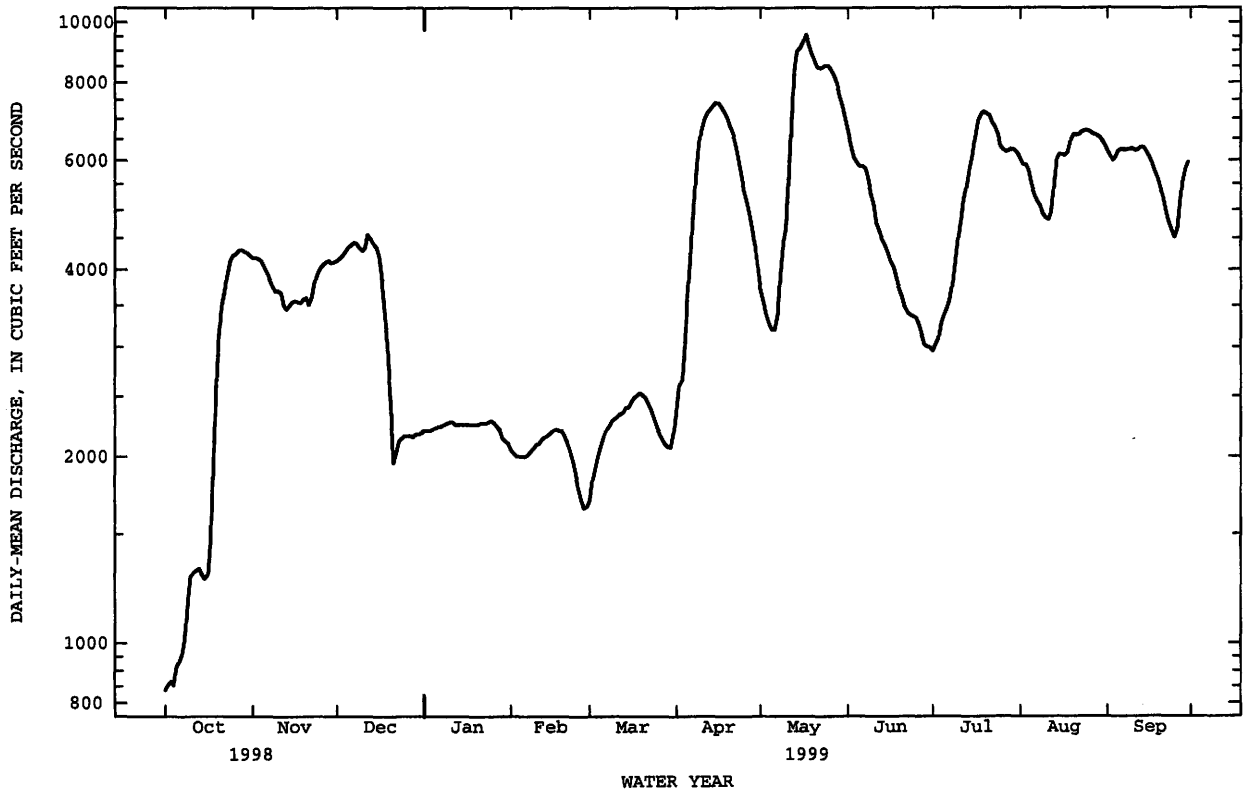
05227500 MISSISSIPPI RIVER AT AITKIN, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1945 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	2665	2767	2284	1962	1881	2245	5214	5276	3677	3125	2378	2263
MAX	6534	6756	4498	3525	3196	5415	10830	15510	8072	8201	8270	6689
(WY)	1966	1972	1997	1966	1966	1945	1966	1950	1965	1993	1953	1986
MIN	313	328	324	345	398	638	1074	669	540	346	273	321
(WY)	1977	1977	1977	1977	1977	1977	1977	1958	1988	1961	1961	1976

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1945 - 1999	
ANNUAL TOTAL	942011		1525528			
ANNUAL MEAN	2581		4180		2971	
HIGHEST ANNUAL MEAN					4985	1966
LOWEST ANNUAL MEAN					796	1977
HIGHEST DAILY MEAN	6180	Jun 28	9570	May 17	19900	May 20 1950
LOWEST DAILY MEAN	611	Aug 20	838 a	Oct 1	153	Sep 1 1961
ANNUAL SEVEN-DAY MINIMUM	711	Sep 9	888	Oct 1	195	Aug 26 1961
INSTANTANEOUS PEAK FLOW			9690	May 17	20000	May 20 1950
INSTANTANEOUS PEAK STAGE			14.06	May 18	22.49b	May 20 1950
INSTANTANEOUS LOW FLOW			830 a	Oct 1	151	Sep 1 1961
ANNUAL RUNOFF (AC-FT)	1868000		3026000		2152000	
ANNUAL RUNOFF (CFSM)	.42		.68		.48	
ANNUAL RUNOFF (INCHES)	5.71		9.24		6.57	
10 PERCENT EXCEEDS	4320		6810		5910	
50 PERCENT EXCEEDS	2200		4030		2360	
90 PERCENT EXCEEDS	862		2030		970	

a Rising stage
b Present datum.



05242300 MISSISSIPPI RIVER AT BRAINERD, MN

LOCATION.--Lat 46°22'40", long 94°10'59", in SE¼/SW¼ sec. 18, T. 145 N., R.30 W., Crow Wing County, Hydrologic Unit 07010104, on left bank in hydro-plant of Potlach Corporation, Northwest Paper Division in Brainerd, 12.7 mi upstream from Crow Wing River, and at mile 1003.7 upstream from Ohio River.

DRAINAGE AREA.--7,320 mi^2 (approximately).

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

GAGE.--Water-stage recorder. Datum of gage is 1,146.96 ft above sea level.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Flow regulated by Winnibigoshish Lake, Leech Lake, Pokegama Lake, Sandy Lake, Pine River Reservoir at Cross Lake, and by hydropower plant in Brainerd.

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	1020	5090	4920	e2700	e2580	e2100	2950	4710	9040	3670	7060	7390
2	1070	5170	4950	e2700	e2560	e2170	3330	4370	8590	3740	6810	7130
3	1130	5000	5030	e2700	e2530	e2260	3410	4190	8090	3730	6930	7070
4	1100	5010	5060	e2700	e2500	e2360	3800	4070	7670	3820	6750	e7200
5	1210	4990	5080	e2700	e2500	e2480	4310	4130	7940	3980	6430	e7300
6	1210	4820	5140	e2710	e2500	e2560	4890	4100	7470	3920	6040	e7400
7	1220	4860	5190	e2720	e2500	e2630	5600	4260	7490	4080	5950	7460
8	1340	4660	5300	e2720	e2510	e2700	6510	4590	7480	4250	5700	7460
9	1420	4680	5150	e2720	e2520	e2750	7410	5230	6990	4470	5690	7490
10	1670	4780	5090	e2720	e2530	e2800	7930	5910	6930	4770	5550	7660
11	1660	4520	4990	e2730	e2540	e2830	8150	6850	6400	5080	5560	7650
12	1640	4560	4940	e2740	e2570	e2860	8350	8570	6060	5360	5750	7660
13	1710	4290	5320	e2760	e2600	e2870	8730	10600	5770	5860	6080	7700
14	1720	4320	5150	e2770	e2610	e2900	8950	11700	5340	6280	7110	7970
15	1650	4340	5170	e2780	e2620	e2930	8970	11900	5280	6450	7320	7820
16	1880	4350	5060	e2790	e2640	e2970	8940	12500	5090	7490	7370	7760
17	2020	4380	4520	e2800	e2660	e3020	8940	12800	4820	7830	7340	7450
18	2440	4430	3970	e2810	e2650	3170	8900	12900	4610	8260	7300	7290
19	2980	4400	3710	e2820	e2640	3160	8760	12700	4570	8480	7290	6900
20	3730	4480	2960	e2830	e2600	3220	8620	12500	4260	8530	7560	6550
21	3960	4430	2560	e2830	e2550	3120	8420	12100	4200	8540	7570	6310
22	4440	4360	2640	e2840	e2480	3090	8110	11700	4160	8370	7480	6040
23	4560	4470	e2700	e2850	e2410	3030	7700	11700	4020	8380	7880	5730
24	4880	4730	e2700	e2860	e2320	2900	7320	11500	4030	8110	7900	5420
25	5080	4830	e2700	e2840	e2200	2810	6990	11500	4030	7770	7740	5250
26	5090	4880	e2700	e2800	e2130	2770	6590	11300	4030	7670	7710	5480
27	5330	4920	e2700	e2760	e2080	2740	6210	11000	4030	7440	7600	5730
28	5200	4910	e2700	e2740	e2080	2800	5880	10700	3860	7460	7440	6090
29	5270	4900	e2700	e2710	---	2870	5380	10300	3820	7390	7490	6580
30	5260	4910	e2700	e2660	---	2870	5050	9840	3750	7580	7560	6810
31	5230	---	e2700	e2620	---	2900	---	9420	---	7350	7490	---
TOTAL	88120	140470	126200	85430	69610	86640	205100	279640	169820	196110	215450	207750
MEAN	2843	4682	4071	2756	2486	2795	6837	9021	5661	6326	6950	6925
MAX	5330	5170	5320	2860	2660	3220	8970	12900	9040	8540	7900	7970
MIN	1020	4290	2560	2620	2080	2100	2950	4070	3750	3670	5550	5250
AC-FT	174800	278600	250300	169500	138100	171900	406800	554700	336800	389000	427300	412100
CFSM	.39	.64	.56	.38	.34	.38	.93	1.23	.77	.86	.95	.95
IN.	.45	.71	.64	.43	.35	.44	1.04	1.42	.86	1.00	1.09	1.06

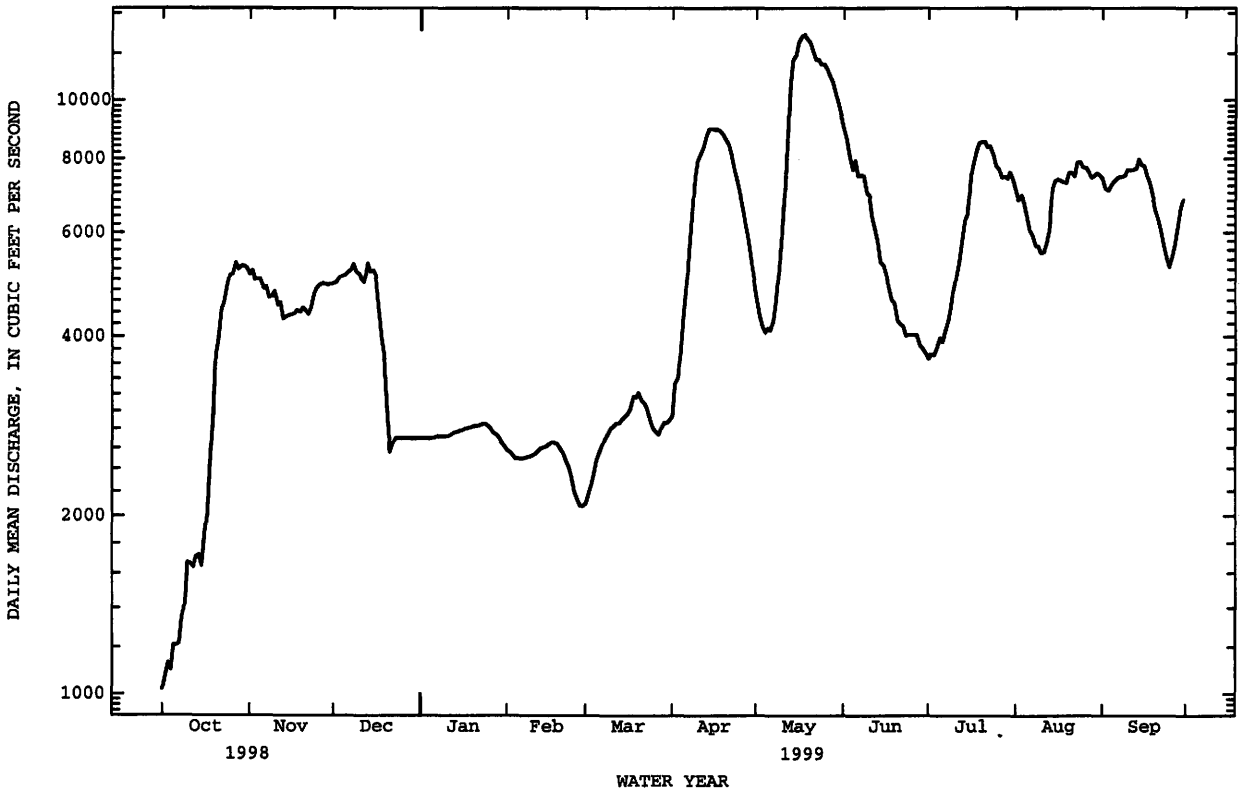
e Estimated

05242300 MISSISSIPPI RIVER AT BRAINERD, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1987 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	3236	3532	3091	2547	2399	2809	6180	5802	3933	4518	2729	2665
MAX	8002	5854	5926	4081	3973	3918	12890	10770	6193	10260	6950	6925
(WY)	1996	1997	1997	1997	1997	1995	1997	1996	1990	1993	1999	1999
MIN	1840	1931	1362	1140	1040	1435	3400	1928	662	442	935	1067
(WY)	1992	1993	1991	1991	1991	1991	1990	1988	1988	1988	1990	1998

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1987 - 1999	
ANNUAL TOTAL	1203440		1870340			
ANNUAL MEAN	3297		5124		3674	
HIGHEST ANNUAL MEAN					5438	1997
LOWEST ANNUAL MEAN					1950	1988
HIGHEST DAILY MEAN	8210	Jun 28	12900	May 18	15200	Apr 9 1997
LOWEST DAILY MEAN	834	Sep 7	1020	Oct 1	348	Jul 30 1988
ANNUAL SEVEN-DAY MINIMUM	924	Sep 10	1140	Oct 1	357	Jul 29 1988
INSTANTANEOUS PEAK FLOW			13000	May 18	15400	Apr 10 1997
INSTANTANEOUS PEAK STAGE			14.52	May 18	16.03	Apr 10 1997
INSTANTANEOUS LOW FLOW			968	Oct 12	273	Jul 12 1988
ANNUAL RUNOFF (AC-FT)	2387000		3710000		2662000	
ANNUAL RUNOFF (CFSM)	.45		.70		.50	
ANNUAL RUNOFF (INCHES)	6.12		9.51		6.82	
10 PERCENT EXCEEDS	5300		8360		6940	
50 PERCENT EXCEEDS	2850		4820		3050	
90 PERCENT EXCEEDS	1160		2530		1370	



05243725 STRAIGHT RIVER NEAR PARK RAPIDS, MN

LOCATION.--Lat 46°52'30", long 95°03'56", in NW¼NE¼ sec. 11, T. 139 N., R. 35 W., Hubbard County, Hydrologic Unit 07010106, upstream from culvert on U.S. Highway 71 3.2 mi south of Park Rapids.

DRAINAGE AREA.--53.2 mi^2.

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1970-71, 1973, 1975-76. October 1986 to current year (no winter records in 1987, 1990-91). May 1988 through August 1989, records of hourly water temperature (available in files of the Geological Survey).

GAGE.--Water-stage recorder. Datum of gage is 1,399.55 ft above sea level (levels by Minnesota Department of Natural Resources).

REMARKS.--Records good except those for estimated daily discharges, which are fair.

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	73	74	e76	e71	e64	102	76	78	76	69	77
2	70	72	74	e76	e69	e64	103	75	77	76	68	80
3	68	71	74	e76	e68	e64	102	75	76	73	73	82
4	67	70	73	e76	e69	e64	111	76	73	78	73	88
5	71	70	79	e76	e71	e64	109	82	78	85	73	92
6	78	70	79	e75	e71	e64	108	91	81	88	72	91
7	79	69	75	e75	e70	e65	108	94	79	86	73	90
8	77	69	73	e75	e68	e65	104	92	77	86	73	89
9	75	70	73	e74	e66	e65	102	87	77	86	76	86
10	74	75	71	e74	e63	e65	102	92	80	83	79	84
11	73	82	70	e74	e63	e64	103	104	78	80	84	83
12	74	83	70	e74	e63	e64	99	105	78	76	94	83
13	73	78	70	e75	e64	e64	94	110	76	77	102	83
14	73	78	69	e76	e66	e64	92	107	74	76	103	83
15	74	78	69	e77	e66	e64	89	103	72	78	99	83
16	87	78	69	e79	e66	e64	88	100	71	89	95	82
17	106	78	70	e80	e66	e64	87	97	70	92	91	80
18	104	79	e71	e81	e66	e65	84	94	69	89	89	79
19	96	81	e74	e81	e66	e66	84	89	70	84	86	79
20	89	80	e76	e82	e67	e67	84	86	69	79	85	79
21	85	78	e76	e82	e66	e68	84	84	69	76	83	78
22	81	76	e77	e82	e64	e69	83	81	70	74	80	77
23	78	77	e77	e82	e63	e70	83	80	81	77	82	76
24	76	77	e78	e82	e63	e72	81	79	80	74	81	76
25	78	77	e78	e82	e63	e74	80	77	78	74	79	77
26	76	75	e78	e82	e63	76	80	76	80	74	78	78
27	75	74	e78	e81	e64	80	81	75	82	72	76	78
28	74	73	e77	e80	e64	103	79	75	82	71	75	77
29	73	73	e77	e77	---	103	78	73	79	68	74	76
30	73	75	e76	e75	---	100	77	73	78	70	74	76
31	73	---	e76	e73	---	102	---	77	---	70	77	---
TOTAL	2423	2259	2301	2410	1849	2207	2761	2685	2282	2437	2516	2442
MEAN	78.2	75.3	74.2	77.7	66.0	71.2	92.0	86.6	76.1	78.6	81.2	81.4
MAX	106	83	79	82	71	103	111	110	82	92	103	92
MIN	67	69	69	73	63	64	77	73	69	68	68	76
AC-FT	4810	4480	4560	4780	3670	4380	5480	5330	4530	4830	4990	4840
CFSM	1.47	1.42	1.40	1.46	1.24	1.34	1.73	1.63	1.43	1.48	1.53	1.53
IN.	1.69	1.58	1.61	1.69	1.29	1.54	1.93	1.88	1.60	1.70	1.76	1.71

e Estimated

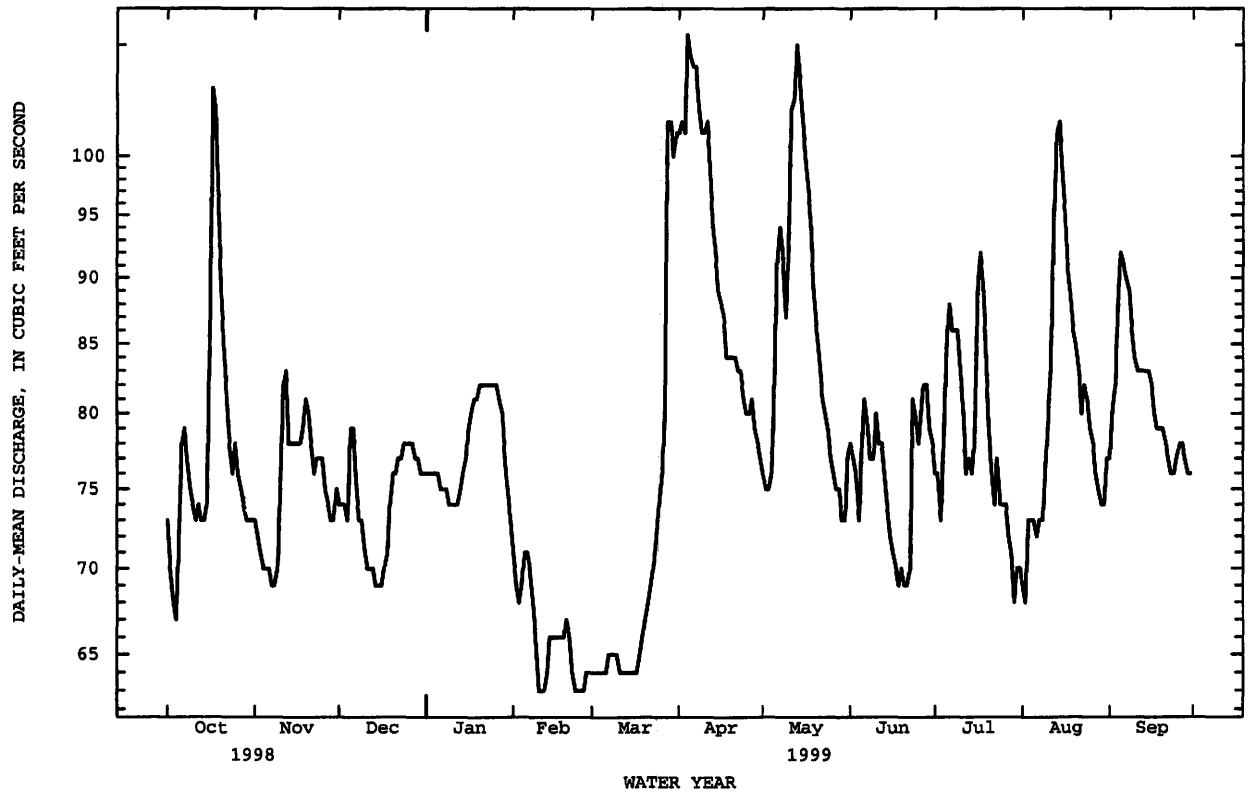
05243725 STRAIGHT RIVER NEAR PARK RAPIDS, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1987 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	63.1	64.3	61.0	55.9	56.2	63.3	72.5	66.8	59.8	59.2	56.3	60.2
MAX	83.1	77.6	74.5	77.7	69.8	76.8	101	86.6	76.1	81.5	81.2	81.4
(WY)	1996	1998	1995	1999	1998	1995	1997	1999	1999	1997	1999	1999
MIN	42.2	47.4	46.0	41.9	44.8	50.9	56.1	46.2	41.9	39.5	35.9	38.7
(WY)	1993	1989	1989	1992	1992	1989	1991	1992	1992	1988	1990	1990

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1987 - 1999	
ANNUAL TOTAL	25303		28572			
ANNUAL MEAN	69.3		78.3		62.9	
HIGHEST ANNUAL MEAN					78.3	1999
LOWEST ANNUAL MEAN					48.0	1992
HIGHEST DAILY MEAN	106	Oct 17	111	Apr 4	144	Apr 6 1997
LOWEST DAILY MEAN	55	May 26	63a	Feb 10-12, 23-26	28a	Jan 9 1992
ANNUAL SEVEN-DAY MINIMUM	57	May 23	63	Feb 22	34	Aug 5 1990
INSTANTANEOUS PEAK FLOW			113	Apr 4	149	Apr 6 1997
INSTANTANEOUS PEAK STAGE			2.90b	Dec 21	2.90b	Dec 21 1998
INSTANTANEOUS LOW FLOW			44c	Feb 12	25ac	Jan 9 1992
ANNUAL RUNOFF (AC-FT)	50190		56670		45590	
ANNUAL RUNOFF (CFSM)	1.30		1.47		1.18	
ANNUAL RUNOFF (INCHES)	17.69		19.98		16.07	
10 PERCENT EXCEEDS	78		92		78	
50 PERCENT EXCEEDS	68		77		61	
90 PERCENT EXCEEDS	60		66		44	

a Estimated.
b Backwater from ice.
c Result of freezeup.



05244000 CROW WING RIVER AT NIMROD, MN

LOCATION.--Lat 46°38'25", long 94°52'44", in SE¼NW¼ sec. 32, T. 137 N., R. 33 W., Wadena County, Hydrologic Unit 07010106, on right bank 200 ft upstream from County Highway 227 bridge, 0.2 mi north of Nimrod, and 0.7 mi upstream from Cat River.

DRAINAGE AREA.--1,030 mi^2.

PERIOD OF RECORD.--April 1910 to September 1914, July 1930 to September 1981, October 1991 to current year (winter records incomplete prior to 1940). October 1981 to September 1987, annual maximums only.

REVISED RECORDS.--WSP 1508: 1910-11, 1913-14, 1937, 1942(M), 1944(M).

GAGE.--Water-stage recorder. Datum of gage is 1,313.27 ft above sea level (levels by Wadena County Highway Department from Minnesota Department of Transportation bench mark). Apr. 15, 1910 to Sept. 30, 1914, nonrecording gage at same site, at datum 2.2 ft lower. July 28, 1930 to Nov. 4, 1949, nonrecording gages at same site and datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Flow affected by natural storage in many lakes.

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	370	850	812	e530	e460	e525	1130	841	965	588	564	648
2	366	824	807	e500	e470	e530	1210	797	927	588	539	671
3	363	789	805	e480	e485	e530	1250	777	897	578	564	704
4	347	757	795	e460	e500	e530	1430	787	860	575	572	804
5	356	733	826	e450	e520	e525	1510	899	854	578	553	811
6	385	712	850	e440	e520	e520	1560	1040	875	563	544	790
7	405	686	861	e430	e525	e520	1620	1130	876	556	538	771
8	413	664	849	e420	e530	e520	1620	1130	846	582	532	768
9	407	645	783	e420	e535	e520	1600	1080	817	614	550	772
10	405	672	757	e420	e535	e525	1570	1110	826	636	564	781
11	408	707	791	e420	e535	e530	1520	1350	830	628	586	792
12	424	719	739	e420	e530	e535	1480	1510	799	619	698	846
13	433	739	723	e420	e525	e535	1430	1840	767	620	831	842
14	439	682	712	e420	e520	e535	1370	1870	741	615	819	824
15	487	676	711	e420	e510	e535	1320	1820	714	632	794	785
16	794	684	693	e430	e500	e540	1290	1810	684	926	773	745
17	1120	681	e670	e430	e500	e540	1280	1780	631	961	762	719
18	1170	686	e600	e440	e495	e540	1250	1730	576	937	767	691
19	1130	706	e400	e440	e495	e540	1260	1660	535	901	786	673
20	1090	740	e270	e440	e490	e540	1240	1590	518	877	797	658
21	1060	792	e400	e450	e490	e520	1230	1510	506	864	786	635
22	1050	708	e600	e450	e490	e520	1210	1440	502	869	774	616
23	1060	696	e720	e450	e495	520	1160	1380	575	906	805	609
24	1070	707	e730	e440	e495	526	1110	1320	565	886	804	600
25	1070	724	e730	e440	e495	524	1070	1270	555	855	767	595
26	1050	741	e710	e435	e500	548	1040	1220	550	816	734	621
27	1010	741	e680	e435	e510	594	1020	1170	559	767	712	615
28	982	741	e650	e440	e520	849	984	1130	576	715	699	602
29	942	765	e620	e440	---	999	946	1070	596	661	680	595
30	909	807	e590	e440	---	1060	891	1020	595	625	663	587
31	877	---	e560	e445	---	1100	---	996	---	594	669	---
TOTAL	22392	21774	21444	13695	14175	18375	38601	40077	21117	22132	21226	21170
MEAN	722	726	692	442	506	593	1287	1293	704	714	685	706
MAX	1170	850	861	530	535	1100	1620	1870	965	961	831	846
MIN	347	645	270	420	460	520	891	777	502	556	532	587
AC-FT	44410	43190	42530	27160	28120	36450	76570	79490	41890	43900	42100	41990
CFSM	.72	.72	.68	.44	.50	.59	1.27	1.28	.70	.71	.68	.70

e Estimated

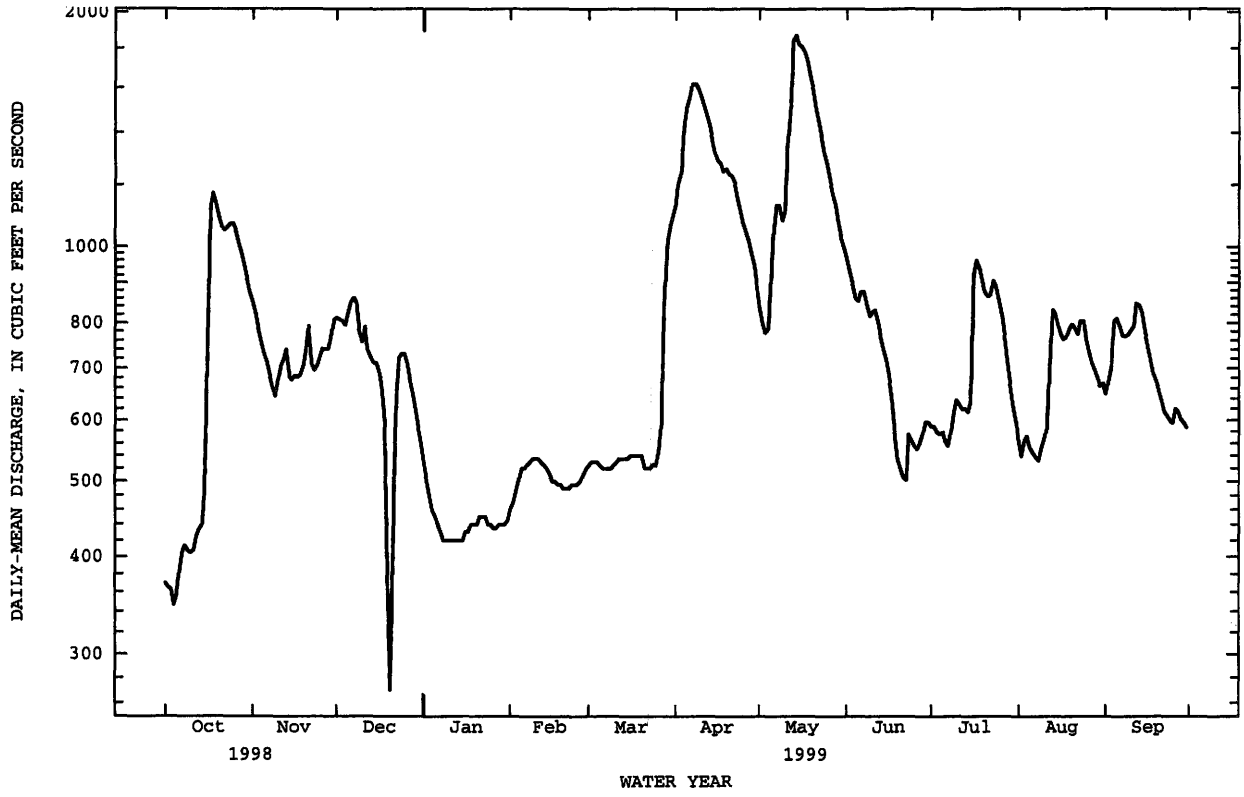
05244000 CROW WING RIVER AT NIMROD, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1910 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	417	410	350	304	308	411	767	679	575	452	380	387
MAX	1463	871	692	462	506	780	1624	1615	1354	1124	1452	929
(WY)	1974	1972	1999	1966	1999	1995	1966	1950	1965	1997	1944	1944
MIN	137	146	131	125	170	171	202	181	149	84.0	74.3	131
(WY)	1937	1937	1940	1940	1940	1940	1911	1911	1934	1936	1936	1934

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1910 - 1999	
ANNUAL TOTAL	219318		276178			
ANNUAL MEAN	601		757		484	
HIGHEST ANNUAL MEAN					757	1999
LOWEST ANNUAL MEAN					230	1940
HIGHEST DAILY MEAN	1240	May 16	1870	May 14	3580	Oct 10 1973
LOWEST DAILY MEAN	255	Sep 25	270a	Dec 20	45	Aug 7 1936
ANNUAL SEVEN-DAY MINIMUM	285	Sep 22	370	Oct 1	55	Aug 3 1936
INSTANTANEOUS PEAK FLOW			1900	May 13	3700	Oct 10 1973
INSTANTANEOUS PEAK STAGE			5.13b	Dec 24	7.64b	Apr 20 1950
INSTANTANEOUS LOW FLOW					45	Aug 7 1936
ANNUAL RUNOFF (AC-FT)	435000		547800		350800	
ANNUAL RUNOFF (CFSM)	.59		.75		.48	
10 PERCENT EXCEEDS	836		1210		805	
50 PERCENT EXCEEDS	590		691		380	
90 PERCENT EXCEEDS	355		440		202	

a Estimated, result of freezeup.
b Backwater from ice.



05245100 LONG PRAIRIE RIVER AT LONG PRAIRIE, MN

LOCATION.--Lat 45°58'30", long 94°51'56", in NE¼NW¼ sec. 20, T. 129 N., R. 33 W., Todd County, Hydrologic Unit 07010108, on right bank 90 ft upstream from bridge on First Avenue at Long Prairie and 400 ft downstream from Venewitz Creek.

DRAINAGE AREA.--434 mi^2.

PERIOD OF RECORD.--October 1971 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,281.74 ft above sea level.

REMARKS.--Records good to fair except those for estimated daily discharges, which are fair to poor.

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	179	185	e98	e107	e107	533	217	333	243	187	e205
2	71	177	182	e98	e107	e110	518	210	321	234	180	e200
3	66	171	176	e99	e105	e110	490	208	306	230	176	e197
4	67	159	169	e98	e101	e105	500	213	290	222	171	e236
5	100	149	172	e96	e100	e102	492	234	333	214	165	e233
6	109	146	167	e94	e104	e101	530	250	343	204	159	e223
7	122	141	152	e94	e105	e99	570	321	342	196	153	e221
8	125	134	e150	e92	e101	e99	606	391	351	215	149	e218
9	111	130	e145	e90	e100	e98	605	432	355	219	162	e215
10	95	143	e140	e91	e101	e99	592	500	377	208	161	e216
11	87	135	e140	e91	e101	e99	583	587	371	206	156	e227
12	91	183	e135	e92	e100	e97	560	734	379	206	180	e231
13	85	196	e130	e94	e100	e100	504	854	388	205	222	e223
14	81	200	e130	e96	e102	e100	468	931	401	199	200	e215
15	90	165	e125	e97	e103	e100	447	971	410	194	205	207
16	124	157	e120	e97	e103	e104	435	1080	395	208	207	199
17	182	152	e118	e98	e102	e130	427	1130	351	197	197	193
18	224	160	e114	e100	e100	e200	412	1030	302	197	209	188
19	259	195	e105	e100	e99	e225	389	933	270	208	220	185
20	299	209	e90	e100	e99	e250	368	890	255	222	225	179
21	338	175	e74	e100	e99	407	354	837	247	233	225	173
22	336	256	e76	e100	e100	504	339	777	245	239	220	171
23	271	229	e78	e102	e102	672	316	747	259	249	223	165
24	237	197	e81	e102	e103	423	290	689	257	247	217	160
25	220	202	e86	e103	e103	310	272	624	260	238	209	162
26	220	204	e92	e103	e103	268	259	558	268	232	202	192
27	222	201	e97	e105	e104	255	252	507	281	221	194	184
28	216	193	e98	e107	e104	330	242	475	293	214	188	170
29	204	188	e99	e110	---	415	233	432	280	210	185	172
30	e193	186	e100	e109	---	461	225	394	260	202	e194	177
31	186	---	e100	e107	---	482	---	368	---	195	e203	---
TOTAL	5110	5312	3826	3063	2858	6962	12811	18524	9523	6707	5944	5937
MEAN	165	177	123	98.8	102	225	427	598	317	216	192	198
MAX	338	256	185	110	107	672	606	1130	410	249	225	236
MIN	66	130	74	90	99	97	225	208	245	194	149	160
AC-FT	10140	10540	7590	6080	5670	13810	25410	36740	18890	13300	11790	11780
CFSM	.38	.41	.28	.23	.24	.52	.98	1.38	.73	.50	.44	.46
IN.	.44	.46	.33	.26	.24	.60	1.10	1.59	.82	.57	.51	.51

e Estimated

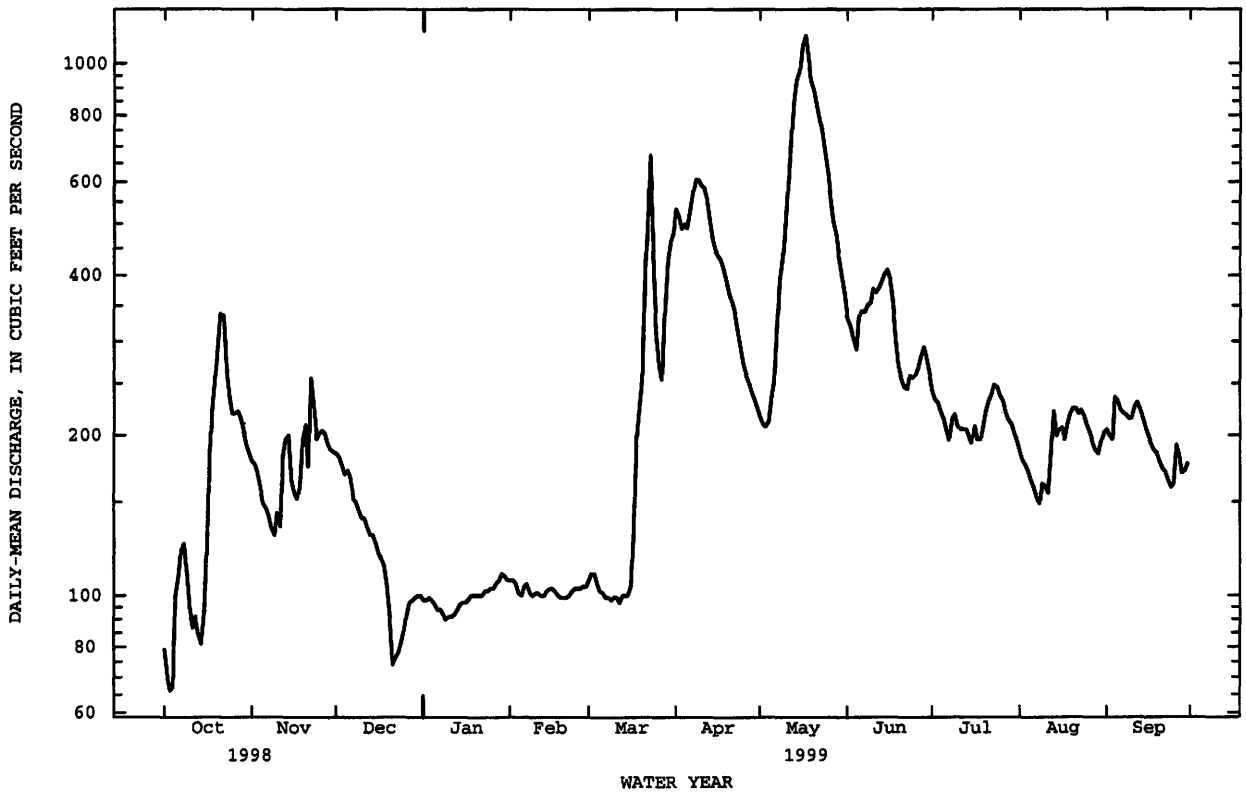
05245100 LONG PRAIRIE RIVER AT LONG PRAIRIE, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1972 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	133	119	77.2	63.6	66.6	178	368	272	213	193	140	122
MAX	512	425	270	217	208	441	827	653	422	777	715	607
(WY)	1987	1972	1987	1987	1987	1985	1997	1986	1985	1972	1972	1986
MIN	13.4	8.69	3.19	1.05	1.62	19.8	71.8	45.5	27.5	4.73	10.0	5.32
(WY)	1977	1977	1977	1977	1977	1989	1977	1977	1988	1988	1989	1976

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1972 - 1999	
ANNUAL TOTAL	60415		86577			
ANNUAL MEAN	166		237		162	
HIGHEST ANNUAL MEAN					366	1972
LOWEST ANNUAL MEAN					25.2	1977
HIGHEST DAILY MEAN	632	Jul 21	1130	May 17	2900	Jul 22 1972
LOWEST DAILY MEAN	32	Sep 24	66	Oct 3	.84	Jan 12 1977
ANNUAL SEVEN-DAY MINIMUM	37	Sep 19	82	Dec 20	.84	Jan 12 1977
INSTANTANEOUS PEAK FLOW			1130a	May 17	3270	Jul 22 1972
INSTANTANEOUS PEAK STAGE					9.37	Jul 22 1972
INSTANTANEOUS LOW FLOW			62	Oct 4	.84	Jan 12 1977
ANNUAL RUNOFF (AC-FT)	119800		171700		117600	
ANNUAL RUNOFF (CFSM)	.38		.55		.37	
ANNUAL RUNOFF (INCHES)	5.18		7.42		5.08	
10 PERCENT EXCEEDS	285		464		368	
50 PERCENT EXCEEDS	152		197		105	
90 PERCENT EXCEEDS	64		98		25	

a Maximum daily.



05247500 CROW WING RIVER NEAR PILLAGER, MN

LOCATION.--Lat 46°18'18", long 94°22'38", in SW¼NE¼ sec. 30, T. 133 N., R. 29 W., Cass County, Hydrologic Unit 07010106, at Sylvan Dam power plant of Minnesota Power Co., 3.6 mi above mouth and 4.9 mi southeast of Pillager.

DRAINAGE AREA.--3,520 mi^2 (approximately).

PERIOD OF RECORD.--October 1968 to September 1986, October 1987 to current year. Records for August 1924 to September 1968 available in files of the Minnesota District Office.

GAGE.--Water stage recorder. Datum of gage is 1,151.00 ft above sea level, adjustment of 1912. Prior to January 16, 1991, staff gage attached to retaining wall approximately 20 ft below the turbine outlet bays, at datum 1150.17 ft, adjustment of 1912.

REMARKS.--Records good. Discharge computed on the basis of power plant records prior to January 16, 1991. Records for Oct. 1, 1968 to Sept. 30, 1975, were adjusted for storage change in the Sylvan dam reservoir. Flow partly regulated by Sylvan Dam power plant and Gull Lake reservoir.

COOPERATION.--Records collected by Minnesota Power Company prior to February 1991, in connection with a Federal Energy Regulatory Commision project.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum daily discharge since 1924, 18,300 ft^3/s, Apr. 14, 1965.

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

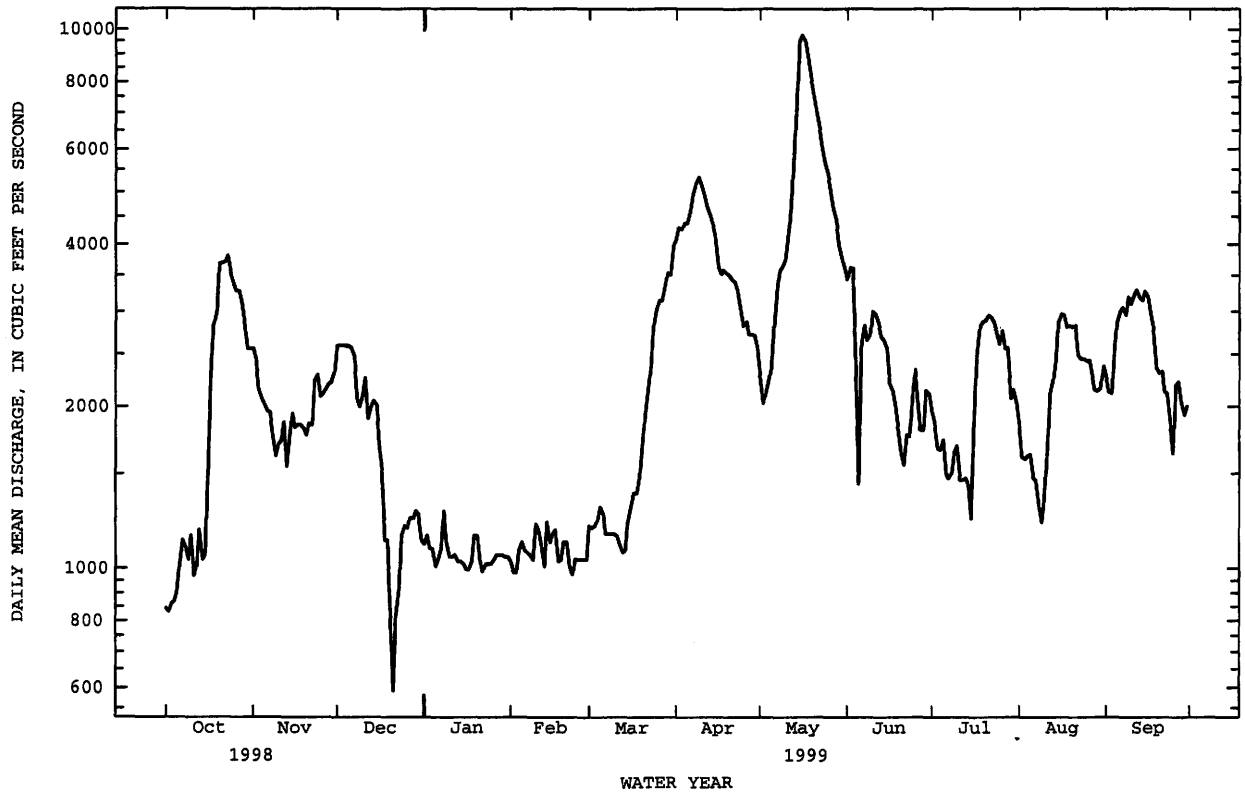
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	843	2560	2590	1110	1030	1200	4070	2290	3440	1960	1840	2270
2	831	2450	2600	1150	983	1190	4290	2030	3620	1870	1610	2130
3	861	2160	2600	1090	983	1200	4270	2100	3610	1670	1600	2120
4	868	2070	2590	1090	1080	1230	4380	2230	2240	1660	1620	2540
5	905	2020	2590	1010	1120	1300	4380	2360	1440	1730	1630	2860
6	1030	1960	2570	1040	1080	1260	4610	2770	2580	1500	1470	3000
7	1130	1950	2470	1090	1070	1160	4930	3260	2820	1470	1460	3050
8	1100	1780	2070	1280	1060	1160	5180	3570	2660	1510	1300	2960
9	1040	1620	2000	1120	1040	1160	5320	3650	2720	1650	1220	3190
10	1150	1700	2100	1050	1210	1160	5190	3750	3000	1690	1350	3100
11	970	1730	2260	1050	1180	1150	4950	4090	2970	1460	1670	3210
12	1010	1870	1900	1060	1110	1110	4700	4740	2850	1460	2110	3290
13	1180	1550	2000	1030	1010	1070	4530	5770	2690	1470	2240	3180
14	1040	1770	2050	1030	1220	1080	4350	7110	2660	1430	2440	3140
15	1060	1940	2010	1020	1120	1230	4160	9500	2560	1240	2870	3270
16	1560	1830	1690	998	1160	1310	3630	9760	2210	1960	2970	3190
17	2390	1850	1530	993	1180	1380	3520	9500	2140	2500	2950	2970
18	2820	1850	1130	1030	1030	1380	3580	8870	2010	2820	2810	2800
19	3000	1820	1130	1150	1040	1470	3530	8200	1830	2870	2820	2350
20	3680	1770	779	1150	1120	1670	3500	7550	1640	2890	2810	2310
21	3690	1860	593	1030	1120	1950	3430	7050	1560	2950	2820	2320
22	3710	1850	825	990	1010	2130	3410	6530	1770	2930	2490	2130
23	3800	2240	915	1020	976	2330	3290	6030	1760	2870	2450	2110
24	3510	2290	1150	1020	1040	2830	3010	5690	2030	2740	2450	1850
25	3390	2090	1200	1020	1040	3020	2820	5400	2340	2610	2430	1640
26	3280	2110	1190	1040	1040	3140	2870	5040	2040	2760	2430	2190
27	3270	2160	1240	1060	1040	3140	2720	4680	1810	2560	2280	2220
28	3110	2200	1240	1060	1040	3310	2720	4430	1810	2570	2150	2040
29	2810	2220	1280	1060	---	3540	2710	3990	2140	2070	2140	1930
30	2560	2320	1260	1050	---	3510	2580	3750	2110	2150	2160	2000
31	2560	---	1130	1050	---	3980	---	3610	---	2020	2370	---
TOTAL	64158	59590	52682	32941	30132	57750	116630	159300	71060	65040	66960	77360
MEAN	2070	1986	1699	1063	1076	1863	3888	5139	2369	2098	2160	2579
MAX	3800	2560	2600	1280	1220	3980	5320	9760	3620	2950	2970	3290
MIN	831	1550	593	990	976	1070	2580	2030	1440	1240	1220	1640
AC-FT	127300	118200	104500	65340	59770	114500	231300	316000	140900	129000	132800	153400
CFSM	.63	.60	.51	.32	.33	.56	1.18	1.56	.72	.64	.65	.78
IN.	.72	.67	.59	.37	.34	.65	1.31	1.80	.80	.73	.75	.87

05247500 CROW WING RIVER NEAR PILLAGER, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1969 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	1252	1218	861	701	721	1382	3371	2424	1663	1436	1020	964
MAX	3771	3674	1699	1188	1360	2996	7980	5671	3625	3295	3520	3309
(WY)	1974	1972	1999	1986	1998	1972	1997	1986	1993	1972	1972	1986
MIN	215	215	199	218	255	548	882	545	447	206	120	161
(WY)	1977	1977	1977	1977	1977	1981	1981	1977	1988	1988	1976	1976

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1969 - 1999	
ANNUAL TOTAL	642972		853603			
ANNUAL MEAN	1762		2339		1419	
HIGHEST ANNUAL MEAN					2564	1972
LOWEST ANNUAL MEAN					446	1977
HIGHEST DAILY MEAN	4050	May 19	9760	May 16	16600	Apr 12 1969
LOWEST DAILY MEAN	548	Sep 9	593	Dec 21	60	Aug 10 1976
ANNUAL SEVEN-DAY MINIMUM	620	Sep 6	924	Oct 1	68	Aug 9 1976
INSTANTANEOUS PEAK FLOW			10800	May 14		
INSTANTANEOUS PEAK STAGE			9.97	May 14		
INSTANTANEOUS LOW FLOW			247	Feb 16		
ANNUAL RUNOFF (AC-FT)	1275000		1693000		1028000	
ANNUAL RUNOFF (CFSM)	.53		.71		.43	
ANNUAL RUNOFF (INCHES)	7.25		9.62		5.84	
10 PERCENT EXCEEDS	2970		3770		2910	
50 PERCENT EXCEEDS	1550		2070		961	
90 PERCENT EXCEEDS	833		1040		437	



05261000 MISSISSIPPI RIVER NEAR FORT RIPLEY, MN

LOCATION.--Lat 46°10'50", long 94°21'56", in SE¼NW¼ sec. 27, T. 43 N., R. 32 W., Crow Wing County, Hydrologic Unit 07010104, on left bank 600 ft upstream from Nokasippi River, 1.0 mile north of Fort Ripley, and at mile 982.1 upstream from Ohio River.

DRAINAGE AREA.--11,010 mi^2 (approximately)

PERIOD OF RECORD.--June 1987 to current year. Operated as high-flow partial-record station October 1971 to June 1987. Prior to Oct. 1971 stage records collected by U.S. Weather Service.

GAGE.--Water-stage recorder. Datum of gage is 1,133.84 ft above sea level. Aug. 1904 to June 1987, nonrecording gages at different datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Flow partly regulated by power plants and Winnibigoshish, Leech, Pokegama, Sandy, and Gull Lakes, and by Pine River Reservoir.

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	1800	7550	e7150	e3900	e3720	e3330	7720	7420	12300	6060	8910	9270
2	1800	7450	7260	e3900	e3680	e3400	8380	6810	11900	6060	8510	8930
3	1890	7060	7320	e3900	e3680	e3550	8710	6460	11900	5880	8380	8810
4	1940	6910	7380	e3900	e3670	e3650	9040	6510	10700	5840	8370	9060
5	1950	6820	7390	e3900	e3660	e3800	9520	6510	9580	6080	8090	9560
6	2230	6630	7430	e3920	e3650	e3850	10400	7060	10300	5910	7780	9940
7	2190	6570	7390	e3920	e3650	e3900	11500	7650	10600	5920	7470	10100
8	2370	6420	7180	e3920	e3680	e3950	12400	8410	10500	6050	7240	10200
9	2340	6130	6970	e3920	e3700	e3980	13400	9250	9950	6390	7090	10400
10	2570	6290	6990	e3920	e3740	e4020	13900	10300	10300	6740	7030	10300
11	2630	6250	7030	e3900	e3760	e4050	14100	11400	9740	6840	7060	10300
12	2530	6270	6690	e3900	e3780	e4060	13900	13400	9360	7120	7600	10500
13	2740	5940	7080	e3900	e3800	e4100	13900	16700	8830	7510	8010	10600
14	2810	5870	7000	e3920	e3800	e4150	14000	19600	8300	7840	8720	10600
15	2620	6170	6970	e3930	e3830	e4250	13700	22400	8060	8060	9460	10600
16	3200	6070	6610	e3930	e3870	e4350	13100	23800	7660	9100	9760	10500
17	4120	6120	6290	e3940	e3850	e4450	12900	24200	7180	10000	9690	9980
18	4980	6200	5290	e3980	e3800	e4600	12500	24000	6950	10800	9630	9650
19	5630	6090	e5000	e4000	e3780	4760	12300	23200	6600	11200	9540	9210
20	7230	6190	e4000	e4000	e3720	4910	12100	22200	6320	11300	9640	8770
21	8020	6250	e3100	e3980	e3650	5260	11800	21000	6030	11300	9840	8480
22	8190	6120	e3350	e3980	e3550	5260	11600	19700	6250	11400	9510	8190
23	8720	6380	e3550	e3970	e3500	5550	11100	18700	6070	11200	9660	7820
24	8760	6850	e3750	e3970	e3450	5770	10600	18000	6200	11000	10100	7440
25	8690	6850	e3850	e3970	e3350	5850	9920	17300	6520	10400	9840	7020
26	8400	e6850	e3930	e3970	e3300	5850	9690	16700	6430	10700	9790	7420
27	8360	e6900	e3970	e3960	e3250	6000	9120	16000	6230	9960	9640	7790
28	8270	e6950	e3980	e3940	e3250	6100	8900	15400	6120	10000	9260	8010
29	7980	e6950	e3970	e3870	---	6590	8420	14600	6210	9500	9140	8280
30	7720	e7000	e3940	e3820	---	6690	7980	13700	6300	9460	9200	8390
31	7620	---	e3930	e3780	---	7400	---	13200	---	9330	9400	---
TOTAL	150300	196100	175740	121710	102120	147430	336600	461580	249390	264950	273360	276120
MEAN	4848	6537	5669	3926	3647	4756	11220	14890	8313	8547	8818	9204
MAX	8760	7550	7430	4000	3870	7400	14100	24200	12300	11400	10100	10600
MIN	1800	5870	3100	3780	3250	3330	7720	6460	6030	5840	7030	7020
AC-FT	298100	389000	348600	241400	202600	292400	667600	915500	494700	525500	542200	547700
CFSM	.44	.59	.51	.36	.33	.43	1.02	1.35	.76	.78	.80	.84

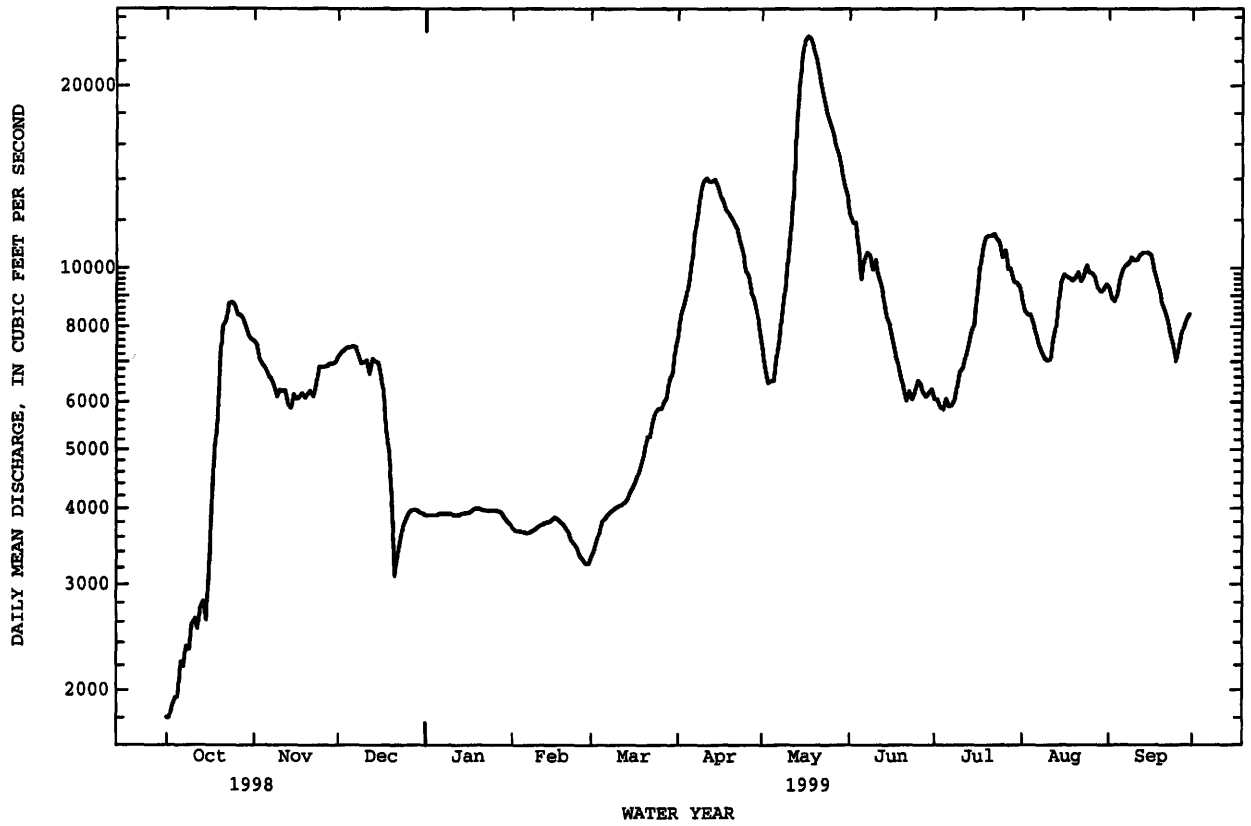
e Estimated

05261000 MISSISSIPPI RIVER NEAR FORT RIPLEY, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1987 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	4523	4692	3944	3272	3160	4599	9865	8760	5745	6138	3920	3760
MAX	11380	7590	7156	5116	5154	7156	21220	14890	9972	13710	8818	9204
(WY)	1996	1996	1997	1997	1997	1995	1997	1999	1993	1993	1999	1999
MIN	2563	2624	1827	1518	1508	2559	5510	3025	1196	729	1517	1769
(WY)	1993	1993	1991	1991	1991	1993	1990	1988	1988	1988	1989	1990

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1987 - 1999	
ANNUAL TOTAL	1865500		2755400			
ANNUAL MEAN	5111		7549		5241	
HIGHEST ANNUAL MEAN					7549	1999
LOWEST ANNUAL MEAN					2813	1988
HIGHEST DAILY MEAN	12100	Jun 29	24200	May 17	31400	Apr 8 1997
LOWEST DAILY MEAN	1470	Sep 11	1800	Oct 1,2	558	Jul 30 1988
ANNUAL SEVEN-DAY MINIMUM	1620	Sep 7	1970	Oct 1	626	Jul 24 1988
INSTANTANEOUS PEAK FLOW			24300	May 16	32200	Apr 8 1997
INSTANTANEOUS PEAK STAGE			12.19	May 16	14.15	Apr 8 1997
INSTANTANEOUS LOW FLOW			1790	Oct 1	528	Jul 30 1988
ANNUAL RUNOFF (AC-FT)	3700000		5465000		3797000	
ANNUAL RUNOFF (CFSM)	.46		.69		.48	
10 PERCENT EXCEEDS	8380		11800		9630	
50 PERCENT EXCEEDS	4550		7000		4240	
90 PERCENT EXCEEDS	2040		3680		1980	



05267000 MISSISSIPPI RIVER NEAR ROYALTON, MN

LOCATION.--Lat 45°51'41", long 94°21'33", in lot 2, sec. 20, T. 39 N., R. 32 W., Morrison County, Hydrologic Unit 07010104, at plant of Minnesota Power Co., 4 mi northwest of Royalton, 4.5 mi downstream from Swan River, and at mile 956 upstream from Ohio River.

DRAINAGE AREA.--11,600 mi^2 (approximately).

PERIOD OF RECORD.--March 1924 to current year.

REMARKS.--Records fair. Discharges flow-averaged based on nearby gaging stations, furnished record from Minnesota Power Co., and measured flow. Flow partly regulated by power plants and Winnibigoshish, Leech, Pokegama, Sandy, and Gull Lakes and by Pine River Reservoir.

COOPERATION.--Furnished records collected by Minnesota Power Co. in connection with a Federal Energy Regulatory Commission project.

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

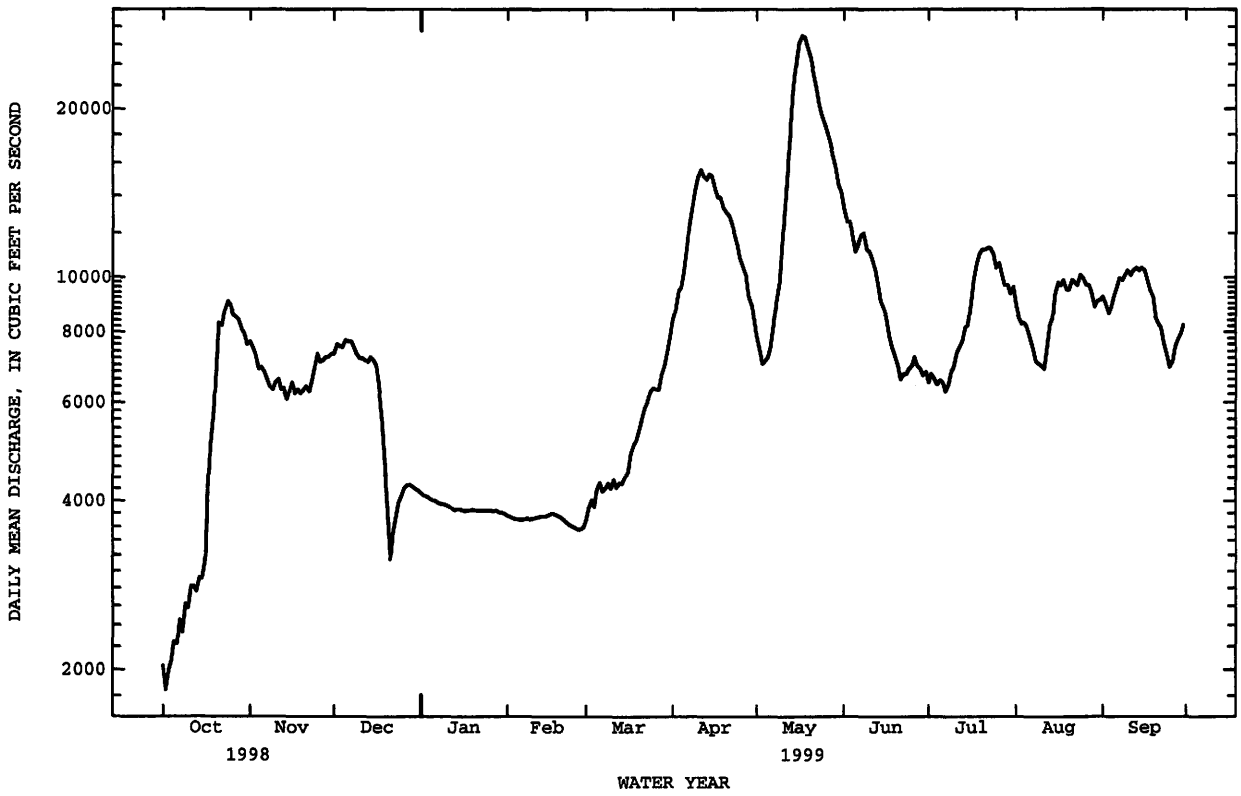
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2030	7700	7320	4130	3760	3690	8410	7880	13300	6510	8930	9220
2	1840	7500	7600	4080	3740	3870	8740	7410	12600	6740	8500	8980
3	2000	7320	7550	4070	3720	4010	9450	7030	12600	6600	8260	8640
4	2070	6890	7500	4040	3710	3910	9600	7120	11800	6460	8310	8840
5	2240	6940	7740	4010	3700	4180	10200	7220	11100	6560	8170	9220
6	2220	6790	7700	4000	3700	4310	11300	7500	11400	6510	7790	9600
7	2450	6600	7700	3970	3700	4160	12500	8260	11900	6270	7500	9980
8	2330	6410	7500	3950	3720	4220	13500	9070	12000	6460	7080	9880
9	2620	6320	7320	3950	3700	4290	14400	9780	11200	6790	7030	10100
10	2580	6510	7170	3930	3720	4200	15100	11300	11100	6940	6980	10300
11	2820	6600	7170	3900	3730	4370	15600	13200	10800	7360	6890	10100
12	2820	6320	7120	3880	3740	4230	15200	15500	10300	7500	7410	10300
13	2760	6360	7080	3850	3750	4310	15000	18800	9690	7740	8220	10400
14	2920	6080	7220	3860	3750	4300	15300	21700	9070	8120	8460	10300
15	2910	6270	7120	3860	3760	4400	15200	24400	8790	8220	9360	10400
16	3140	6510	6980	3840	3780	4510	14400	26200	8500	9020	9780	10300
17	4280	6220	6460	3840	3800	4840	13900	27000	7840	9880	9690	9880
18	5040	6320	5600	3840	3780	5040	13900	26800	7500	10600	9880	9500
19	5750	6220	4750	3850	3760	5130	13300	25800	7270	11000	9500	9220
20	6840	6320	3810	3850	3740	5320	13100	24700	6980	11200	9500	8500
21	8310	6410	3150	3840	3700	5600	12900	23300	6600	11200	9880	8260
22	8220	6270	3500	3840	3660	5840	12500	21800	6740	11300	9780	8120
23	8740	6560	3750	3840	3630	5980	12000	20500	6740	11300	9690	7650
24	9070	6980	3970	3840	3610	6270	11400	19600	6890	11000	10100	7270
25	8930	7320	4100	3840	3590	6360	10800	18800	6980	10400	9980	6940
26	8600	7080	4220	3840	3560	6320	10400	18200	7220	10600	9690	7080
27	8500	7120	4260	3830	3560	6320	10100	17500	6980	10100	9690	7500
28	8410	7220	4270	3840	3590	6700	9260	16500	6890	9690	9400	7740
29	8080	7220	4240	3810	---	6980	8930	15800	6700	9690	8880	7930
30	7930	7320	4200	3810	---	7360	8460	14600	6790	9360	9070	8220
31	7600	---	4170	3790	---	7880	---	14200	---	9600	9120	---
TOTAL	154050	201700	182240	120820	103660	158900	364850	507470	274270	270720	272520	270370
MEAN	4969	6723	5879	3897	3702	5126	12160	16370	9142	8733	8791	9012
MAX	9070	7700	7740	4130	3800	7880	15600	27000	13300	11300	10100	10400
MIN	1840	6080	3150	3790	3560	3690	8410	7030	6600	6270	6890	6940
AC-FT	305600	400100	361500	239600	205600	315200	723700	1007000	544000	537000	540500	536300
CFSM	.43	.58	.51	.34	.32	.44	1.05	1.41	.79	.75	.76	.78
IN.	.49	.65	.58	.39	.33	.51	1.17	1.63	.88	.87	.87	.87

05267000 MISSISSIPPI RIVER NEAR ROYALTON, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1924 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	4145	3960	3125	2742	2644	3849	9253	8679	6453	4937	3737	3598
MAX	12930	14640	7297	5713	5480	12290	25430	24600	18160	15250	15230	12940
(WY)	1966	1972	1997	1966	1997	1966	1997	1950	1965	1993	1953	1986
MIN	632	618	627	534	758	968	1924	1663	1071	648	449	535
(WY)	1937	1937	1935	1935	1937	1940	1931	1977	1988	1988	1934	1934

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1924 - 1999	
ANNUAL TOTAL	2056390		2881570			
ANNUAL MEAN	5634		7895		4787	
HIGHEST ANNUAL MEAN					9555	1966
LOWEST ANNUAL MEAN					1213	1934
HIGHEST DAILY MEAN	14200	Jun 29	27000	May 17	38200	Apr 8 1997
LOWEST DAILY MEAN	1780	Sep 9	1840	Oct 2	254	Nov 25 1936
ANNUAL SEVEN-DAY MINIMUM	1870	Sep 7	2120	Oct 1	358	Sep 3 1936
ANNUAL RUNOFF (AC-FT)	4079000		5716000		3468000	
ANNUAL RUNOFF (CFSM)	.49		.68		.41	
ANNUAL RUNOFF (INCHES)	6.59		9.24		5.61	
10 PERCENT EXCEEDS	9150		12700		9850	
50 PERCENT EXCEEDS	5100		7220		3480	
90 PERCENT EXCEEDS	2340		3740		1320	



05270500 SAUK RIVER NEAR ST. CLOUD, MN

LOCATION.--Lat 45°33'35", long 94°14'00", in SW¼SW¼ sec. 8, T. 124 N., R. 28 W., Stearns County, Hydrologic Unit 07010203, on right bank 0.5 mi northwest of Waite Park, 3 mi west of St. Cloud, and 5 mi upstream from mouth.

DRAINAGE AREA.--1030 mi^2.

PERIOD OF RECORD.--July 1909 to December 1912, April to December 1913, May to November 1929, March 1930 to September 1931, April to November 1932, March to November 1933, March 1934 to September 1981, October 1990 to current year. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORD--WSP 895: Drainage area. WSP 1308: 1912(M), 1932 (M). WSP 1508: 1937(m).

GAGE.--Water-stage recorder. Datum of gage is 1,034.63 ft above sea level. Prior to Nov. 22, 1934, nonrecording gage on highway bridge 1 mi downstream at datum 6.77 ft lower.

REMARKS:.--Records good except those for estimated daily discharge, which are poor. Flow regulated in part by power plants and reservoirs above 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	159	294	325	e170	e144	243	639	466	982	385	179	178
2	149	286	318	e180	e150	257	649	441	947	383	174	171
3	136	284	306	e180	e155	273	637	410	891	427	175	162
4	131	290	295	e170	e145	278	680	396	824	418	174	171
5	144	285	314	e170	e138	290	688	417	903	392	168	171
6	184	271	326	e170	e150	296	791	436	890	363	164	152
7	190	254	312	e160	e150	296	867	478	851	330	160	150
8	178	243	308	e160	e160	292	858	470	850	331	154	164
9	172	249	298	e160	e160	311	840	464	895	338	165	153
10	173	305	289	e150	e150	298	845	502	888	313	175	139
11	168	427	278	e160	e160	277	885	738	923	302	167	132
12	183	363	268	e160	e150	265	873	938	982	291	166	139
13	172	355	265	e160	e140	259	832	1100	967	277	179	151
14	152	358	269	e165	e150	259	806	1220	892	263	182	146
15	145	351	269	e160	e150	262	799	1360	816	250	189	135
16	173	329	262	e160	e148	270	786	1480	750	243	199	127
17	245	345	257	e150	e148	312	776	1530	687	224	208	133
18	265	345	253	e150	e147	335	763	1560	633	211	210	134
19	269	427	241	e150	e140	365	748	1570	594	195	220	142
20	272	386	e180	e140	e140	432	724	1580	572	187	231	139
21	267	365	e160	e150	e138	511	693	1590	534	182	245	132
22	267	351	e140	e150	e140	578	652	1570	506	174	259	137
23	268	364	e150	e140	e145	642	638	1560	504	168	261	137
24	266	369	e155	e140	e145	654	646	1520	475	158	250	136
25	260	380	e160	e140	e150	630	622	1450	448	154	240	139
26	260	368	e165	e140	e150	600	585	1390	442	164	233	158
27	258	354	e170	e137	e180	592	556	1330	471	148	220	165
28	252	344	e175	e140	e210	628	524	1260	448	147	204	150
29	240	342	e180	e140	---	628	502	1190	430	146	180	151
30	281	347	e180	e139	---	626	485	1120	407	161	168	154
31	294	---	e175	e138	---	646	---	1050	---	197	188	---
TOTAL	6573	10031	7443	4779	4233	12605	21389	32586	21402	7922	6087	4448
MEAN	212	334	240	154	151	407	713	1051	713	256	196	148
MAX	294	427	326	180	210	654	885	1590	982	427	261	178
MIN	131	243	140	137	138	243	485	396	407	146	154	127
AC-FT	13040	19900	14760	9480	8400	25000	42430	64630	42450	15710	12070	8820
CFSM	.21	.32	.23	.15	.15	.39	.69	1.02	.69	.25	.19	.14
IN.	.24	.36	.27	.17	.15	.46	.77	1.18	.77	.29	.22	.16

e Estimated

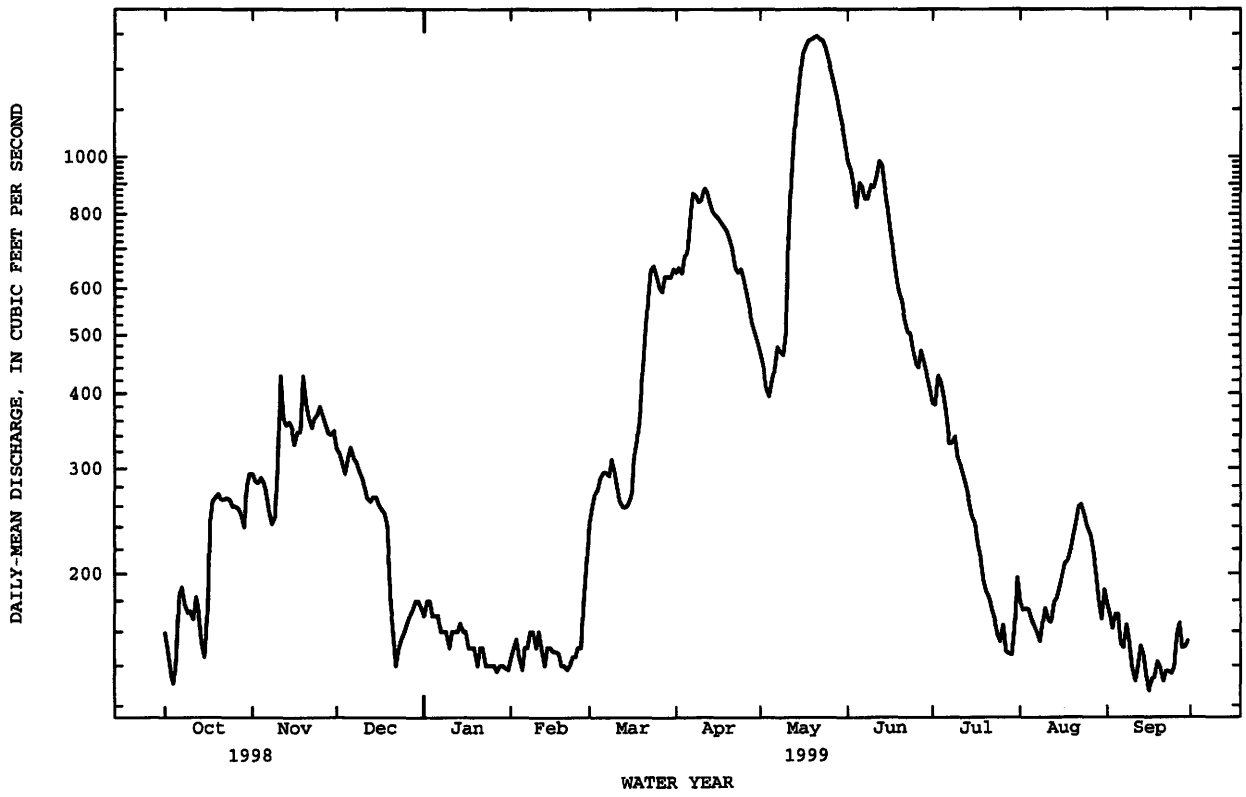
05270500 SAUK RIVER NEAR ST. CLOUD, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	172	181	138	101	110	317	825	513	416	323	208	182
MAX	1154	1091	528	336	568	1380	2997	1572	1333	1262	1250	1136
(WY)	1996	1972	1972	1980	1966	1966	1997	1975	1957	1993	1972	1957
MIN	6.22	6.18	5.15	3.25	7.61	28.7	16.5	7.84	15.9	10.6	10.5	10.7
(WY)	1934	1934	1935	1935	1935	1940	1934	1934	1934	1934	1933	1933

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1909 - 1999	
ANNUAL TOTAL	138629		139498			
ANNUAL MEAN	380		382		307[a]	
HIGHEST ANNUAL MEAN					732	1972
LOWEST ANNUAL MEAN					51.0	1931
HIGHEST DAILY MEAN	982	Jul 3	1590	May 21	7940	Apr 14 1965
LOWEST DAILY MEAN	120	Jan 13	127	Sep 16	1.3	Jan 6 1935
ANNUAL SEVEN-DAY MINIMUM	126	Jan 12	135	Sep 15	1.5	Jan 2 1935
INSTANTANEOUS PEAK FLOW			1600	May 20	9100	Apr 13 1965
INSTANTANEOUS PEAK STAGE			4.69	May 20	10.68	Apr 13 1965
INSTANTANEOUS LOW FLOW			116	Sep 11	.30	Nov 25 1936
ANNUAL RUNOFF (AC-FT)	275000		276700		222100	
ANNUAL RUNOFF (CFSM)	.37		.37		.30	
ANNUAL RUNOFF (INCHES)	5.01		5.04		4.04	
10 PERCENT EXCEEDS	747		850		734	
50 PERCENT EXCEEDS	318		262		143	
90 PERCENT EXCEEDS	160		145		36	

a Median of annual mean discharges is 300 ft^3/s.



UPPER MISSISSIPPI RIVER MAIN STEM--Continued

05270700 MISSISSIPPI RIVER AT ST. CLOUD, MN

LOCATION.--Lat 45°32'50", long 94°08'44", in SE¼SW¼ sec. 1, T. 35 N., R. 31 W., Sherburne County, Hydrologic Unit 07010203, on left bank about 250 ft below the left downstream end of the City of St. Cloud hydropower dam and at mile 926.3 upstream from Ohio River.

DRAINAGE AREA.--13,320 mi^2 (approximately).

PERIOD OF RECORD.--October 1988 to current year.

GAGE.--Water-stage recorder. Datum of gage is 958.49 ft above sea level.

REMARKS.--Records good except those for estimated daily discharge, which are fair. Flow partly regulated by power plants and reservoirs.

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	2490	8700	8300	e4800	e4200	4440	10000	9220	15700	7670	9940	10100
2	2090	8370	8770	e4700	e4200	4740	10000	8840	14700	8110	9380	10000
3	2310	8310	8570	e4650	e4150	4880	11200	8300	14700	8040	9000	9390
4	2420	7620	8470	e4600	e4150	4600	11200	8530	14200	7800	9110	9580
5	2780	7750	8940	e4550	e4150	5000	11900	8710	13800	7750	9080	9820
6	2450	7630	8760	e4500	e4150	5240	13400	8750	13600	7750	8640	10300
7	2970	7370	8860	e4450	e4150	4860	14800	9710	14400	7290	8280	10900
8	2530	7070	8630	e4400	e4150	4930	16100	10700	14700	7590	7700	10700
9	3180	7150	8380	e4400	e4100	5070	17100	11400	13600	7920	7680	10900
10	2880	7430	8150	e4350	e4100	4830	17900	13500	13100	7830	7670	11200
11	3310	7630	8080	e4300	e4100	5140	18600	16400	13000	8620	7400	10800
12	3410	7030	8310	e4250	e4100	4840	18200	19200	12200	8680	7950	11100
13	3050	7470	7780	e4200	e4100	4980	17800	22900	11700	8820	9250	11200
14	3330	6930	8190	e4200	e4100	4910	18200	25900	10800	9300	9030	11100
15	3500	6980	7990	e4200	e4100	5010	18300	29000	10400	9200	10200	11400
16	3410	7630	8120	e4150	e4100	5150	17400	31500	10200	9860	10800	11200
17	4880	7020	7360	e4150	e4150	5710	16200	32700	9330	10800	10800	10900
18	5640	e7100	6480	e4100	e4150	5990	16600	32400	8800	11600	11100	10300
19	6430	e7050	5040	e4100	e4150	6060	15600	31300	8710	12100	10600	10200
20	7120	e7140	4020	e4100	e4150	6340	15600	29800	8390	12200	10400	9150
21	9440	e7210	e3550	e4100	e4150	6540	15300	28000	7830	12400	11100	8920
22	9130	e7080	e4000	e4100	e4150	7080	14800	26100	7930	12400	11100	8880
23	9680	7400	e4350	e4100	e4150	7080	14100	24600	8160	12600	10700	8280
24	10300	7850	e4600	e4100	e4150	7390	13500	23300	8270	12100	11000	7850
25	10100	8550	e4800	e4100	e4200	7570	12900	22400	8150	11700	11200	7600
26	9730	8040	e4950	e4100	e4200	7430	12100	21700	8760	11700	10600	7460
27	9560	8050	e5000	e4100	e4250	7260	12000	20800	8470	11200	10800	8000
28	9390	8260	e5000	e4150	e4300	7960	10600	19300	8340	10500	10500	8290
29	9040	8230	e4950	e4150	---	8090	10400	18500	7910	10800	9550	8440
30	8980	8420	e4900	e4200	---	8780	9790	17200	8020	10200	9940	8930
31	8430	---	e4850	e4200	---	9200	---	16800	---	10900	9810	---
TOTAL	173960	228470	208150	132550	116250	187100	431590	607460	327870	305430	300310	292890
MEAN	5612	7616	6715	4276	4152	6035	14390	19600	10930	9853	9687	9763
MAX	10300	8700	8940	4800	4300	9200	18600	32700	15700	12600	11200	11400
MIN	2090	6930	3550	4100	4100	4440	9790	8300	7830	7290	7400	7460
AC-FT	345000	453200	412900	262900	230600	371100	856100	1205000	650300	605800	595700	580900
CFSM	.42	.57	.50	.32	.31	.45	1.08	1.47	.82	.74	.73	.73
IN.	.49	.64	.58	.37	.32	.52	1.21	1.70	.92	.85	.84	.82

e Estimated

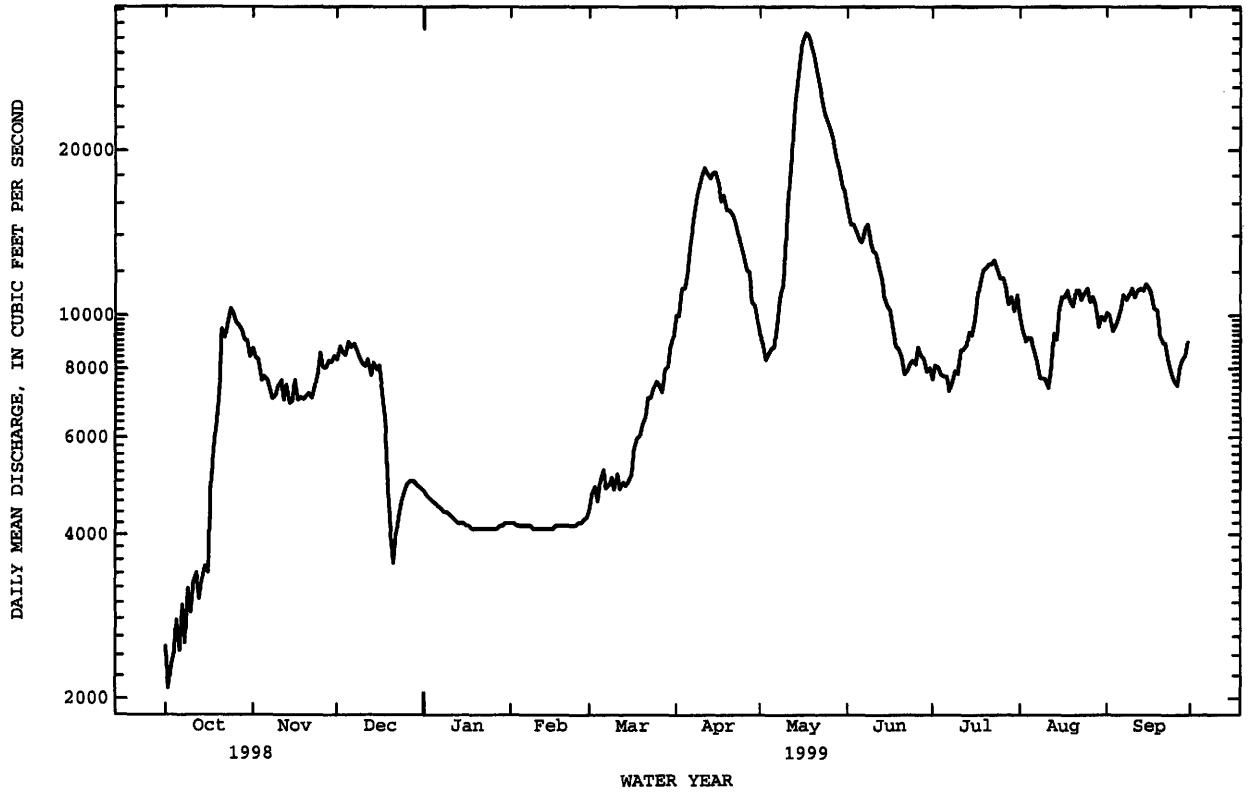
05270700 MISSISSIPPI RIVER AT ST. CLOUD, MN--Continued

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

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	5739	5736	4725	3978	3946	6637	13700	11800	7884	8467	5070	5006
MAX	15680	9675	7434	5616	5796	10600	29600	19600	12730	16830	9687	9763
(WY)	1996	1996	1997	1997	1997	1995	1997	1999	1993	1993	1999	1999
MIN	3106	2953	2310	1927	1815	3860	6576	5653	3743	3930	1535	2297
(WY)	1993	1989	1991	1991	1990	1989	1990	1998	1992	1989	1989	1990

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1988 - 1999	
ANNUAL TOTAL	2302180		3312030			
ANNUAL MEAN	6307		9074		6883	
HIGHEST ANNUAL MEAN					9167	1997
LOWEST ANNUAL MEAN					4615	1990
HIGHEST DAILY MEAN	16200	Jun 29	32700	May 17	45100	Apr 9 1997
LOWEST DAILY MEAN	1840	Sep 9	2090	Oct 2	1010	Aug 24 1989
ANNUAL SEVEN-DAY MINIMUM	2110	Sep 8	2500	Oct 1	1250	Aug 13 1989
INSTANTANEOUS PEAK FLOW			33800	May 17	46900	Apr 8 1997
INSTANTANEOUS PEAK STAGE			9.38	May 17	11.44	Apr 8 1997
INSTANTANEOUS LOW FLOW			779a	Mar 17	484a	Oct 18 1992
ANNUAL RUNOFF (AC-FT)	4566000		6569000		4986000	
ANNUAL RUNOFF (CFSM)	.47		.68		.52	
ANNUAL RUNOFF (INCHES)	6.43		9.25		7.02	
10 PERCENT EXCEEDS	10400		15000		12900	
50 PERCENT EXCEEDS	5730		8290		5640	
90 PERCENT EXCEEDS	2650		4100		2610	

a Result of regulation.



05275000 ELK RIVER NEAR BIG LAKE, MN

LOCATION.--Lat 45°20'02", long 93°40'00", in NE¼SW¼ sec. 23, T.33 N., R.27 W., Sherburne County, Hydrologic Unit 07010203, on right bank at upstream side of County Highway 15 bridge, 4 mi east of Big Lake and 4 mi downstream from confluence with St. Francis River.

DRAINAGE AREA.--559 mi^2.

PERIOD OF RECORD.--April 1911 to September 1917, April to September 1931, April to November 1932, March to November 1933, March 1934 to September 1987, October 1990 to current year.

REVISED RECORDS.--WSP 895: 1939. WSP 1308: 1912(M), 1915-17(M).

GAGE.--Water-stage recorder. Datum of gage is 899.60 ft above sea level. April 1911 to Sept. 30, 1917, April 1, 1931 to July 26, 1934, nonrecording gage at same site and datum.

REMARKS.--Records good except those for periods of estimated daily discharge, which are fair.

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	76	105	136	e92	e88	e130	212	185	275	169	181	202
2	77	103	133	e90	e88	e130	219	173	265	181	162	186
3	74	100	131	e90	e86	e128	217	162	245	198	154	176
4	72	97	130	e88	e80	e124	227	156	225	205	151	187
5	76	96	e130	e86	e80	e128	236	167	233	189	148	197
6	84	96	e130	e86	e90	e130	282	184	237	181	139	187
7	86	96	e133	e84	e94	e124	312	205	265	174	133	177
8	86	98	e133	e82	e96	e120	314	226	287	178	125	169
9	84	99	e140	e77	e100	e120	313	220	284	189	128	163
10	82	130	e140	e79	e100	e130	318	229	302	183	136	151
11	79	171	e139	e79	e97	e130	334	331	297	171	129	139
12	79	168	e135	e80	e96	e130	330	445	276	157	126	145
13	86	150	134	e80	e92	e140	307	565	253	148	137	140
14	86	145	129	e80	e90	e145	286	621	228	143	133	132
15	88	145	126	e82	e100	148	277	648	212	136	124	131
16	102	146	126	e82	e94	149	284	688	198	130	121	134
17	126	143	e120	e82	e90	165	292	854	184	126	114	134
18	134	144	e95	e80	e90	163	291	900	172	122	114	134
19	131	157	e85	e80	e92	150	287	876	168	117	119	148
20	120	156	e80	e83	e92	164	286	850	169	111	123	157
21	117	145	e77	e86	e96	189	283	878	164	110	129	156
22	113	155	e75	e88	e100	203	283	913	159	106	178	151
23	111	152	e80	e84	e98	209	280	857	173	103	214	139
24	108	147	e82	e82	e100	210	276	763	172	97	219	127
25	108	143	e86	e78	e105	205	269	679	162	95	244	118
26	107	138	e90	e82	e110	195	264	597	157	227	275	118
27	107	137	e96	e84	e120	187	253	522	161	229	286	127
28	106	136	e98	e84	e120	223	238	464	179	180	274	122
29	109	136	e96	e84	---	233	217	417	187	163	250	115
30	109	137	e94	e82	---	218	199	365	178	154	230	111
31	105	---	e92	e86	---	210	---	312	---	179	223	---
TOTAL	3028	3971	3471	2582	2684	5030	8186	15452	6467	4851	5219	4473
MEAN	97.7	132	112	83.3	95.9	162	273	498	216	156	168	149
MAX	134	171	140	92	120	233	334	913	302	229	286	202
MIN	72	96	75	77	80	120	199	156	157	95	114	111
AC-FT	6010	7880	6880	5120	5320	9980	16240	30650	12830	9620	10350	8870
CFSM	.17	.24	.20	.15	.17	.29	.49	.89	.39	.28	.30	.27
IN.	.20	.26	.23	.17	.18	.33	.54	1.03	.43	.32	.35	.30

e Estimated

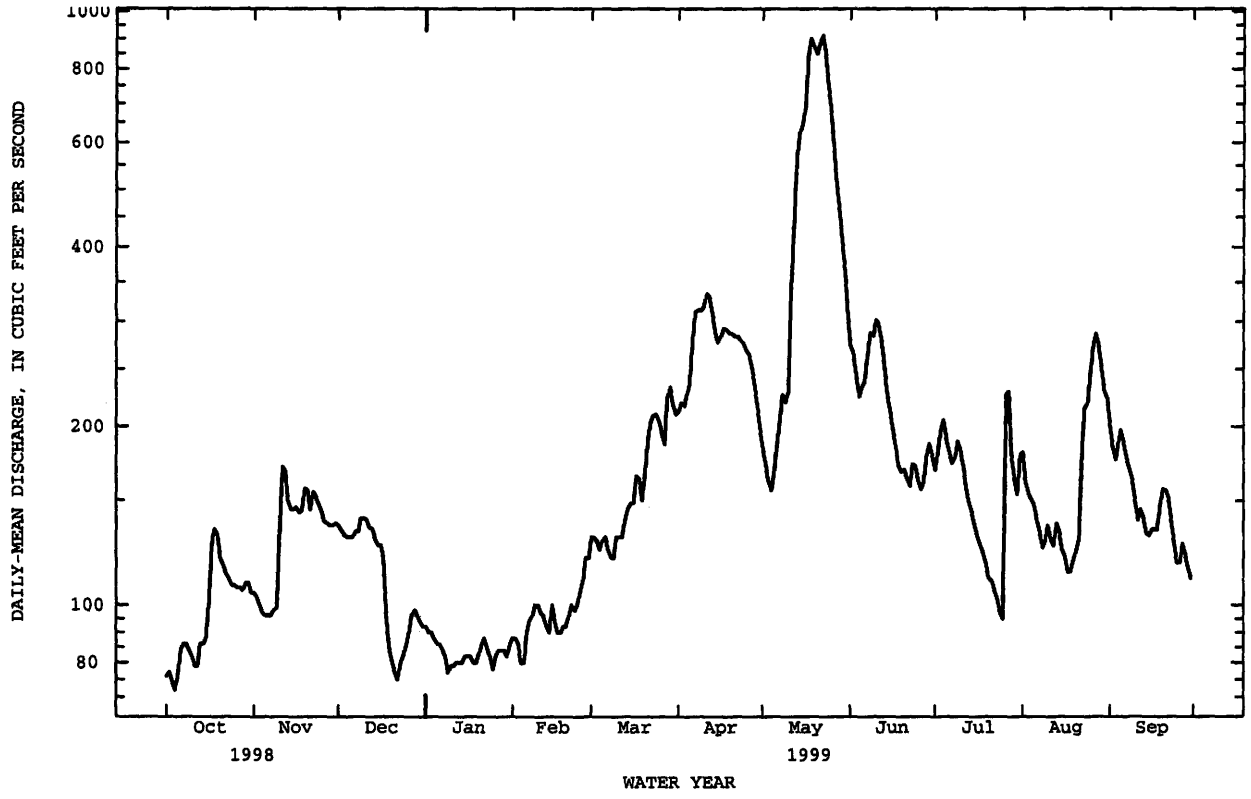
05275000 ELK RIVER NEAR BIG LAKE, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1911 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	209	213	151	112	118	306	656	441	337	265	181	200
MAX	778	794	410	290	392	1125	1823	1620	1647	1026	926	1050
(WY)	1985	1972	1966	1979	1984	1966	1969	1986	1984	1978	1972	1986
MIN	32.7	56.3	44.1	38.4	29.8	58.8	75.5	37.5	20.5	8.94	8.74	23.4
(WY)	1934	1935	1935	1935	1936	1934	1934	1934	1934	1934	1934	1932

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1911 - 1999	
ANNUAL TOTAL	73096		65414			
ANNUAL MEAN	200		179		276[a]	
HIGHEST ANNUAL MEAN					669	1986
LOWEST ANNUAL MEAN					88.0	1935
HIGHEST DAILY MEAN	1250	Apr 8	913	May 22	7170	Apr 16 1965
LOWEST DAILY MEAN	54	Sep 12	72	Oct 4	4.0	Aug 1 1934
ANNUAL SEVEN-DAY MINIMUM	57	Sep 10	78	Oct 1	4.5	Jul 27 1934
INSTANTANEOUS PEAK FLOW			921	May 22	7360	Apr 16 1965
INSTANTANEOUS PEAK STAGE			3.49	May 22	10.86	Apr 16 1965
INSTANTANEOUS LOW FLOW			70	Oct 4	3.6	Jul 31 1934
ANNUAL RUNOFF (AC-FT)	145000		129700		200000	
ANNUAL RUNOFF (CFSM)	.36		.32		.49	
ANNUAL RUNOFF (INCHES)	4.86		4.35		6.71	
10 PERCENT EXCEEDS	364		286		556	
50 PERCENT EXCEEDS	151		138		166	
90 PERCENT EXCEEDS	78		84		69	

a Median of annual mean discharges is 250 ft^3/s.



05280000 CROW RIVER AT ROCKFORD, MN

LOCATION.--Lat 45°05'12", long 93°44'02", in sec. 29, T.119 N., R.24 W., Hennepin County, Hydrologic Unit 07010204, on right bank at Rockford, 150 ft downstream from bridge on State Highway 55, 2 miles downstream from confluence of North and South Forks, and 23 miles upstream from confluence with the Mississippi River.

DRAINAGE AREA.--2,640 mi^2.

PERIOD OF RECORD.--April to July 1906 (published as "near Dayton"), June 1909 to September 1917, April to November 1929, March 1930 to September 1931, April to November 1932, March to November 1933, March 1934 to current year. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WSP 1115: 1932. WSP 1508: 1933. WDR MN-77-2: 1972 (M)(m).

GAGE.--Water-stage recorder. Datum of gage is 893.08 ft above sea level. Apr. 13 to July 21, 1906, nonrecording gage at Berning Mill 14 mi downstream at different datum. June 4, 1909 to Sept. 30, 1917, nonrecording gage at site 600 ft downstream at different datum;. Apr. 23, 1929 to Aug. 21, 1934, nonrecording gage at site 600 ft downstream at present datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair.

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	160	275	468	e250	e230	360	1390	1430	2160	1360	427	392
2	155	276	463	e245	e235	389	1400	1370	2070	1320	388	369
3	152	280	e460	e245	e240	464	1390	1290	1960	1350	359	341
4	152	284	e455	e240	e245	490	1380	1200	1880	1480	332	320
5	158	289	e450	e240	e250	478	1340	1170	1810	1530	305	314
6	160	282	e445	e235	e255	491	1470	1170	1740	1500	282	312
7	163	275	e445	e235	e260	e450	1630	1170	1670	1410	264	312
8	163	264	e440	e230	e265	448	1740	1170	1620	1320	250	293
9	166	261	e445	e220	e270	427	1800	1160	1590	1340	257	276
10	166	320	e450	e220	279	e410	1850	1180	1610	1470	271	255
11	166	386	e460	e220	298	e400	1960	1480	1670	1530	306	239
12	160	448	e465	e220	315	e400	2060	1840	1760	1530	319	275
13	155	540	e465	e210	e310	e395	2120	2290	1860	1500	351	299
14	152	582	e455	e210	e310	e410	2140	2580	1940	1460	375	354
15	152	600	e445	e210	307	439	2150	2820	2060	1390	374	348
16	185	588	e430	e220	305	463	2170	2990	2170	1280	358	342
17	241	573	e410	e240	333	581	2180	3160	2260	1110	341	319
18	218	558	e390	e245	352	813	2170	3240	2300	970	317	289
19	237	556	376	e240	366	1020	2140	3270	2280	856	292	264
20	258	539	e340	e235	354	1110	2100	3250	2170	767	280	248
21	282	491	e320	e235	352	1200	2060	3230	1990	700	272	241
22	282	510	e310	e230	339	1390	2000	3210	1830	645	530	233
23	278	541	e300	e230	316	1660	1930	3210	1760	601	888	227
24	268	536	e310	e225	300	1870	1870	3140	1680	558	876	223
25	258	516	e325	e225	295	1590	1810	3060	1590	516	779	209
26	250	506	e330	e230	292	1410	1750	2950	1500	485	692	203
27	247	496	e310	e230	298	1290	1680	2810	1430	460	609	202
28	245	483	e290	e240	326	1330	1620	2680	1410	439	528	196
29	261	477	e280	e240	---	1370	1550	2540	1410	419	464	195
30	270	472	e270	e230	---	1380	1490	2400	1400	415	425	188
31	276	---	e260	e230	---	1380	---	2270	---	447	406	---
TOTAL	6436	13204	12062	7155	8297	26308	54340	70730	54580	32158	12917	8278
MEAN	208	440	389	231	296	849	1811	2282	1819	1037	417	276
MAX	282	600	468	250	366	1870	2180	3270	2300	1530	888	392
MIN	152	261	260	210	230	360	1340	1160	1400	415	250	188
AC-FT	12770	26190	23920	14190	16460	52180	107800	140300	108300	63790	25620	16420
CFSM	.08	.17	.15	.09	.11	.32	.69	.86	.69	.39	.16	.10
IN.	.09	.19	.17	.10	.12	.37	.77	1.00	.77	.45	.18	.12

e Estimated

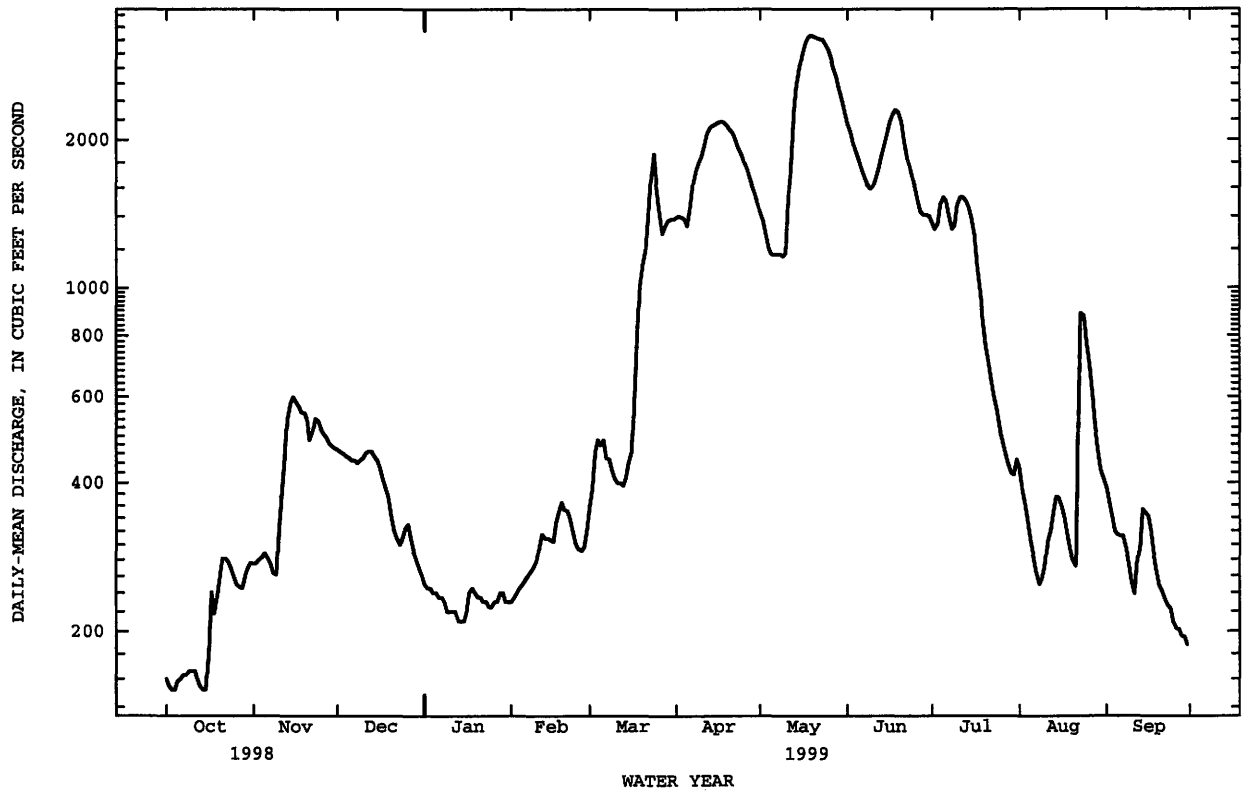
05280000 CROW RIVER AT ROCKFORD, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1906 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	447	424	297	175	174	872	2207	1459	1269	1041	560	486
MAX	3809	1909	1477	928	1115	4085	9026	5992	6166	6759	3356	4941
(WY)	1986	1972	1983	1992	1966	1983	1965	1986	1906	1993	1997	1991
MIN	16.6	28.3	17.3	12.4	12.5	25.1	57.1	26.7	14.8	5.76	5.87	13.0
(WY)	1934	1937	1938	1938	1959	1934	1934	1934	1934	1934	1934	1933

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1906 - 1999	
ANNUAL TOTAL	430395		306465			
ANNUAL MEAN	1179		840		816[a]	
HIGHEST ANNUAL MEAN					2754	1986
LOWEST ANNUAL MEAN					64.5	1931
HIGHEST DAILY MEAN	5720	Apr 7	3270	May 19	22100	Apr 16 1965
LOWEST DAILY MEAN	152	Oct 3	152	Oct 3,4,14,15	3.8	Aug 4 1934
ANNUAL SEVEN-DAY MINIMUM	157	Oct 1	157	Oct 1	4.0	Jul 31 1934
INSTANTANEOUS PEAK FLOW			3280	May 19	22400	Apr 16 1965
INSTANTANEOUS PEAK STAGE			6.56	May 19	19.27[b]	Apr 16 1965
INSTANTANEOUS LOW FLOW			152	Oct 3,14	1.8[c]	Nov 15 1936
ANNUAL RUNOFF (AC-FT)	853700		607900		590900	
ANNUAL RUNOFF (CFSM)	.45		.32		.31	
ANNUAL RUNOFF (INCHES)	6.06		4.32		4.20	
10 PERCENT EXCEEDS	2770		2060		2240	
50 PERCENT EXCEEDS	566		440		274	
90 PERCENT EXCEEDS	210		230		39	

a Median of annual mean discharges is 620 ft^3/s.
b From floodmark.
c Caused by ice jam upstream.



05284000 MILLE LACS LAKE AT COVE BAY NEAR ONAMIA, MN

LOCATION.--Lat 46°06'36", long 93°37'08", in NE¼NE¼ sec. 21, T.42 N., R.26 W., Mille Lacs County, Hydrologic Unit 07010207, in Minnesota Department of Natural Resources boathouse at Cove Bay boatlanding, 3.6 mi northeast of Onamia.

PERIOD OF RECORD.--June 1931 to current year. Monthend records for the period October 1939 to September 1953 published in WSP 1278 (fragmentary 1940-41). Published as "at Wealthwood" prior to October 1939, and as "at Garrison" October 1939 to September 1987 (gage heights collected at Wealthwood October 1939 to September1941, but converted to gage datum at Garrison for publication).

GAGE.--Water-stage recorder. Datum of gage is 1,240.40 ft above sea level (levels by Minnesota Department of Natural Resources). Gage readings have been reduced to elevations above sea level. Prior to Oct. 1, 1941, non-recording gage at Wealthwood, 17 mi north of present site, at various datums; gage readings have been reduced to elevations, adjustment of 1912. Oct. 1, 1941 to Sept. 30, 1958, water-stage recorder at Garrison, 16 mi northwest of present site at datum 1,240.50 ft, adjustment of 1912. To convert these readings to National Geodetic Vertical Datum of 1929, subtract 0.10 ft. Oct. 1, 1958 to Sept. 30, 1987, water-stage recorder at Garrison at present datum.

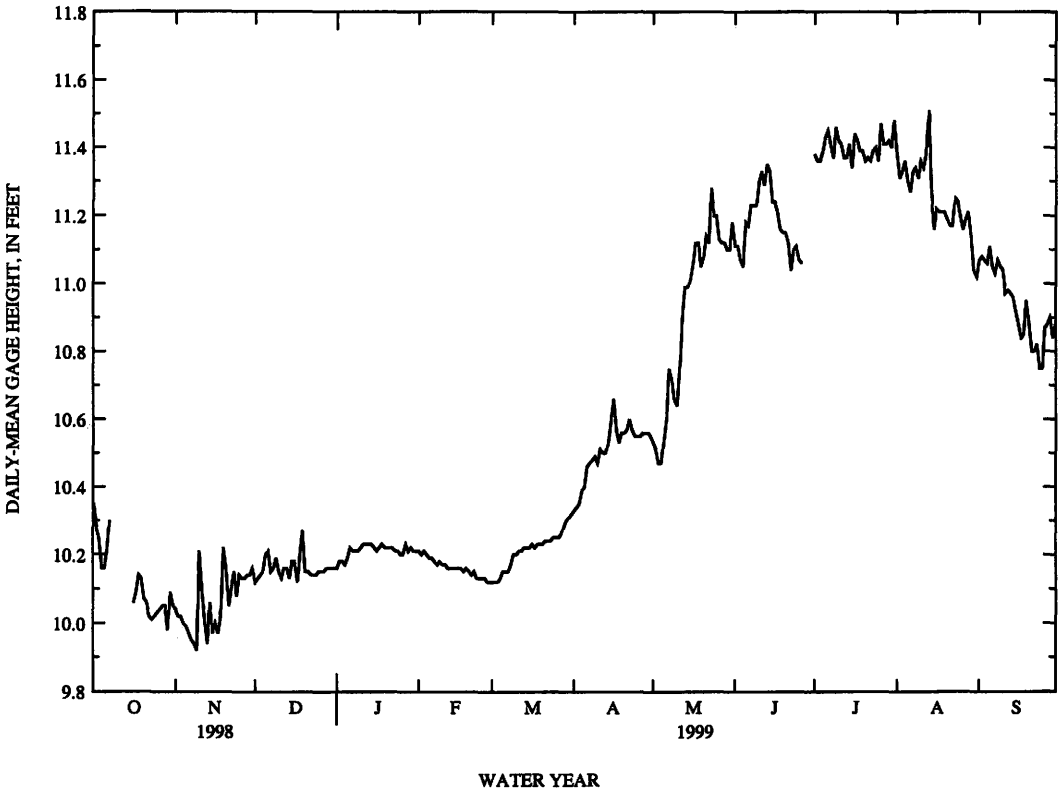
REMARKS.--Water level affected by fixed-crest spillway constructed in 1953 at outlet of Ogechie Lake, 2.7 mi downstream from outlet of Mille Lacs Lake, with crest at elevation 1,250.50 ft. Water level subject to fluctuation caused by seiches.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage-height, 13.47 ft, Aug. 14, 1972 (affected by seiche action); maximum daily, 13.03 ft, Aug. 22, 1972; minimum gage-height observed, 5.34 ft (present datum) Oct. 16-19, 1936.

EXTREMES FOR CURRENT YEAR.--Maximum gage-height, 12.12 ft, July 9, affected by wind and seiche action; maximum daily, 11.51 ft, Aug. 13; minimum gage height, 9.70 ft, Nov. 18; minimum daily, 9.92 ft, Nov. 9.

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	10.35	10.04	10.12	10.16	10.21	10.12	10.33	10.53	11.11	11.38	11.38	11.07
2	10.28	10.02	10.13	10.18	10.20	10.12	10.34	10.51	11.11	11.36	11.31	11.08
3	10.25	10.02	10.14	10.18	10.21	10.12	10.35	10.47	11.07	11.36	11.33	11.07
4	10.16	10.00	10.15	10.17	10.20	10.13	10.39	10.47	11.05	11.39	11.36	11.06
5	10.16	9.99	10.20	10.19	10.19	10.15	10.40	10.53	11.18	11.43	11.30	11.11
6	10.21	9.97	10.21	10.22	10.19	10.15	10.46	10.60	11.17	11.45	11.27	11.05
7	10.30	9.95	10.15	10.21	10.18	10.15	10.47	10.75	11.23	11.41	11.33	11.03
8	---	9.94	10.16	10.21	10.17	10.17	10.48	10.72	11.23	11.37	11.34	11.07
9	---	9.92	10.19	10.21	10.18	10.20	10.49	10.66	11.23	11.46	11.31	11.05
10	---	10.21	10.15	10.22	10.17	10.20	10.47	10.64	11.30	11.42	11.36	11.04
11	---	10.08	10.13	10.23	10.17	10.21	10.51	10.73	11.33	11.41	11.34	10.97
12	---	10.01	10.16	10.23	10.16	10.21	10.50	10.90	11.29	11.37	11.38	10.98
13	---	9.94	10.16	10.23	10.16	10.22	10.50	10.99	11.35	11.37	11.51	10.97
14	---	10.06	10.13	10.23	10.16	10.22	10.53	10.99	11.33	11.41	11.28	10.96
15	---	9.97	10.18	10.22	10.16	10.22	10.59	11.01	11.24	11.34	11.16	10.92
16	10.06	10.00	10.18	10.21	10.16	10.23	10.66	11.06	11.24	11.44	11.22	10.88
17	10.09	9.97	10.12	10.22	10.16	10.22	10.57	11.12	11.21	11.42	11.21	10.84
18	10.14	10.01	10.20	10.23	10.15	10.23	10.53	11.12	11.16	11.39	11.21	10.85
19	10.13	10.22	10.27	10.22	10.16	10.23	10.56	11.05	11.15	11.39	11.21	10.95
20	10.07	10.16	10.15	10.22	10.15	10.23	10.56	11.08	11.15	11.36	11.19	10.88
21	10.06	10.05	10.15	10.22	10.14	10.24	10.57	11.14	11.12	11.37	11.17	10.80
22	10.02	10.10	10.14	10.22	10.15	10.24	10.60	11.12	11.04	11.36	11.17	10.80
23	10.01	10.15	10.14	10.21	10.13	10.24	10.57	11.28	11.10	11.39	11.25	10.82
24	10.02	10.08	10.14	10.21	10.13	10.25	10.55	11.20	11.11	11.40	11.24	10.75
25	10.03	10.14	10.15	10.20	10.13	10.25	10.55	11.20	11.07	11.36	11.20	10.75
26	10.04	10.13	10.15	10.20	10.13	10.25	10.55	11.13	11.06	11.47	11.16	10.87
27	10.05	10.13	10.15	10.23	10.12	10.26	10.56	11.12	---	11.41	11.19	10.88
28	10.05	10.14	10.16	10.21	10.12	10.28	10.56	11.12	---	11.41	11.21	10.90
29	9.98	10.14	10.16	10.22	---	10.30	10.56	11.10	---	11.42	11.14	10.84
30	10.09	10.16	10.16	10.21	---	10.31	10.55	11.10	---	11.40	11.04	10.88
31	10.05	---	10.16	10.21	---	10.32	---	11.18	---	11.48	11.02	---
MEAN	---	10.06	10.16	10.21	10.16	10.22	10.51	10.92	---	11.40	11.25	10.94
MAX	---	10.22	10.27	10.23	10.21	10.32	10.66	11.28	---	11.48	11.51	11.11
MIN	---	9.92	10.12	10.16	10.12	10.12	10.33	10.47	---	11.34	11.02	10.75


DAILY-MEAN GAGE HEIGHT, IN FEET
11.8
11.6
11.4
11.2
11.0
10.8
10.6
10.4
10.2
10.0
9.8
O
N
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A
S
1998
1999
WATER YEAR

05286000 RUM RIVER NEAR ST. FRANCIS, MN

LOCATION.--Lat 45°19'40", long 93°22'20", in SE¼ sec. 19, T.33 N., R.24 W., Anoka County, Hydrologic Unit 07010207, on left bank at upstream side of County Highway 27 bridge, 4 mi south of St. Francis and 15.8 mi upstream from mouth.

DRAINAGE AREA.--1,360 mi^2 (approximately).

PERIOD OF RECORD.--May to November 1929, March 1930 to September 1931, April to November 1932, March 1933 to current year.

REVISED RECORDS.--WSP 1308: 1930(M), 1932(M).

GAGE.--Water-stage recorder. Datum of gage is 860.74 ft above sea level (levels by Anoka County Highway Department). Prior to Nov. 9, 1933, nonrecording gage at site 50 ft downstream at same datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair to poor. Occasional regulation by Ogechie (also controls Mille Lacs Lake) and Onamia Lakes.

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	142	181	263	e140	e146	193	676	e540	762	813	667	507
2	144	176	255	e145	e144	e186	678	e515	699	837	671	483
3	142	172	249	e142	e142	e180	654	e480	655	860	786	455
4	141	168	246	e140	e134	e180	635	e445	619	855	882	432
5	141	167	252	e140	e138	e180	645	e420	625	823	922	426
6	147	167	262	e140	e138	e160	703	418	661	809	906	412
7	151	167	267	e140	e140	e160	773	468	685	813	820	399
8	150	167	267	e140	e140	e140	845	581	700	818	703	396
9	147	169	266	e128	e140	e103	907	739	703	786	609	387
10	149	204	253	e130	e140	e150	952	873	780	746	549	372
11	143	261	238	e130	e136	e138	995	1070	814	710	513	361
12	143	291	251	e130	e136	e122	1010	1310	781	697	490	365
13	144	277	258	e135	e134	e128	997	1730	734	685	481	354
14	143	267	272	e135	e136	e140	959	2020	691	656	471	347
15	145	268	260	e132	e140	e170	939	2140	657	607	493	338
16	175	270	257	e140	e140	218	923	2500	622	565	664	330
17	213	267	212	e140	e136	238	892	3340	583	527	819	323
18	228	268	211	e140	e132	256	860	4590	547	495	940	312
19	225	273	201	e138	e130	281	842	5350	513	470	1010	319
20	217	279	e150	e138	e136	320	823	5290	488	449	970	311
21	204	275	e125	e150	e150	381	789	4800	465	430	893	304
22	195	267	e120	e150	e160	456	754	4160	457	412	860	293
23	189	283	e130	e145	e170	501	718	3520	547	404	819	283
24	187	288	e140	e140	180	503	e690	2920	585	393	780	271
25	187	298	e150	e133	181	469	e670	2360	703	375	724	260
26	182	297	e155	e135	178	439	e650	1830	826	504	689	264
27	181	284	e160	e140	178	420	e635	1440	950	534	682	259
28	181	275	e155	e140	179	476	e620	1200	942	588	656	249
29	181	268	e145	e140	---	568	e590	1050	894	e677	607	250
30	181	264	e140	e138	---	604	e565	930	823	696	562	257
31	181	---	e140	e138	---	636	---	838	---	691	532	---
TOTAL	5279	7258	6450	4292	4134	9096	23389	59867	20511	19725	22170	10319
MEAN	170	242	208	138	148	293	780	1931	684	636	715	344
MAX	228	298	272	150	181	636	1010	5350	950	860	1010	507
MIN	141	167	120	128	130	103	565	418	457	375	471	249
AC-FT	10470	14400	12790	8510	8200	18040	46390	118700	40680	39120	43970	20470
CFSM	.13	.18	.15	.10	.11	.22	.57	1.42	.50	.47	.53	.25
IN.	.14	.20	.18	.12	.11	.25	.64	1.64	.56	.54	.61	.28

e Estimated

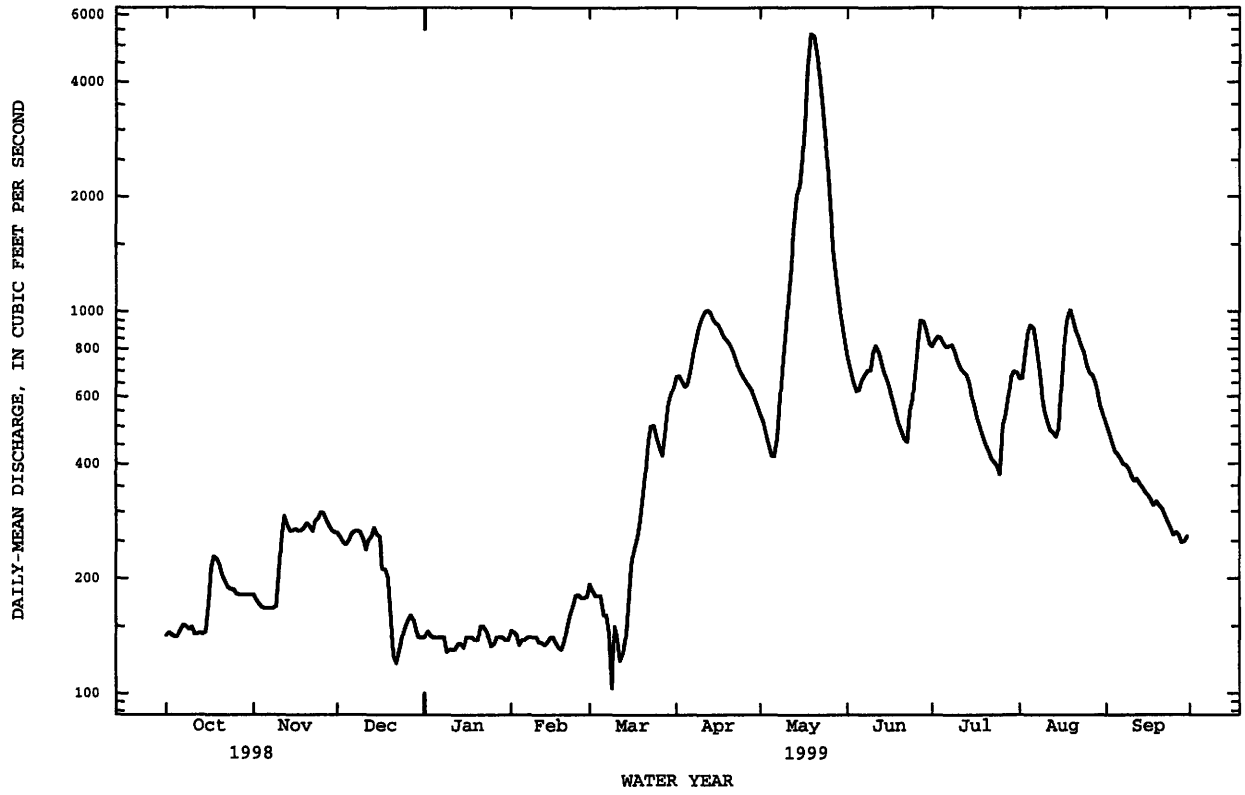
05286000 RUM RIVER NEAR ST. FRANCIS, MN--Continued

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

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	459	446	326	245	249	621	1543	1109	864	634	414	428
MAX	2300	1715	1051	660	813	2699	4269	3899	3400	2532	2251	2362
(WY)	1969	1972	1983	1987	1966	1966	1969	1986	1984	1954	1972	1986
MIN	65.4	71.8	55.8	51.5	59.2	75.8	154	73.6	43.7	34.5	37.3	47.1
(WY)	1934	1934	1934	1934	1934	1934	1934	1934	1934	1934	1934	1933

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1929 - 1999	
ANNUAL TOTAL	143488		192490			
ANNUAL MEAN	393		527		630	
HIGHEST ANNUAL MEAN					1512	1986
LOWEST ANNUAL MEAN					66.1	1934
HIGHEST DAILY MEAN	1960	Apr 9	5350	May 19	10000	Apr 13 1969
LOWEST DAILY MEAN	120	Dec 22	103	Mar 9	30	Aug 3 1934
ANNUAL SEVEN-DAY MINIMUM	137	Sep 19	131	Jan 9	31	Aug 1 1934
INSTANTANEOUS PEAK FLOW			5430	May 19	10100[a]	Apr 20 1965
INSTANTANEOUS PEAK STAGE			8.10	May 19	11.63	Apr 13 1969
INSTANTANEOUS LOW FLOW			72[b]	Mar 9	29	Aug 18 1934
ANNUAL RUNOFF (AC-FT)	284600		381800		456100	
ANNUAL RUNOFF (CFSM)	.29		.39		.46	
ANNUAL RUNOFF (INCHES)	3.92		5.27		6.29	
10 PERCENT EXCEEDS	799		893		1350	
50 PERCENT EXCEEDS	268		319		363	
90 PERCENT EXCEEDS	148		140		110	

a Also occurred Apr. 13, 1969.
b Result of ice jam upstream.



05287890 ELM CREEK NEAR CHAMPLIN, MN

LOCATION.--Lat 45°09'48", long 93°26'11", in NE¼NW¼ sec. 35, T.120 N., R.22 W., Hennepin County, Hydrologic Unit 07010206, on left bank, 33 ft downstream from bridge on Elm Creek Road, 2.5 mi southwest of Champlin.

DRAINAGE AREA.--86.0 mi^2.

PERIOD OF RECORD.--October 1978 to current year.

GAGE.--Water-stage recorder. Datum of gage is 850.70 ft above sea level. Prior to March 16, 1979, nonrecording gage at present site and datum.

REMARKS.--Records good except those for estimated daily discharges, which are poor.

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	5.3	10	e2.7	1.1	e6.8	68	37	58	121	29	32
2	2.4	4.7	7.8	e2.5	1.2	e7.4	66	34	53	104	27	26
3	2.3	4.4	7.8	e2.3	1.2	e7.7	63	30	48	96	25	23
4	2.4	4.3	7.0	e2.0	1.4	e7.7	62	26	46	91	23	21
5	2.7	4.0	9.9	e1.8	1.5	e7.8	62	26	57	84	21	20
6	2.8	3.8	10	e1.6	3.4	e8.0	87	25	63	78	19	17
7	2.6	5.5	9.9	e1.5	4.3	e9.4	103	26	59	71	17	15
8	2.4	3.9	10	e1.4	4.3	e8.8	115	28	54	69	15	15
9	2.3	4.1	8.5	e1.4	3.8	e10	123	27	49	67	16	12
10	2.5	11	8.5	e1.4	3.1	e14	124	28	46	63	16	12
11	2.6	22	8.4	e1.4	e3.5	e13	129	80	48	58	15	11
12	2.9	24	8.0	e1.4	e3.4	e11	126	186	48	53	14	14
13	3.0	25	7.8	e1.4	e3.6	e10	118	385	46	48	14	15
14	3.2	26	7.6	e1.5	3.5	e10	108	464	44	45	13	15
15	3.5	26	7.5	e1.6	3.5	11	105	492	41	41	12	13
16	6.6	25	7.3	1.7	3.9	16	105	481	39	39	11	10
17	12	25	6.9	1.5	5.4	25	100	464	36	36	10	8.5
18	9.3	28	7.0	1.4	4.5	37	94	424	33	33	9.9	8.0
19	7.7	28	e6.0	1.4	5.2	40	90	386	30	31	9.8	e7.6
20	6.9	25	e5.5	1.4	e4.5	50	86	359	28	28	9.3	e7.2
21	6.1	26	e4.3	1.2	e4.0	65	81	335	26	26	9.4	e6.6
22	5.6	23	e3.6	1.2	e3.5	79	76	296	25	24	39	e6.2
23	5.3	20	e3.5	1.2	3.3	83	68	264	68	23	75	e5.6
24	5.2	18	e3.7	1.2	3.5	78	61	229	135	22	84	e5.2
25	5.1	17	e3.9	1.1	3.8	68	57	194	164	20	84	e5.0
26	4.4	16	e4.0	1.2	4.1	59	53	163	172	33	80	e4.9
27	4.5	14	e4.1	1.2	5.2	52	50	137	179	37	70	e4.7
28	14	13	e3.8	1.1	6.2	58	47	115	177	35	59	e4.4
29	12	12	e3.6	1.1	---	59	43	95	164	32	49	e4.3
30	9.1	11	e3.3	1.1	---	61	40	78	143	29	41	e4.1
31	7.0	---	e3.0	1.1	---	65	---	65	---	30	37	---
TOTAL	161.2	475.0	202.2	46.0	99.9	1037.6	2510	5979	2179	1567	953.4	353.3
MEAN	5.20	15.8	6.52	1.48	3.57	33.5	83.7	193	72.6	50.5	30.8	11.8
MAX	14	28	10	2.7	6.2	83	129	492	179	121	84	32
MIN	2.3	3.8	3.0	1.1	1.1	6.8	40	25	25	20	9.3	4.1
AC-FT	320	942	401	91	198	2060	4980	11860	4320	3110	1890	701
CFSM	.06	.18	.08	.02	.04	.39	.97	2.24	.84	.59	.36	.14
IN.	.07	.21	.09	.02	.04	.45	1.09	2.59	.94	.68	.41	.15

e Estimated

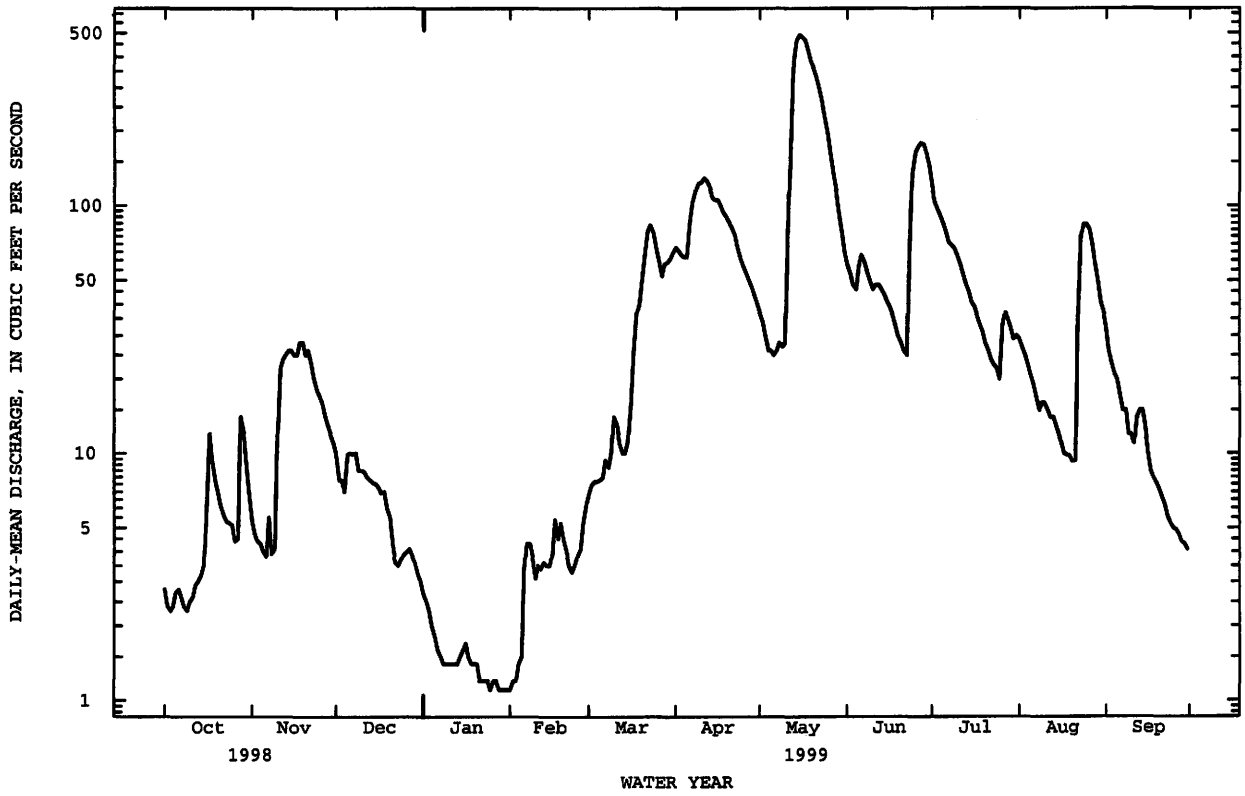
05287890 ELM CREEK NEAR CHAMPLIN, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1979 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	30.1	22.7	11.8	5.67	10.5	69.9	96.7	63.2	40.6	33.9	31.0	27.0
MAX	229	67.4	41.3	22.0	99.1	182	221	193	140	157	143	170
(WY)	1986	1994	1992	1992	1984	1992	1986	1999	1991	1993	1993	1991
MIN	1.13	1.03	.92	.74	.91	5.51	5.31	4.95	1.34	.76	1.44	1.08
(WY)	1990	1990	1990	1991	1990	1981	1987	1987	1988	1988	1989	1988

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1979 - 1999	
ANNUAL TOTAL	8819.8		15563.6			
ANNUAL MEAN	24.2		42.6		37.0	
HIGHEST ANNUAL MEAN					75.1	1986
LOWEST ANNUAL MEAN					4.54	1988
HIGHEST DAILY MEAN	302	Apr 5	492	May 15	545	Mar 27 1986
LOWEST DAILY MEAN	1.8	Feb 14	1.1[a]	Jan 25	.31	Jun 30 1988
ANNUAL SEVEN-DAY MINIMUM	2.0	Feb 8	1.1	Jan 25	.35	Jun 26 1988
INSTANTANEOUS PEAK FLOW			506	May 15	597	Mar 27 1986
INSTANTANEOUS PEAK STAGE			9.40	May 15	9.93	Mar 27 1986
INSTANTANEOUS LOW FLOW			1.0	Jan 29	.29	Jul 9 1989
ANNUAL RUNOFF (AC-FT)	17490		30870		26820	
ANNUAL RUNOFF (CFSM)	.28		.50		.43	
ANNUAL RUNOFF (INCHES)	3.82		6.73		5.85	
10 PERCENT EXCEEDS	50		101		104	
50 PERCENT EXCEEDS	9.9		15		13	
90 PERCENT EXCEEDS	2.6		2.4		1.9	

a Also occurred Jan. 28-31 and Feb. 1.



PERIOD OF RECORD.--February 1988 to current year.

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)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)
OCT									
08...	1615	2.5	653	8.0	10.1	--	11.2	101	.041
NOV									
a10-19	1700	--	--	--	--	--	--	--	.221
19...	1545	27	538	7.8	2.4	739	11.5	87	.122
NOV									
a21-29	1700	--	--	--	--	--	--	--	.122
DEC									
31...	1040	2.0	695	7.2	.0	745	9.2	64	.278
JAN									
21...	1145	.71	696	7.6	1.0	740	9.9	72	.419
FEB									
19...	1130	7.6	775	7.2	.1	747	9.3	66	.555
MAR									
10...	1135	22	662	7.3	.0	751	10.2	71	.120
MAR									
a19-28	2225	--	--	--	--	--	--	--	.218
APR									
a06-17	0100	--	--	--	--	--	--	--	.036
08...	1130	116	534	7.7	8.7	738	9.0	80	<.020
MAY									
a10-20	2050	--	--	--	--	--	--	--	.044
14...	1145	466	464	7.5	12.2	743	6.8	66	.036
MAY									
a20-30	2030	--	--	--	--	--	--	--	.042
JUL									
23...	1200	21	505	7.7	24.9	740	5.5	68	.084
JUL 26-									
aAUG 04	0230	--	--	--	--	--	--	--	.061
AUG									
a22-31	0258	--	--	--	--	--	--	--	.058
SEP									
02...	1040	26	477	7.6	21.3	740	6.0	70	.058
10...	1200	12	548	7.8	14.5	--	7.8	79	.048
16...	1130	9.2	548	7.9	12.3	749	8.6	82	.040

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

DATE	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	RESIDUE TOTAL AT 105 DEG. C, SUS-PENDED (MG/L) (00530)	RESIDUE VOLA-TILE, SUS-PENDED (MG/L) (00535)
OCT								
08...	.013	.54	.205	.085	.068	23	1	9
NOV								
a10-19	.012	1.3	.333	.132	.084	54	10	9
19...	.014	1.2	.271	.107	.062	52	7	7
NOV								
a21-29	.011	1.5	.242	.106	.037	51	8	10
DEC								
31...	.012	.90	.190	.067	<.050	24	1	3
JAN								
21...	<.010	.70	.094	.065	E.034	9.7	4	2
FEB								
19...	<.010	1.4	.294	.134	E.042	83	<1	<1
MAR								
10...	<.010	1.2	.152	.090	E.036	70	9	<1
MAR								
a19-28	.020	1.6	.567	.210	.090	54	15	8
APR								
a06-17	<.010	1.8	.296	.106	<.050	63	14	6
08...	<.010	1.4	.409	.162	.242	67	<1	10
MAY								
a10-20	.028	1.1	.910	.198	.139	44	22	7
14...	.032	1.3	.950	.189	.146	50	17	6
MAY								
a20-30	<.010	1.3	.064	.222	.166	36	14	7
JUL								
23...	.025	1.3	.180	.315	.239	26	6	1
JUL 26-								
aAUG 04	.036	1.3	.213	.303	.196	26	6	4
AUG								
a22-31	.017	1.4	.160	.339	.176	31	14	3
SEP								
02...	.015	1.1	.143	.243	.176	30	6	2
10...	.015	1.0	.143	.204	.124	28	1	<1
16...	.010	.93	.114	.160	.093	32	2	<1

QUALITY ASSURANCE SAMPLES, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	TIME	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	RESI TOTAE AT 1 DEG. SUS PEND (MG) (005)
APR										
08...	1220	--	<.020	<.010	1.3	.437	.153	.055	--	-
08...	1221	--	.103	<.010	1.3	.446	.134	.060	--	-
JUL 26-										
aAUG 04	0231	--	.058	.036	1.3	.216	.312	.210	26	4

a Samples collected by automatic sampler.

05288500 MISSISSIPPI RIVER NEAR ANOKA, MN

LOCATION.--Lat 45°07'36", long 93°17'48", in SW¼ sec. 12, T.119 N., R.21 W., Hennepin County, Hydrologic Unit 07010206, on right bank 0.4 mi downstream from Coon Creek, 1.3 mi downstream from Coon Rapids dam at Coon Rapids, 6.5 mi downstream from Anoka, and at mile 864.8 upstream from Ohio River.

DRAINAGE AREA.--19,100 mi^2 (approximately).

PERIOD OF RECORD.--June 1931 to current year. Prior to October 1931 published as "at Coon Rapids, near Anoka."

GAGE.--Water-stage recorder. Datum of gage is 804.53 ft above sea level. Prior to June 14, 1932, at site 1.2 mi upstream at different datum.

REMARKS.--Records good to fair except those for estimated days, which are fair to poor. Flow slightly regulated by six reservoirs on headwaters; total usable capacity, 1,640,600 acre-ft. Diurnal regulation caused by Coon Rapids dam 1.3 mi. above 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	2940	9710	10100	e6100	5700	5750	11900	12300	20900	11000	12300	11500
2	3210	10300	10300	e6100	5720	5880	12500	11600	19600	10700	11500	11800
3	2830	9820	10600	e6000	5690	5590	12700	9940	18500	11200	10900	11400
4	2960	9670	10400	e6000	5290	5930	13700	10200	18600	11100	11000	11100
5	3180	9020	10600	e5800	5880	5980	13800	10300	17700	10900	11000	11200
6	3590	9220	10900	e5700	5640	6250	15100	10500	16700	10800	10800	11400
7	3270	9030	10900	e5600	5660	6450	16400	11100	17100	10400	10200	12000
8	3710	8770	10900	e5500	5840	6300	17800	11800	16800	10100	9740	12400
9	3290	8520	10600	e5500	5680	6230	19000	12800	16900	10600	9520	12100
10	3880	9220	10400	e5400	5810	6210	20100	14000	16900	10600	9220	12400
11	3630	9470	9970	e5300	5800	6310	21500	17400	17100	10500	9260	12300
12	4070	9540	10100	e5300	5640	6550	21700	21500	16500	11100	8870	12500
13	4080	8950	10200	e5200	6450	6300	21300	26500	15800	10900	10200	12500
14	3770	9570	9840	e5200	6480	6430	21100	31300	15400	11300	10300	12700
15	4110	8870	10300	e5200	6000	6450	21500	35000	14300	11400	10700	12400
16	4630	9220	9920	e5200	6190	e6570	21500	38300	14100	11500	11900	12800
17	4820	9510	9950	e5200	5940	e7010	20200	41500	13700	11900	12400	12400
18	6120	9220	9140	e5200	5950	e7440	19700	43500	12800	12500	12500	12100
19	6900	9600	7820	e5200	6150	8140	19600	44300	12600	13300	13000	11700
20	7860	9930	5850	e5200	5990	8370	18900	43500	12000	13600	12300	11400
21	8840	9210	e4600	e5200	5870	8660	18800	41500	11600	13700	12400	10500
22	10600	9210	e4000	e5200	6030	9180	18100	39000	10900	13700	14100	10300
23	10300	9840	e4900	e5300	6080	9850	17600	36400	11500	13700	13500	10100
24	10900	9350	e5300	e5300	5790	10200	16900	33700	11200	13500	13400	9620
25	11100	10000	e5700	e5400	5590	10300	16400	31300	11400	13300	13700	9170
26	11200	10400	e5900	e5400	5610	9990	15500	29400	11300	14300	13500	9140
27	11700	9870	e6000	e5500	5730	9600	14900	27800	11700	13400	12900	8870
28	11000	10100	e6200	e5500	5770	10000	14200	26100	11700	12800	12800	9460
29	10700	10200	e6300	e5600	---	10500	13600	24900	11400	12400	12400	9440
30	10300	10200	e6200	e5600	---	11000	13000	23300	10600	12400	11500	9790
31	10200	---	e6200	5680	---	11400	---	21800	---	12400	12000	---
TOTAL	199690	285540	260090	169580	163970	240820	519000	792540	437300	371000	359810	336490
MEAN	6442	9518	8390	5470	5856	7768	17300	25570	14580	11970	11610	11220
MAX	11700	10400	10900	6100	6480	11400	21700	44300	20900	14300	14100	12800
MIN	2830	8520	4000	5200	5290	5590	11900	9940	10600	10100	8870	8870
AC-FT	396100	566400	515900	336400	325200	477700	1029000	1572000	867400	735900	713700	667400
CFSM	.34	.50	.44	.29	.31	.41	.91	1.34	.76	.63	.61	.59
IN.	.39	.56	.51	.33	.32	.47	1.01	1.54	.85	.72	.70	.66

e Estimated

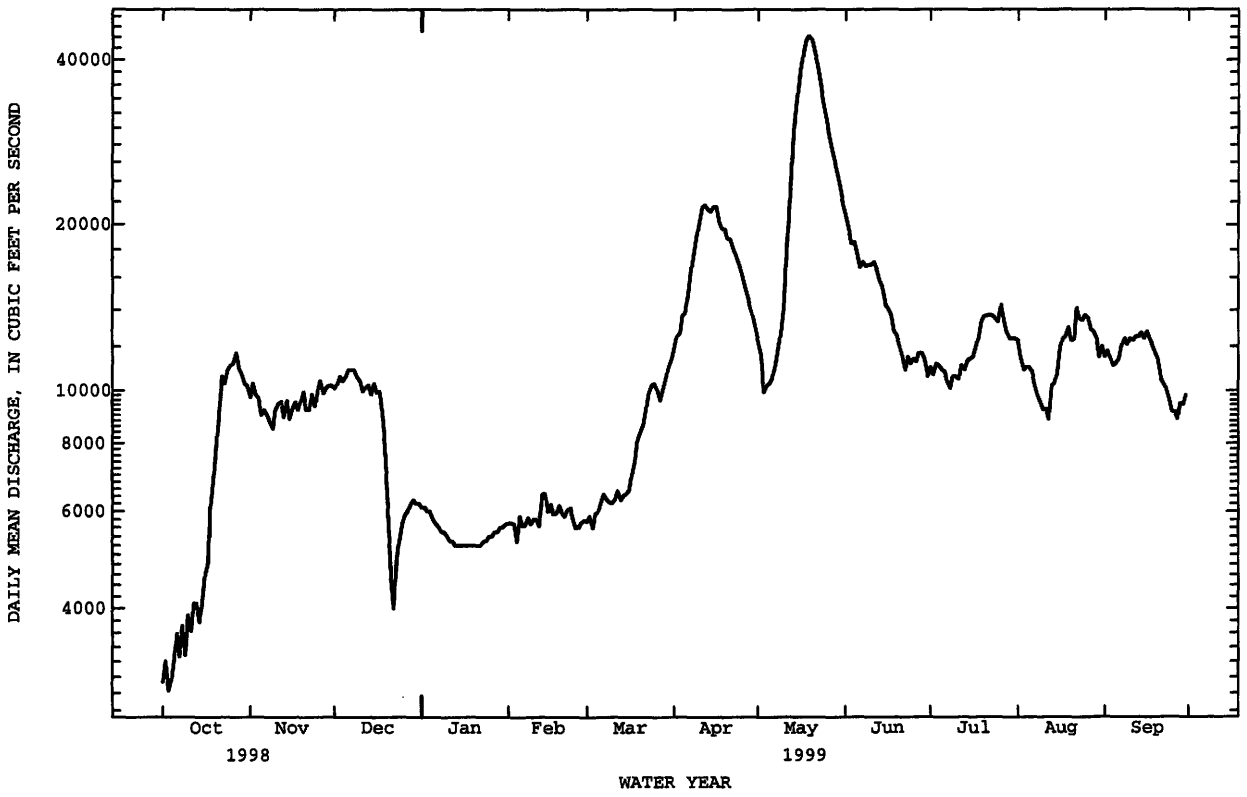
05288500 MISSISSIPPI RIVER NEAR ANOKA, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	6454	6315	4895	4267	4198	7370	17650	14980	11450	8787	6132	5879
MAX	21250	22800	10800	8304	9948	23410	43690	39760	29910	27240	22490	23570
(WY)	1987	1972	1972	1986	1966	1966	1997	1986	1943	1993	1972	1986
MIN	1128	1152	1006	935	1079	1602	3575	2796	1646	1022	715	888
(WY)	1937	1937	1935	1935	1933	1940	1959	1934	1934	1934	1934	1934

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1931 - 1999	
ANNUAL TOTAL	3313280		4135830			
ANNUAL MEAN	9077		11330		8230	
HIGHEST ANNUAL MEAN					17750	1986
LOWEST ANNUAL MEAN					1603	1934
HIGHEST DAILY MEAN	22500	Apr 11	44300	May 19	90300	Apr 17 1965
LOWEST DAILY MEAN	2710	Sep 18	2830	Oct 3	602	Sep 10 1934
ANNUAL SEVEN-DAY MINIMUM	2970	Sep 9	3140	Oct 1	646	Aug 26 1934
INSTANTANEOUS PEAK FLOW			44500	May 19	91000	Apr 17 1965
INSTANTANEOUS PEAK STAGE			12.15	May 19	19.53	Apr 17 1965
INSTANTANEOUS LOW FLOW					529a	Aug 29 1976
ANNUAL RUNOFF (AC-FT)	6572000		8203000		5963000	
ANNUAL RUNOFF (CFSM)	.48		.59		.43	
ANNUAL RUNOFF (INCHES)	6.45		8.06		5.85	
10 PERCENT EXCEEDS	16600		18500		17800	
50 PERCENT EXCEEDS	8770		10300		5730	
90 PERCENT EXCEEDS	3630		5360		2100	

a Result of regulation.



05288705 SHINGLE CREEK AT QUEEN AVE. IN MINNEAPOLIS, MN

LOCATION.-- Lat 45°03'00", long 93°18'36", in NE¼NW¼ sec. 11, T.118 N., R.21 W., Hennepin County, Hydrologic Unit 07010206, at bridge over Shingle Creek at intersection of Queen Avenue North and 52nd Avenue North in Minneapolis.

DRAINAGE AREA.-- 28.2 mi^2.

PERIOD OF RECORD.-- May 1996 to current year.

GAGE.-- Water-stage recorder. Elevation of gage is 850 ft above sea level (from topographic map).

REMARKS.-- Records fair except those for estimated daily discharges, which are poor.

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	4.0	7.1	4.4	---	---	11	15	13	15	37	e38	e10
2	3.3	5.5	5.0	---	---	11	13	10	14	40	e27	e9.2
3	2.8	6.2	5.6	---	---	9.6	12	9.9	12	66	e21	e7.9
4	2.6	5.3	9.7	---	---	8.9	20	16	17	57	e17	e7.0
5	3.9	4.4	18	---	---	8.1	29	23	36	60	e11	e6.4
6	4.1	3.4	15	---	---	7.4	52	18	36	53	e7.5	e6.2
7	3.7	3.1	10	---	---	6.7	49	27	30	46	e6.0	11
8	3.1	3.1	7.8	---	---	8.6	44	22	21	50	e5.3	20
9	3.8	4.6	5.8	---	---	8.5	35	16	19	45	e11	14
10	4.8	41	4.8	---	---	7.5	30	23	24	38	e32	10
11	8.7	45	4.2	---	---	7.8	38	50	69	31	e25	13
12	10	41	3.8	---	---	7.4	35	78	57	25	e44	26
13	9.8	31	3.8	---	---	7.1	34	77	50	21	e34	20
14	10	21	4.0	---	---	7.4	30	74	40	20	e26	14
15	13	13	4.5	---	---	11	38	72	31	17	e22	8.9
16	28	10	4.1	---	---	20	39	71	25	25	e17	6.5
17	39	8.3	3.8	---	---	30	35	67	20	26	e14	5.4
18	35	11	4.1	---	---	23	31	63	18	19	e11	4.9
19	24	13	2.8	---	---	19	28	58	17	15	e13	9.3
20	14	12	---	---	---	17	27	61	16	13	e11	9.5
21	8.4	9.6	---	---	---	14	25	57	15	12	e24	6.9
22	5.5	8.6	---	---	---	9.9	23	52	17	10	e60	5.3
23	4.4	7.2	---	---	---	8.0	20	48	63	13	e56	4.6
24	4.0	6.1	---	---	---	7.1	17	43	75	10	e45	4.2
25	3.7	6.0	---	---	---	5.7	15	39	71	7.9	e38	3.9
26	3.6	5.4	---	---	10	4.8	14	33	60	59	e29	7.1
27	7.6	5.0	---	---	12	5.4	15	29	49	44	e24	8.7
28	5.1	4.4	---	---	12	33	20	25	46	38	e19	7.6
29	11	4.7	---	---	---	30	17	22	43	e32	e17	6.3
30	14	4.3	---	---	---	24	14	18	39	e44	e13	6.2
31	10	---	---	---	---	18	---	16	---	e56	e12	---
TOTAL	304.9	350.3	---	---	---	396.9	814	1230.9	1045	1029.9	729.8	280.0
MEAN	9.84	11.7	---	---	---	12.8	27.1	39.7	34.8	33.2	23.5	9.33
MAX	39	45	---	---	---	33	52	78	75	66	60	26
MIN	2.6	3.1	---	---	---	4.8	12	9.9	12	7.9	5.3	3.9
AC-FT	605	695	---	---	---	787	1610	2440	2070	2040	1450	555
CFSM	.35	.41	---	---	---	.45	.96	1.41	1.24	1.18	.83	.33
IN.	.40	.46	---	---	---	.52	1.07	1.62	1.38	1.36	.96	.37

e Estimated

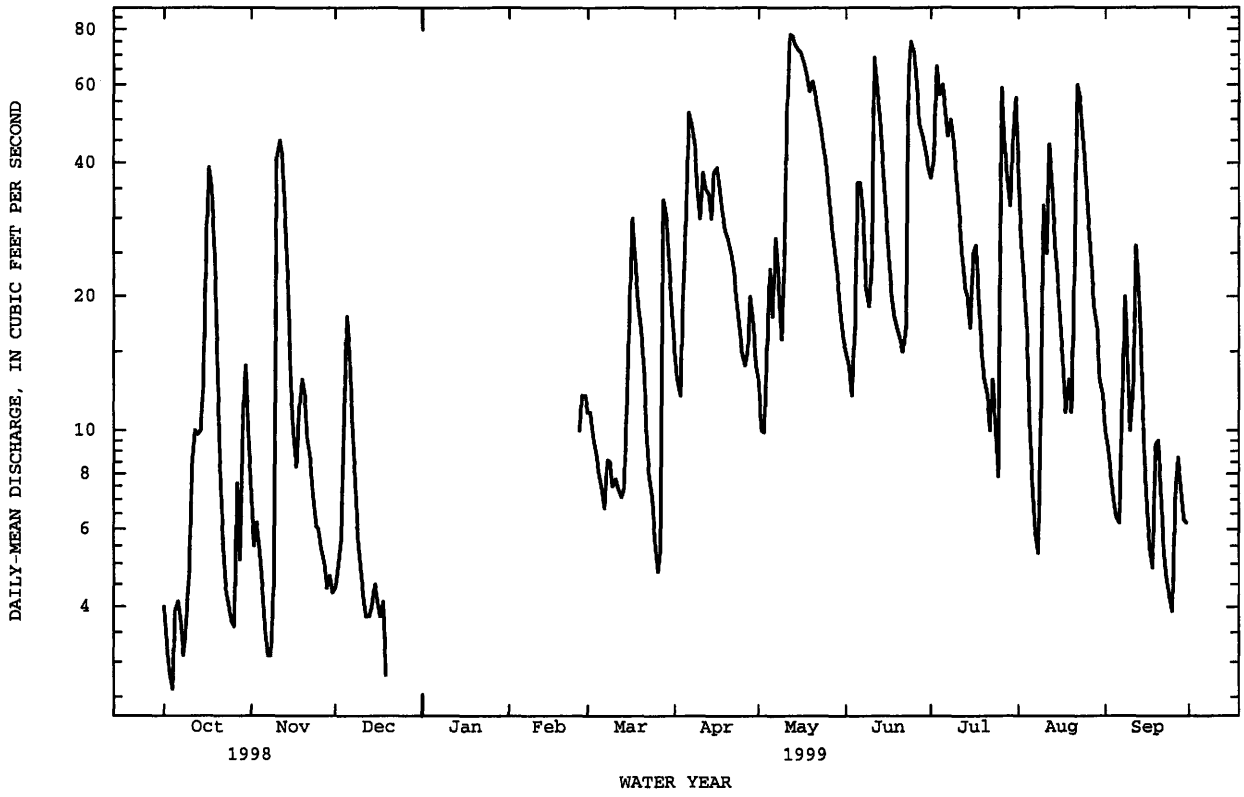
05288705 SHINGLE CREEK AT QUEEN AVE. IN MINNEAPOLIS, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1996 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	10.7	15.0	---	---	---	17.2	29.9	29.9	23.5	26.7	18.2	8.14
MAX	12.9	28.2	---	---	---	24.3	32.1	54.3	34.8	54.1	29.4	16.5
(WY)	1998	1997	---	---	---	1997	1998	1996	1996	1997	1997	1997
MIN	9.18	5.22	---	---	---	12.8	27.1	13.3	7.47	7.92	5.04	2.92
(WY)	1997	1998	---	---	---	1999	1999	1997	1997	1996	1996	1996

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1996 - 1999	
HIGHEST DAILY MEAN	87	Apr 1	78	May 12	136	May 19 1996
LOWEST DAILY MEAN	.83a	Aug 1	2.6a	Oct 4	.13a	Oct 13 1996
INSTANTANEOUS PEAK FLOW			126	Jul 26	225	Jul 1 1997
INSTANTANEOUS PEAK STAGE			11.63	Jul 26	13.07	Jul 1 1997
INSTANTANEOUS LOW FLOW			1.2a	Dec 19	.11a	Oct 11 1996

a Minimum observed.



05288705 SHINGLE CREEK AT QUEEN AVE. IN MINNEAPOLIS, MN--Continued
(National Water-Quality Assessment Program)

WATER-QUALITY RECORDS

PERIOD OF RECORD.-- 1996 to current year.

PERIOD OF DAILY RECORD:

WATER TEMPERATURES.-- May 1996 to September 30, 1998.

SPECIFIC CONDUCTANCE.-- May 1996 to September 30, 1998.

REVISED RECORDS.-- WDR MN-96-1: Specific conductance.

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)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM) (90095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	PH WATER WHOLE LAB (STAND-ARD UNITS) (00403)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
MAR										
23...	1425	7.9	989	1020	7.7	7.9	8.3	741	12.2	107
APR										
30...	1015	15	1020	1030	7.9	8.1	16.5	751	9.4	97
JUN										
02...	1245	13	988	992	7.7	7.9	14.4	742	8.8	89
30...	1230	39	594	598	7.5	7.8	21.0	736	5.2	61
JUL										
08...	1250	51	551	557	7.3	7.7	23.7	737	3.8	46
AUG										
03...	1215	e21	522	522	7.8	7.7	--	742	--	--
SEP										
13...	1130	20	448	458	7.5	7.6	16.1	742	4.8	50

DATE	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	ALKA-LINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)	BICAR-BONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)
MAR										
23...	240	161	196	.163	.013	.75	.95	.282	.108	.018
APR										
30...	390	231	282	.035	<.010	.42	.71	.112	.074	.015
JUN										
02...	340	216	264	.213	.028	.75	.86	.258	.072	.020
30...	210	145	177	.156	.048	.76	.93	.202	.088	.029
JUL										
08...	190	130	158	.125	.044	.79	.94	.194	.111	.039
AUG										
03...	180	124	151	.073	.045	.54	.79	.254	.102	.050
SEP										
13...	160	106	129	.038	.044	.41	.54	.426	.061	.022

05288705 SHINGLE CREEK AT QUEEN AVE. IN MINNEAPOLIS, MN--Continued
(National Water-Quality Assessment Program)

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

DATE	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (00689)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)
MAR									
23...	<.010	6.4	.90	65	18	98	3	4.4	190
APR									
30...	.017	6.3	.80	110	30	57	1	4.0	140
JUN									
02...	.021	7.4	.80	92	27	64	2	3.9	130
30...	.019	8.3	.70	57	15	39	1	2.9	78
JUL									
08...	.027	9.0	.50	51	14	35	1	2.6	72
AUG									
03...	.024	7.1	.50	50	13	31	1	2.4	61
SEP									
13...	<.010	5.5	.60	44	11	27	.9	2.6	55

DATE	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
MAR									
23...	46	.13	8.5	39	374	572	534	20	95
APR									
30...	86	.21	9.3	54	473	629	570	61	53
JUN									
02...	78	.16	12	88	573	633	543	48	54
30...	32	.14	9.0	35	180	387	321	6	88
JUL									
08...	25	.12	9.7	38	255	344	289	8	83
AUG									
03...	30	.10	12	46	165	304	276	4	92
SEP									
13...	31	<.10	7.0	34	102	255	243	6	88

05290000 LITTLE MINNESOTA RIVER NEAR PEEVER, SD

LOCATION.--Lat 45°36'05", long 96°52'18", in SW¼ sec. 13, T.125 N., R.50 W., Roberts County, Hydrologic Unit 07020001, on Sisseton Indian Reservation, on right bank 2 mi northwest of town of Browns Valley, MN, 5.3 mi northeast of Peever, 7.2 mi downstream from Jorgenson River, and 8 mi upstream from Big Stone Lake.

DRAINAGE AREA.--438 mi^2.

PERIOD OF RECORD.--October 1939 to September 1981, October 1989 to current year.

REVISED RECORDS.--WSP 1308: 1943(M).

GAGE.--Water-stage recorder. Datum of gage is 1,002.20 ft above sea level. Oct. 1, 1939 to Mar. 20, 1940, nonrecording gage at site 4.5 mi downstream at different datum. Mar. 21 to Apr. 12, 1940, nonrecording gage at site 100 ft downstream at present datum. April 13 to Aug. 27, 1940, nonrecording gage at present site and datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 200 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Oct 18	1030	225	3.91	May 12	2300	225	3.94
Mar 19	1330	297	4.17	Jun 7	1230	*306	4.20
Apr 7	0930	283	4.12				

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	1.4	49	149	e11	e6.3	e160	213	74	47	50	21	21
2	1.4	52	138	e11	e6.4	e195	210	70	45	49	20	22
3	1.5	48	133	e9.8	e6.4	e185	226	66	41	56	18	21
4	2.6	43	126	e9.0	e6.0	e160	249	60	39	49	16	37
5	5.1	40	119	e8.5	e6.3	e135	271	63	52	42	15	92
6	9.4	36	114	e8.0	e6.4	e120	265	78	146	37	13	112
7	8.7	34	92	e7.5	e7.0	e110	277	113	289	33	13	96
8	6.5	33	e81	e7.2	e10	e100	250	153	225	46	12	109
9	5.3	33	e86	e6.8	e15	e94	218	164	192	95	12	101
10	4.6	40	77	e6.5	e22	e89	197	162	178	95	11	81
11	4.2	24	e83	e6.2	e35	e87	193	187	150	63	12	67
12	4.0	20	83	e6.0	e54	e85	204	212	127	59	14	66
13	3.6	22	79	e5.8	e80	e83	205	224	108	59	16	70
14	3.7	31	72	e5.6	e125	e84	191	208	94	53	29	61
15	5.6	35	70	e5.8	e125	e90	184	188	80	48	29	57
16	13	53	67	e6.0	e114	e110	171	175	71	42	19	55
17	99	61	64	e6.2	e97	274	160	161	67	37	14	53
18	204	68	43	e6.2	e78	262	149	147	65	34	12	51
19	117	62	37	e6.2	e62	248	139	135	65	31	10	49
20	101	e60	e30	e6.2	e51	263	131	124	69	32	8.6	45
21	87	e76	e25	e6.2	e44	223	121	112	70	33	7.9	42
22	72	92	e20	e6.2	e40	198	114	102	65	31	7.8	38
23	61	104	e16	e6.2	e38	183	111	92	60	31	7.1	34
24	49	129	e13	e6.2	e36	168	104	86	54	29	6.4	30
25	41	151	e11	e6.2	e38	153	96	83	49	28	5.9	26
26	35	176	e10	e6.2	e47	140	90	79	43	27	5.4	26
27	31	174	e10	e6.2	e60	134	86	72	39	27	4.5	26
28	28	171	e11	e6.2	e100	151	88	66	41	27	8.2	27
29	34	163	e13	e6.2	---	213	85	60	40	28	7.8	24
30	42	154	e13	e6.2	---	231	78	54	46	31	8.7	21
31	60	---	e12	e6.2	---	227	---	49	---	24	11	---
TOTAL	1141.6	2234	1897	213.7	1315.8	4955	5076	3619	2657	1326	395.3	1560
MEAN	36.8	74.5	61.2	6.89	47.0	160	169	117	88.6	42.8	12.8	52.0
MAX	204	176	149	11	125	274	277	224	289	95	29	112
MIN	1.4	20	10	5.6	6.0	83	78	49	39	24	4.5	21
AC-FT	2260	4430	3760	424	2610	9830	10070	7180	5270	2630	784	3090
CFSM	.08	.17	.14	.02	.11	.36	.38	.26	.20	.10	.03	.12
IN.	.10	.19	.16	.02	.11	.41	.42	.30	.22	.11	.03	.13

e Estimated

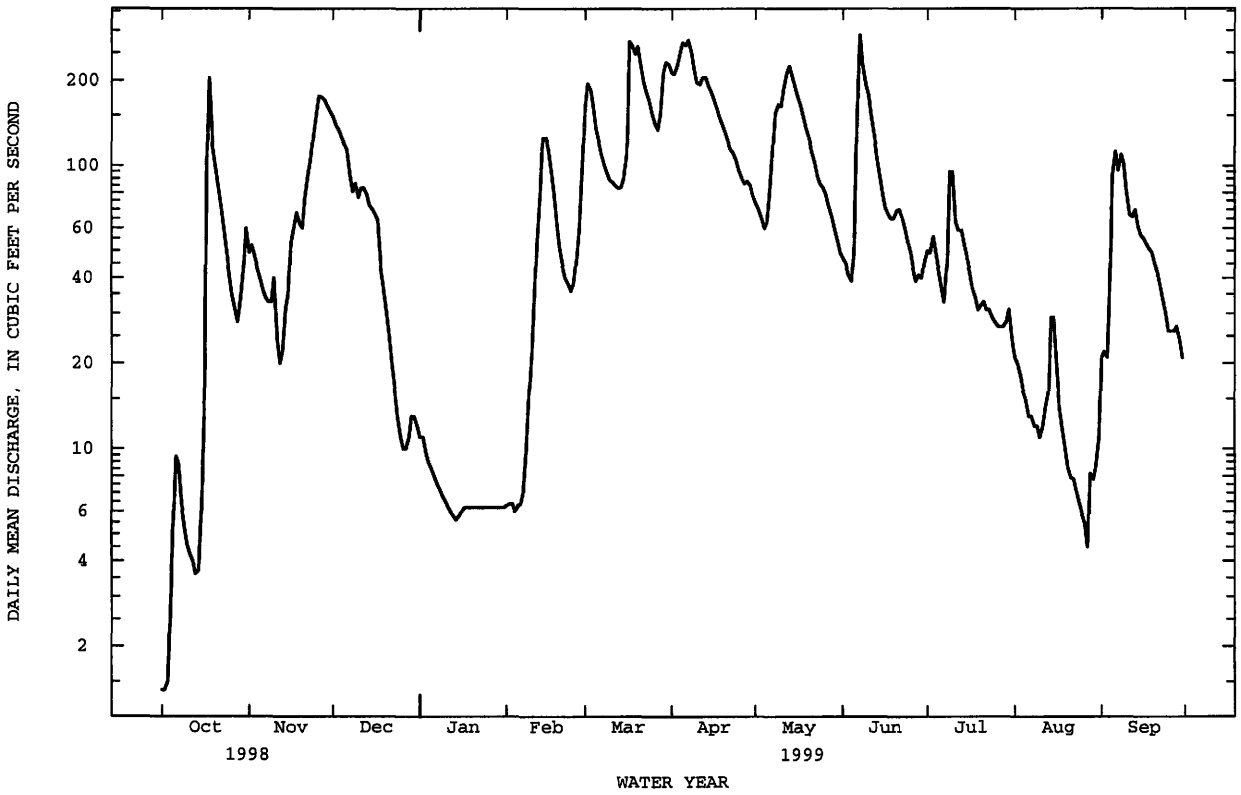
05290000 LITTLE MINNESOTA RIVER NEAR PEEVER, SD--Continued

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

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	6.13	7.09	4.20	1.66	4.57	120	226	103	75.1	54.7	12.8	5.28
MAX	73.9	74.5	61.2	11.4	57.0	603	1321	531	355	865	235	52.0
(WY)	1996	1999	1999	1994	1998	1997	1952	1962	1942	1993	1993	1999
MIN	.21	.25	.10	.000	.000	.51	2.89	2.20	.41	.041	.059	.074
(WY)	1940	1940	1940	1940	1940	1956	1981	1981	1976	1976	1976	1976

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1940 - 1999	
ANNUAL TOTAL	38605.5		26390.4			
ANNUAL MEAN	106		72.3		51.7[a]	
HIGHEST ANNUAL MEAN					172	1997
LOWEST ANNUAL MEAN					1.37	1981
HIGHEST DAILY MEAN	1190	May 17	289	Jun 7	5400	Jul 25 1993
LOWEST DAILY MEAN	1.2	Sep 21	1.4	Oct 1, 2	.00[b]	Jan 1 1940
ANNUAL SEVEN-DAY MINIMUM	1.3	Sep 18	4.3	Oct 1	.00	Jan 1 1940
INSTANTANEOUS PEAK FLOW			306	Jun 7	8900	Jul 25 1993
INSTANTANEOUS PEAK STAGE			4.36[c]	Mar 2	14.40[c]	Mar 27 1997
INSTANTANEOUS LOW FLOW			1.3[d]	Oct 1	.00	Jan 1 1940
ANNUAL RUNOFF (AC-FT)	76570		52350		37490	
ANNUAL RUNOFF (CFSM)	.24		.16		.12	
ANNUAL RUNOFF (INCHES)	3.21		2.20		1.57	
10 PERCENT EXCEEDS	335		180		118	
50 PERCENT EXCEEDS	40		51		3.8	
90 PERCENT EXCEEDS	3.1		6.2		.30	

a Median of annual mean discharges is 38.0 ft^3/s.
b Many days, several years.
c Backwater from ice
d Rising stage.



05291000 WHETSTONE RIVER NEAR BIG STONE CITY, SD

LOCATION.--Lat 45°17'32", long 96°29'14", in SE¼NW¼ sec. 18, T.121 N., R.46 W., Grant County, Hydrologic Unit 07020001, on right bank 20 ft downstream from former highway bridge site, 1.5 mi west of Big Stone City, and 4.5 mi upstream from Big Stone Lake.

DRAINAGE AREA.--398 mi^2.

PERIOD OF RECORD.--March 1910 to November 1912 (no winter records), and March 1931 to current year. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WSP 895: Drainage area. WSP 1308: 1932(M), 1935(M).

GAGE.--Water-stage recorder. Datum of gage is 996.96 ft above sea level, adjustment of 1912. Mar. 8, 1910 to Nov. 30, 1912, nonrecording gage 2 mi downstream at different datum. Mar. 18, 1931 to May 3, 1939, nonrecording gage, at site 20 ft upstream at present datum. May 4, 1939 to Nov. 8, 1952, water-stage recorder at site 80 ft down-stream at present datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair to poor.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage known, about 26 ft in June 1919, present site and datum, from information by local resident, discharge 29,000 ft^3/s, from dam break.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 230 ft^3/s (revised) and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Oct 19	0300	271	3.36	Apr 7	1800	314	3.55
Nov 26	1800	202	3.00	Apr 13	1300	279	3.36
Mar 1	(daily)	e215	--	May 8	2300	241	3.16
Mar 17	1500	*325	3.62				

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	8.2	66	129	e24	e12	e215	114	76	30	23	10	12
2	8.0	61	122	e23	e12	e180	112	70	30	22	10	11
3	8.5	57	110	e21	e12	e166	116	65	29	23	9.9	11
4	14	51	102	e19	e12	e148	133	64	27	24	9.7	46
5	23	47	97	e18	e12	e125	147	72	30	21	8.9	71
6	23	45	90	e17	e13	e115	193	87	33	19	8.6	71
7	21	42	79	e16	e14	e105	269	146	34	17	8.1	48
8	20	41	e67	e15	e16	e100	269	237	56	25	8.1	32
9	16	41	e63	e14	e23	e115	205	226	105	29	9.2	23
10	14	43	e62	e13	e30	e103	163	179	123	25	9.8	17
11	13	51	71	e12	e45	e96	168	144	106	22	8.8	14
12	13	48	62	e11	e56	e87	192	121	83	20	7.9	12
13	12	44	66	e11	e80	e80	259	110	63	18	8.0	11
14	13	48	64	e10	e110	e77	225	101	51	17	7.7	12
15	15	57	62	e10	e100	e79	185	96	43	16	7.5	11
16	38	68	60	e11	e80	82	169	105	38	25	7.2	11
17	161	78	59	e11	e70	251	147	128	34	21	6.4	9.8
18	197	95	50	e12	e64	277	134	169	33	17	7.7	9.1
19	215	93	e35	e12	e60	197	123	135	36	25	7.0	9.1
20	128	96	e28	e12	e58	172	113	107	35	24	6.2	8.9
21	91	129	e24	e12	e58	148	105	91	35	20	6.1	8.7
22	72	112	e23	e12	e60	136	99	79	37	19	6.4	8.5
23	60	111	e22	e12	e63	116	95	69	42	18	6.1	8.5
24	53	129	e22	e12	e66	103	92	62	36	17	5.5	8.6
25	47	158	e21	e12	e73	95	86	58	29	15	5.5	8.3
26	45	187	e21	e12	e81	88	82	52	25	13	5.7	14
27	47	195	e23	e12	e96	83	84	48	25	12	5.2	12
28	45	171	e25	e12	e140	98	83	43	24	13	7.2	11
29	53	154	e26	e12	---	113	85	38	27	12	10	9.8
30	61	136	e25	e12	---	136	82	34	24	12	13	8.9
31	63	---	e25	e12	---	126	---	34	---	11	13	---
TOTAL	1597.7	2654	1735	424	1516	4012	4329	3046	1323	595	250.4	548.2
MEAN	51.5	88.5	56.0	13.7	54.1	129	144	98.3	44.1	19.2	8.08	18.3
MAX	215	195	129	24	140	277	269	237	123	29	13	71
MIN	8.0	41	21	10	12	77	82	34	24	11	5.2	8.3
AC-FT	3170	5260	3440	841	3010	7960	8590	6040	2620	1180	497	1090
CFSM	.13	.22	.14	.03	.14	.33	.36	.25	.11	.05	.02	.05
IN.	.15	.25	.16	.04	.14	.37	.40	.28	.12	.06	.02	.05

e Estimated

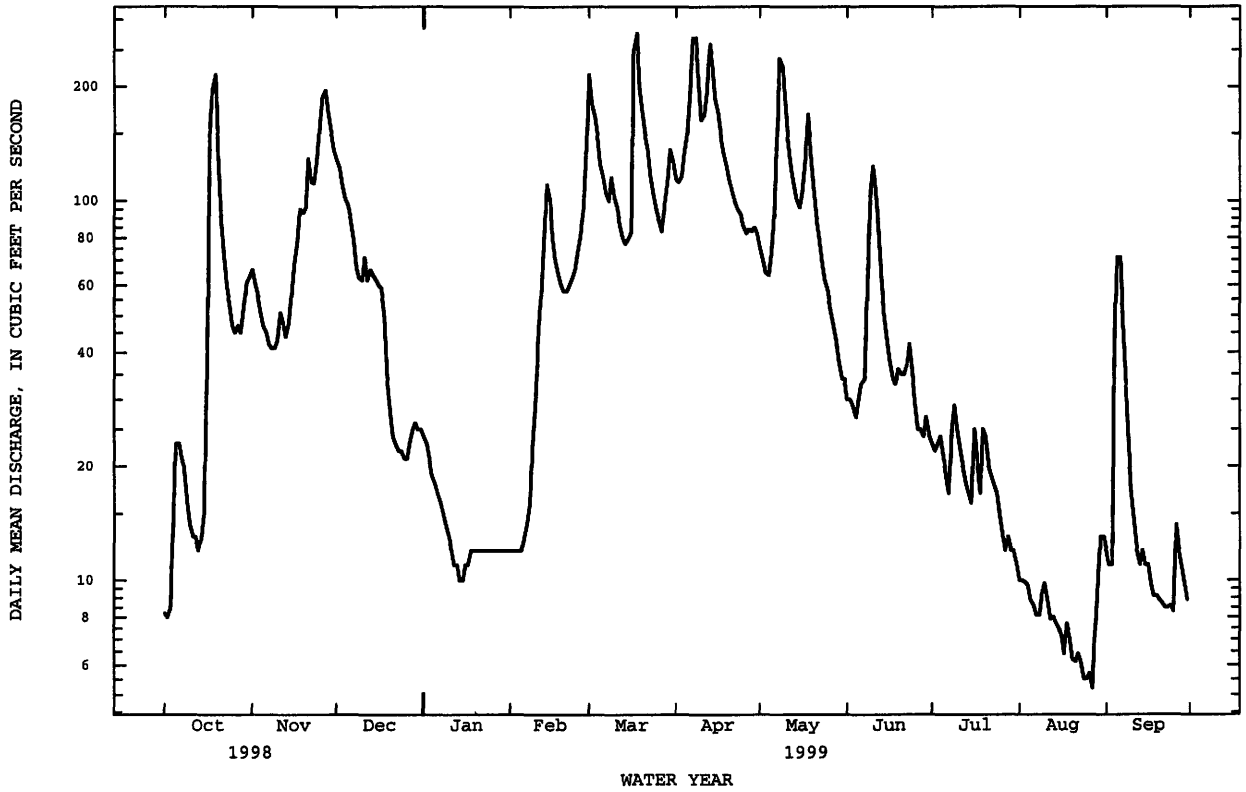
05291000 WHETSTONE RIVER NEAR BIG STONE CITY, SD--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1910 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	14.9	14.7	9.80	6.38	15.2	161	213	92.8	76.8	58.8	19.9	10.6
MAX	280	122	56.0	36.3	168	612	1677	491	478	885	327	77.0
(WY)	1996	1996	1999	1994	1998	1978	1997	1972	1984	1993	1991	1995
MIN	.60	.40	.20	.000	.000	2.85	3.63	.77	1.42	.035	.000	.36
(WY)	1932	1935	1935	1934	1934	1969	1934	1934	1936	1934	1934	1935

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1910 - 1999	
ANNUAL TOTAL	36614.7		22030.3			
ANNUAL MEAN	100		60.4		59.6[a]	
HIGHEST ANNUAL MEAN					232	1997
LOWEST ANNUAL MEAN					1.52	1934
HIGHEST DAILY MEAN	1000	Apr 8	277	Mar 18	6600	Apr 6 1997
LOWEST DAILY MEAN	7.5	Sep 21	5.2	Aug 27	.00[b]	Sep 13 1931
ANNUAL SEVEN-DAY MINIMUM	8.0	Sep 17	5.8	Aug 21	.00	Jul 31 1933
INSTANTANEOUS PEAK FLOW			325	Mar 17	7930	Apr 6 1997
INSTANTANEOUS PEAK STAGE			4.44[c]	Feb 28	14.32[c]	Apr 8 1969
INSTANTANEOUS LOW FLOW			4.9	Aug 27	.00	Sep 13 1931
ANNUAL RUNOFF (AC-FT)	72630		43700		43150	
ANNUAL RUNOFF (CFSM)	.25		.15		.15	
ANNUAL RUNOFF (INCHES)	3.42		2.06		2.03	
10 PERCENT EXCEEDS	217		142		110	
50 PERCENT EXCEEDS	48		41		8.4	
90 PERCENT EXCEEDS	11		9.8		1.4	

a Median of annual mean discharges is 47 ft^3/s.
b Many days, several years.
c Backwater from ice.



05292000 MINNESOTA RIVER AT ORTONVILLE, MN

LOCATION.--Lat 45°17'44", long 96°26'38", in NE¼NW¼ sec. 16, T.121 N., R.46 W., Big Stone County, Hydrologic Unit 07020001, on left bank 400 ft downstream from bridge on U.S. Highway 12 and 1,300 ft downstream from dam at outlet of Big Stone Lake, at Ortonville.

DRAINAGE AREA.--1,160 mi^2 (approximately).

PERIOD OF RECORD.--February 1938 to current year.

REVISED RECORDS.--WSP 895: 1939. WSP 1508: 1942 (yearly mean).

GAGE.--Water-stage recorder. Datum of gage is 956.38 ft above sea level. Prior to Mar. 31, 1939, nonrecording gage on downstream side of dam 1,300 ft upstream at datum 1.31 ft higher.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Affected by regulation of Big Stone Lake.

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	26	211	211	120	74	297	139	147	54	48	61	35
2	26	209	211	136	73	333	142	147	54	52	62	36
3	24	209	211	134	75	244	142	120	50	52	62	37
4	21	209	213	124	72	240	142	100	51	52	62	39
5	19	209	215	120	71	243	142	103	52	52	61	34
6	18	205	213	120	72	238	195	103	53	50	60	33
7	18	197	211	115	67	220	254	107	56	50	60	47
8	16	185	211	110	71	205	379	104	100	52	58	58
9	14	140	213	107	74	230	467	128	310	50	58	57
10	15	228	211	106	e62	225	460	185	420	46	52	55
11	16	209	209	103	e58	210	472	203	412	45	39	55
12	16	197	209	103	e56	198	466	244	409	45	40	55
13	14	196	209	102	115	193	458	270	408	42	42	55
14	14	211	209	100	166	184	468	361	398	42	41	54
15	14	186	211	97	199	190	472	445	394	44	40	54
16	16	205	211	90	182	184	483	451	284	57	37	54
17	16	203	179	90	151	168	466	568	199	52	35	54
18	11	224	e160	92	143	203	454	636	197	49	36	54
19	138	211	e150	85	129	293	456	355	198	45	33	55
20	215	195	e145	88	123	305	335	272	198	45	30	55
21	213	201	e140	85	114	304	251	248	198	45	31	57
22	211	201	e134	82	110	304	251	194	197	45	31	56
23	213	205	e130	82	111	250	252	199	201	53	32	56
24	213	190	e135	80	110	209	251	166	116	57	32	58
25	215	209	e140	74	108	171	248	149	49	57	31	60
26	213	207	151	75	125	136	250	89	50	86	31	60
27	213	209	148	82	163	137	193	56	50	99	35	59
28	211	209	150	77	194	142	147	55	49	72	36	59
29	211	213	138	75	---	141	148	52	49	60	35	61
30	218	215	124	73	---	138	148	53	49	63	35	62
31	213	---	123	74	---	141	---	56	---	62	34	---
TOTAL	3011	6098	5525	3001	3068	6676	9131	6366	5305	1669	1332	1564
MEAN	97.1	203	178	96.8	110	215	304	205	177	53.8	43.0	52.1
MAX	218	228	215	136	199	333	483	636	420	99	62	62
MIN	11	140	123	73	56	136	139	52	49	42	30	33
AC-FT	5970	12100	10960	5950	6090	13240	18110	12630	10520	3310	2640	3100
CFSM	.08	.18	.15	.08	.09	.19	.26	.18	.15	.05	.04	.04
IN.	.10	.20	.18	.10	.10	.21	.29	.20	.17	.05	.04	.05

e Estimated

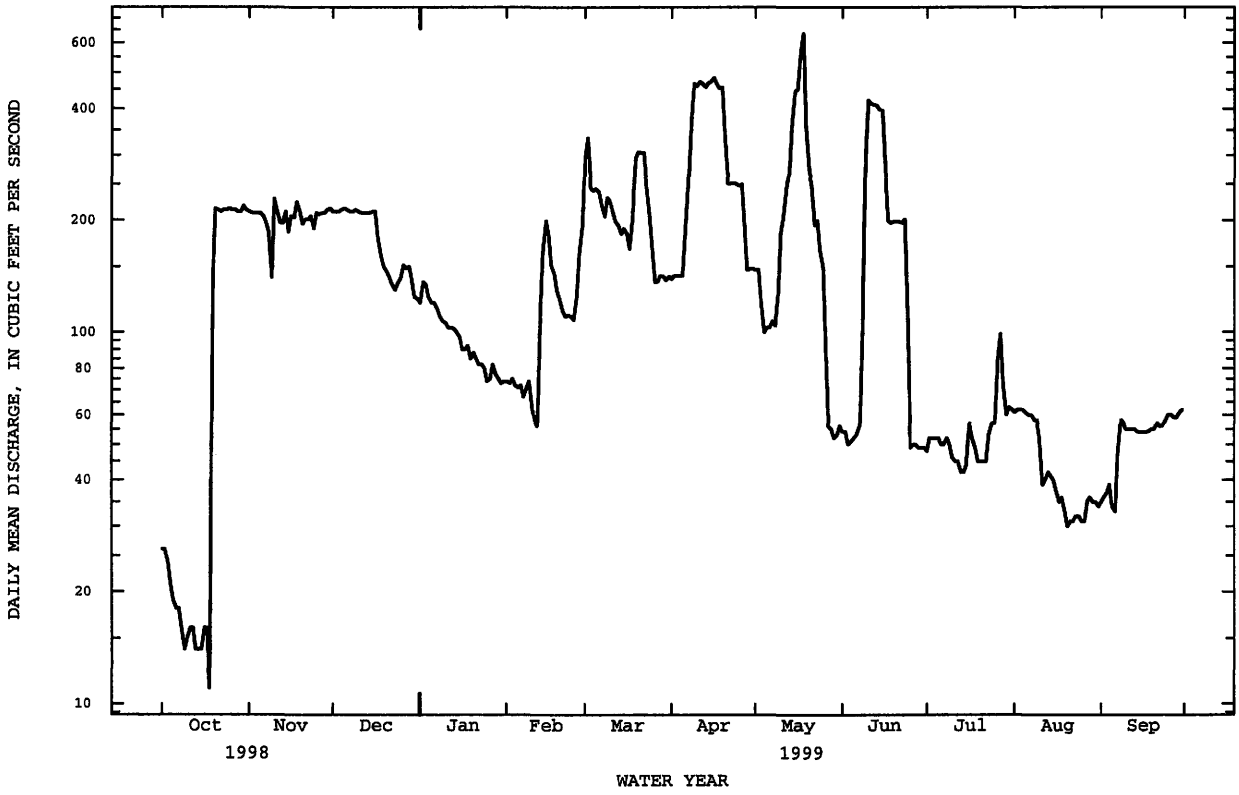
05292000 MINNESOTA RIVER AT ORTONVILLE, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1938 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	31.8	24.1	22.4	22.3	34.6	204	502	272	184	158	77.2	35.5
MAX	441	269	194	164	273	1519	4109	887	1034	1781	1299	250
(WY)	1996	1996	1943	1943	1998	1994	1997	1986	1962	1993	1993	1942
MIN	.20	.20	.20	.17	.16	1.14	1.27	.91	1.30	1.11	.25	.18
(WY)	1939	1939	1939	1940	1940	1941	1941	1941	1977	1977	1959	1988

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1938 - 1999	
ANNUAL TOTAL	89135		52746			
ANNUAL MEAN	244		145		132	
HIGHEST ANNUAL MEAN					514[a]	1997
LOWEST ANNUAL MEAN					2.39	1977
HIGHEST DAILY MEAN	1880	Apr 9	636	May 18	5010	Apr 10 1997
LOWEST DAILY MEAN	11	Oct 18	11	Oct 18	.00	Dec 13 1940
ANNUAL SEVEN-DAY MINIMUM	14	Oct 12	14	Oct 12	.08	Sep 12 1988
INSTANTANEOUS PEAK FLOW			671	May 17	5070	Apr 10 1997
INSTANTANEOUS PEAK STAGE			4.59	May 17	12.92	Apr 13 1952
INSTANTANEOUS LOW FLOW			10[b]	Oct 19	.00	Dec 13 1940
ANNUAL RUNOFF (AC-FT)	176800		104600		95820	
ANNUAL RUNOFF (CFSM)	.21		.12		.11	
ANNUAL RUNOFF (INCHES)	2.86		1.69		1.55	
10 PERCENT EXCEEDS	733		253		350	
50 PERCENT EXCEEDS	149		120		21	
90 PERCENT EXCEEDS	26		36		1.1	

a Median of annual mean discharges is 94 ft^3/s.
b Due in part to regulation.



05292704 NORTH FORK YELLOW BANK RIVER NEAR ODESSA, MN

LOCATION.--Lat 45°11'21", long 96°24'54", in NW¼ NW¼ SW¼ sec.22, T.120 N., R.46 W., Lac qui Parle County, Hydrologic Unit 07020001, on left bank at upstream side of County Highway 87 bridge, 11.0 mi east-southeast of Milbank, SD, 6.4 mi southwest of Odessa, and 2.9 mi upstream from mouth.

DRAINAGE AREA.--208 mi^2.

PERIOD OF RECORD.--May 1991 to current year.

GAGE.--Water-stage recorder and crest-stage gage. Elevation of gage is 1,020 ft above sea level, from topographic map.

REMARKS.--Records good except those for estimated daily discharges, which are poor. 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	2.2	47	75	e5.0	e2.0	e200	55	33	19	47	7.3	3.4
2	2.6	39	67	e5.0	e2.5	e150	52	31	18	39	6.7	3.9
3	2.4	32	62	e5.0	e2.5	e130	51	29	17	29	6.4	4.1
4	4.4	28	58	e4.0	e2.5	e120	57	29	16	27	6.0	8.1
5	6.5	24	53	e4.0	e2.5	e110	66	30	17	26	5.5	61
6	4.7	22	49	e4.0	e2.5	e105	83	32	16	23	5.1	75
7	4.1	20	44	e4.0	e2.5	e100	173	67	15	21	4.7	53
8	7.3	19	43	e4.0	e4.0	e90	163	95	18	22	4.5	30
9	6.2	19	43	e3.0	e6.0	e80	116	104	173	20	4.8	18
10	5.6	20	42	e3.0	e20	e70	94	86	1340	18	5.1	13
11	5.6	e19	42	e3.0	e60	e60	93	73	913	17	4.6	10
12	5.6	e16	41	e3.0	e70	e60	123	64	406	15	4.3	8.0
13	6.7	14	42	e2.0	e80	e60	161	58	244	14	4.4	7.1
14	6.3	18	35	e2.0	e140	e65	128	53	144	13	3.9	6.0
15	6.8	34	32	e2.0	e100	e70	101	48	104	12	3.6	6.6
16	8.5	42	32	e2.0	e65	e80	87	54	87	13	3.5	6.5
17	40	44	31	e2.0	e45	e120	77	83	75	107	3.2	4.7
18	134	56	28	e2.0	e30	e150	71	129	62	144	3.3	4.1
19	123	e65	e20	e2.0	e25	e130	68	98	56	84	3.5	3.8
20	95	e100	e10	e2.0	e25	e110	63	76	53	49	3.2	3.1
21	73	e120	e8.5	e2.0	e20	e85	59	61	54	31	2.8	3.0
22	55	84	e8.5	e2.0	e20	69	54	50	50	25	2.7	3.0
23	42	78	e9.0	e2.0	e20	61	49	44	48	21	2.7	2.8
24	35	101	e9.0	e2.0	e20	55	45	39	45	17	2.6	2.6
25	29	118	e9.5	e1.5	e30	50	41	35	55	15	2.4	3.2
26	24	130	e10	e1.5	e50	45	38	32	43	15	2.2	4.5
27	23	121	e10	e1.5	e80	42	38	29	34	12	2.1	4.2
28	24	106	e10	e1.5	e150	49	37	26	36	11	2.9	4.8
29	28	94	e9.0	e2.0	---	51	37	23	35	10	3.1	4.0
30	35	81	e7.5	e2.0	---	57	35	21	51	9.2	4.1	3.2
31	49	---	e6.0	e2.0	---	53	---	19	---	8.7	4.0	---
TOTAL	894.5	1711	946.0	83.0	1077.0	2677	2315	1651	4244	914.9	125.2	364.7
MEAN	28.9	57.0	30.5	2.68	38.5	86.4	77.2	53.3	141	29.5	4.04	12.2
MAX	134	130	75	5.0	150	200	173	129	1340	144	7.3	75
MIN	2.2	14	6.0	1.5	2.0	42	35	19	15	8.7	2.1	2.6
AC-FT	1770	3390	1880	165	2140	5310	4590	3270	8420	1810	248	723

e Estimated

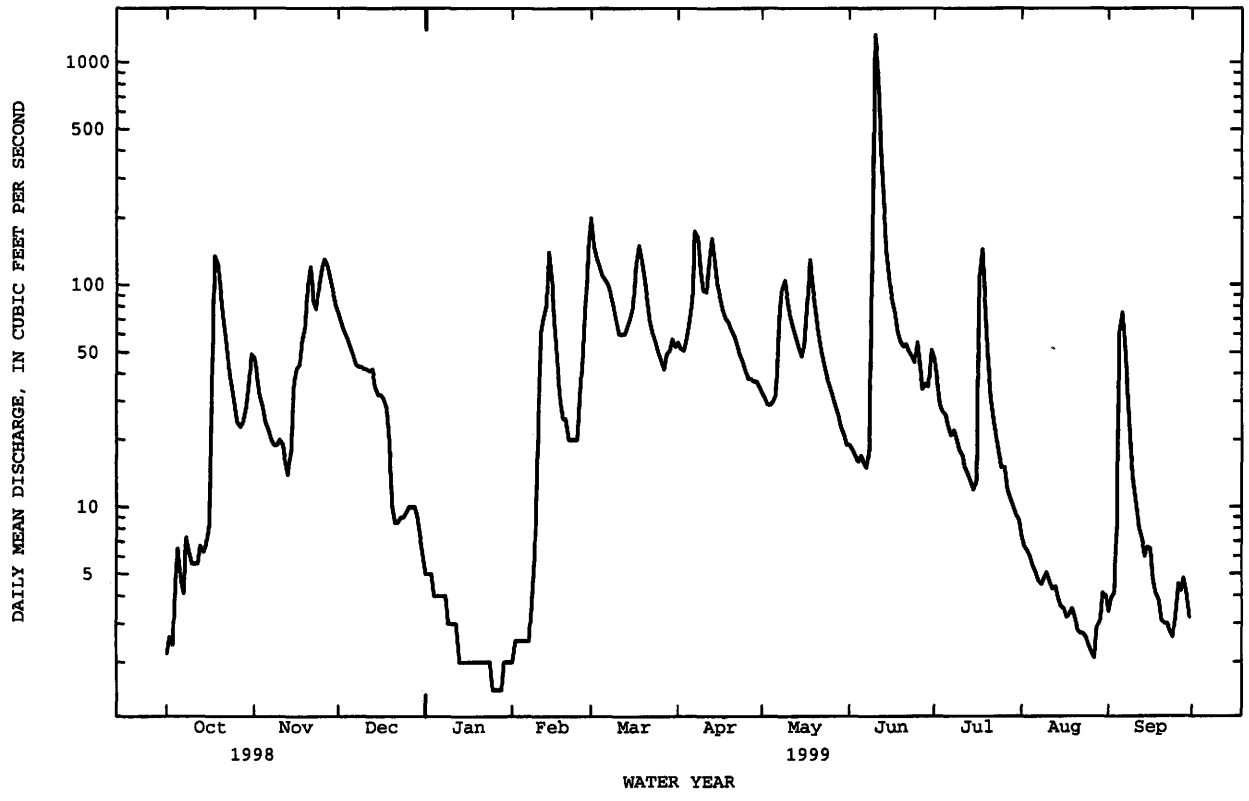
05292704 NORTH FORK YELLOW BANK RIVER NEAR ODESSA, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1992 - 1999, BY WATER YEAR (WY)

MEAN	58.6	34.6	17.2	9.67	45.0	205	280	106	92.9	149	31.1	21.2
MAX	342	122	32.7	19.5	166	422	977	267	212	501	107	72.5
(WY)	1996	1996	1996	1996	1996	1997	1997	1995	1992	1993	1995	1995
MIN	3.98	5.59	5.79	2.68	5.55	36.9	21.8	9.14	24.0	13.2	4.04	2.57
(WY)	1993	1992	1992	1999	1993	1992	1992	1992	1997	1998	1999	1998

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1992 - 1999	
ANNUAL TOTAL	17346.7		17003.3			
ANNUAL MEAN	47.5		46.6		87.6	
HIGHEST ANNUAL MEAN					134	1997
LOWEST ANNUAL MEAN					39.8	1992
HIGHEST DAILY MEAN	791	Apr 9	1340	Jun 10	4210	Mar 31 1997
LOWEST DAILY MEAN	1.6	Sep 21	1.5	Jan 25-28	1.5	Jan 25 1999
ANNUAL SEVEN-DAY MINIMUM	1.9	Sep 17	1.7	Jan 22	1.7	Jan 22 1999
INSTANTANEOUS PEAK FLOW			1750	Jun 10	4670a	Mar 31 1997
INSTANTANEOUS PEAK STAGE			12.76	Jun 10	18.02b	Mar 29 1997
ANNUAL RUNOFF (AC-FT)	34410		33730		63450	
10 PERCENT EXCEEDS	107		102		182	
50 PERCENT EXCEEDS	19		28		21	
90 PERCENT EXCEEDS	3.4		2.8		5.5	

a Gage height, 15.94 ft.
b Backwater from ice.



05293000 YELLOW BANK RIVER NEAR ODESSA, MN

LOCATION.--Lat 45°13'35", long 96°21'12", in SW¼SW¼ sec. 6, T. 120 N., R. 45 W., Lac qui Parle County, Hydrologic Unit 07020001, on left bank 600 ft downstream from highway bridge, 2.5 mi southwest of Odessa, and 4.5 mi upstream from mouth.

DRAINAGE AREA.--459 mi^2.

PERIOD OF RECORD.--October 1939 to current year.

REVISED RECORDS.--WSP 1388: 1947(M), 1950. WRIR 97-4249: Drainage area.

REVISIONS.-- Daily-mean discharge for Sept. 30, 1995 changed to 105 ft^3/s.

GAGE.--Water-stage recorder. Datum of gage is 953.34 ft above sea level (U.S. Army Corps of Engineers bench mark). Prior to Aug. 28, 1940, nonrecording gage at site 150 ft upstream at same datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair to poor.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 300 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Apr 18	--	394	4.82a	Jun 11	0100	*1,430	*9.41

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	6.2	77	149	e21	e11	e135	136	83	78	92	21	11
2	7.1	69	141	e20	e11	e150	139	78	75	81	19	11
3	7.6	59	135	e18	e12	e150	135	74	67	75	18	12
4	12	53	125	e17	e11	e145	141	73	61	65	17	22
5	19	48	114	e15	e11	e140	148	78	59	58	16	41
6	18	43	103	e14	e12	e130	172	81	54	52	15	111
7	28	41	96	e13	e13	e125	227	107	49	47	14	92
8	29	39	e97	e12	e15	e120	277	164	57	56	14	64
9	26	38	e95	e11	e17	e117	240	186	185	53	14	44
10	20	e50	e93	e11	e25	e114	205	183	860	46	14	30
11	16	e69	e89	e10	e52	e110	197	169	1130	41	13	23
12	14	49	e85	e10	e53	e110	210	157	636	37	12	19
13	13	38	77	e10	e52	e115	255	150	417	34	12	16
14	12	34	74	e10	e54	e120	252	142	300	31	12	14
15	12	46	63	e10	e62	e125	219	139	235	29	11	13
16	16	64	60	e10	e65	e140	193	195	192	32	11	13
17	38	65	58	e11	e64	143	178	320	165	54	10	12
18	114	75	58	e11	e64	179	167	360	149	185	9.9	11
19	163	85	e50	e11	e63	189	158	300	141	158	9.6	10
20	140	157	e35	e11	e62	186	151	270	134	110	9.5	9.7
21	107	165	e23	e11	e62	173	145	228	135	73	9.4	9.1
22	87	163	e22	e11	e63	163	138	199	131	57	9.4	8.9
23	70	143	e21	e11	e65	148	126	178	124	49	9.2	8.5
24	57	153	e21	e11	e64	136	114	164	108	41	9.1	8.2
25	51	179	e21	e11	e68	126	103	152	112	35	9.0	8.5
26	44	194	e22	e11	e78	120	96	142	112	31	8.7	8.8
27	42	194	e23	e11	e86	109	94	131	95	30	8.1	8.5
28	41	182	e24	e11	e105	124	91	110	88	29	9.9	8.2
29	47	171	e22	e11	---	136	88	96	83	25	10	8.5
30	52	158	e22	e11	---	138	87	86	84	23	14	8.5
31	68	---	e22	e11	---	140	---	80	---	23	13	---
TOTAL	1376.9	2901	2040	377	1320	4256	4882	4875	6116	1752	381.8	664.4
MEAN	44.4	96.7	65.8	12.2	47.1	137	163	157	204	56.5	12.3	22.1
MAX	163	194	149	21	105	189	277	360	1130	185	21	111
MIN	6.2	34	21	10	11	109	87	73	49	23	8.1	8.2
AC-FT	2730	5750	4050	748	2620	8440	9680	9670	12130	3480	757	1320
CFSM	.10	.21	.14	.03	.10	.30	.35	.34	.44	.12	.03	.05
IN.	.11	.24	.17	.03	.11	.34	.40	.40	.50	.14	.03	.05

a From highwater mark.
e Estimated

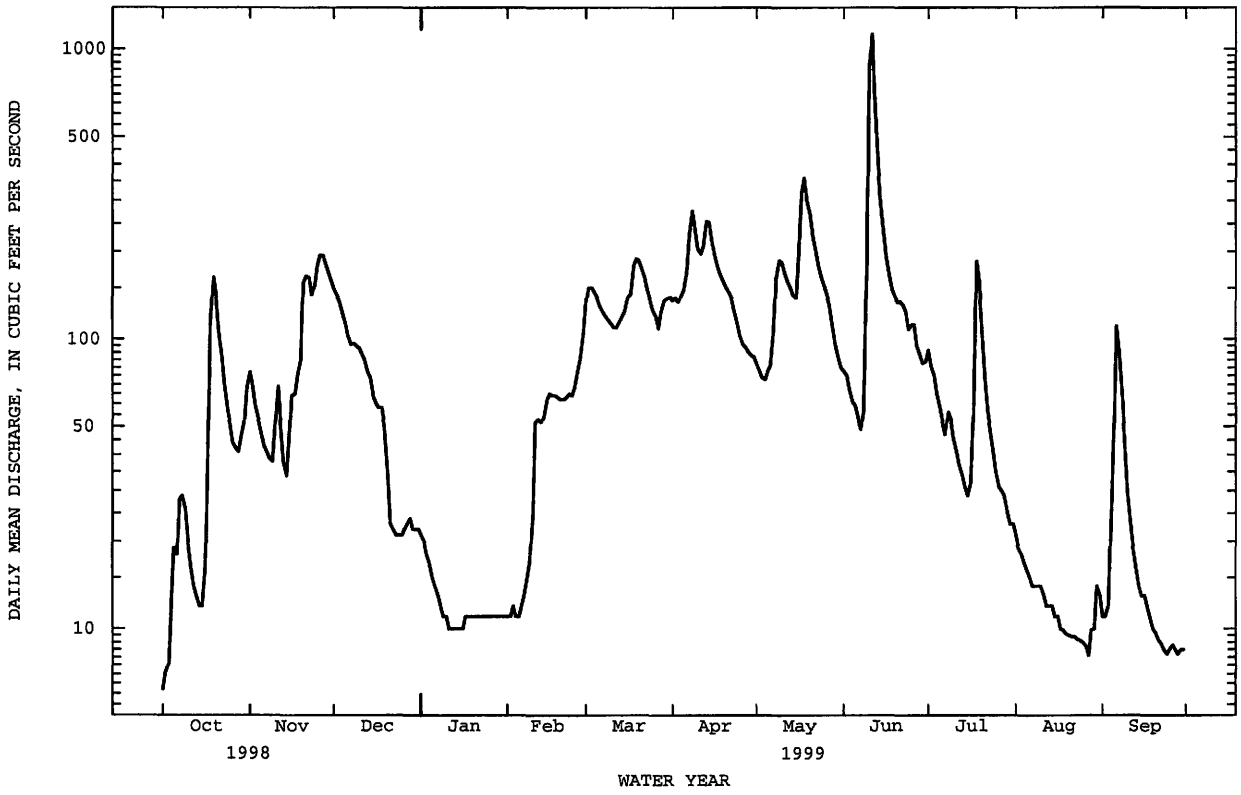
05293000 YELLOW BANK RIVER NEAR ODESSA, MN--Continued

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

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	25.6	24.9	13.1	7.57	16.8	176	268	110	106	67.0	30.8	17.5
MAX	588	256	86.3	68.0	147	693	1614	652	577	741	281	273
(WY)	1996	1996	1996	1994	1998	1996	1997	1972	1992	1993	1991	1985
MIN	.31	.44	.32	.090	.001	1.59	9.13	2.94	1.83	.27	.088	.083
(WY)	1941	1977	1977	1977	1977	1965	1981	1981	1976	1976	1976	1976

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1940 - 1999	
ANNUAL TOTAL	33409.8		30942.1			
ANNUAL MEAN	91.5		84.8		72.0[a]	
HIGHEST ANNUAL MEAN					237	1996
LOWEST ANNUAL MEAN					3.98	1981
HIGHEST DAILY MEAN	1100	Feb 25	1130	Jun 11	6640	Apr 9 1969
LOWEST DAILY MEAN	5.6	Sep 30	6.2	Oct 1	.00[b]	Jan 26 1940
ANNUAL SEVEN-DAY MINIMUM	6.2	Sep 25	8.5	Sep 23	.00	Jan 26 1940
INSTANTANEOUS PEAK FLOW			1430	Jun 11	6970	Apr 9 1969
INSTANTANEOUS PEAK STAGE			9.41	Jun 11	19.07	Apr 9 1969
INSTANTANEOUS LOW FLOW			5.6	Oct 1	.00[c]	Jan 26 1940
ANNUAL RUNOFF (AC-FT)	66270		61370		52160	
ANNUAL RUNOFF (CFSM)	.20		.18		.16	
ANNUAL RUNOFF (INCHES)	2.71		2.51		2.13	
10 PERCENT EXCEEDS	194		178		153	
50 PERCENT EXCEEDS	42		61		12	
90 PERCENT EXCEEDS	9.4		11		1.0	

a Median of annual mean discharges is 54 ft^3/s.
b Many days, several years.
c From highwater mark.



05294000 POMME DE TERRE RIVER AT APPLETON, MN

LOCATION.--Lat 45°12'10", long 96°01'20", in SW¼NW¼ sec. 14, T.120 N., R.43 W., Swift County, Hydrologic Unit 07020002, on left bank 60 ft upstream from bridge on U.S. Highway 59 and State Highway 119 at Appleton and 8 mi upstream from mouth.

DRAINAGE AREA.--864 mi^2.

PERIOD OF RECORD.--March 1931 to September 1935 (no winter records), October 1935 to current year. Prior to October 1953, published as "near Appleton."

REVISED RECORDS.--WSP 1308: 1931(M), 1937(M).

GAGE.--Water-stage recorder. Datum of gage is 978.00 ft above sea level. Prior to Dec. 22, 1952, nonrecording gage at site 4 mi upstream at datum 25.17 ft higher.

REMARKS.--Records good except for estimated daily discharges, which are fair to poor. Flow affected by lakes above station.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 230 ft^3/s (revised) and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Oct 18	1700	232	4.80	Jun 18	1800	310	5.06
Nov 30	1200	256	4.89	Jul 9	1200	290	4.99
Feb 28	1400	245	4.83	Jul 22	2300	548	5.66
Apr 8	0300	451	5.44	Aug 18	0100	310	5.04
May 18	0200	*591	5.75	Sep 10	0800	245	4.81

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	45	180	254	e104	e81	233	340	238	261	202	279	183
2	45	176	249	e101	e82	205	330	234	254	198	253	175
3	46	154	245	e99	e84	e188	332	227	246	204	225	179
4	52	142	240	e92	e87	e182	340	222	235	200	200	211
5	68	138	235	e90	e89	e180	357	252	232	192	187	218
6	78	134	232	e87	e91	e178	383	319	238	183	176	228
7	80	132	220	e85	e97	e177	429	380	237	177	167	236
8	79	131	201	e82	e104	e178	445	440	241	208	155	240
9	76	129	e188	e79	e115	e179	435	468	253	273	169	242
10	74	135	e180	e77	e130	e178	425	454	262	260	194	243
11	70	103	e180	e75	e133	e178	425	444	268	254	209	238
12	67	118	e186	e74	e131	e177	436	454	272	238	197	235
13	62	153	186	e72	e125	e175	422	449	277	215	204	235
14	58	159	184	e70	e124	e176	409	438	283	194	242	232
15	60	141	180	e69	e125	e180	394	429	287	180	260	231
16	79	154	175	e70	e126	e189	385	464	296	181	289	226
17	143	165	174	e74	e123	e200	377	539	298	207	306	220
18	214	165	166	e76	e118	e212	363	582	307	263	306	212
19	216	e150	99	e77	e116	234	346	540	309	338	294	207
20	190	e125	e95	e78	e114	257	332	509	305	420	272	204
21	173	146	e93	e78	e112	258	320	477	294	488	251	204
22	163	195	e92	e79	e110	260	310	447	279	528	233	202
23	157	216	e93	e80	e110	267	299	422	268	525	218	196
24	165	216	e95	e80	e112	271	284	404	259	481	206	191
25	162	216	e98	e80	e130	268	272	382	241	409	197	186
26	157	234	e100	e80	164	251	265	359	229	352	187	182
27	157	249	e102	e80	197	242	261	335	218	315	177	181
28	150	252	e104	e80	237	262	257	316	211	312	172	182
29	150	253	e106	e80	---	330	250	299	214	300	171	179
30	149	255	e107	e80	---	357	242	281	209	288	179	174
31	156	---	e108	e81	---	345	---	268	---	294	182	---
TOTAL	3541	5116	4967	2509	3367	6967	10465	12072	7783	8879	6757	6272
MEAN	114	171	160	80.9	120	225	349	389	259	286	218	209
MAX	216	255	254	104	237	357	445	582	309	528	306	243
MIN	45	103	92	69	81	175	242	222	209	177	155	174
AC-FT	7020	10150	9850	4980	6680	13820	20760	23940	15440	17610	13400	12440
CFSM	.13	.19	.18	.09	.13	.25	.39	.43	.29	.32	.24	.23

e Estimated

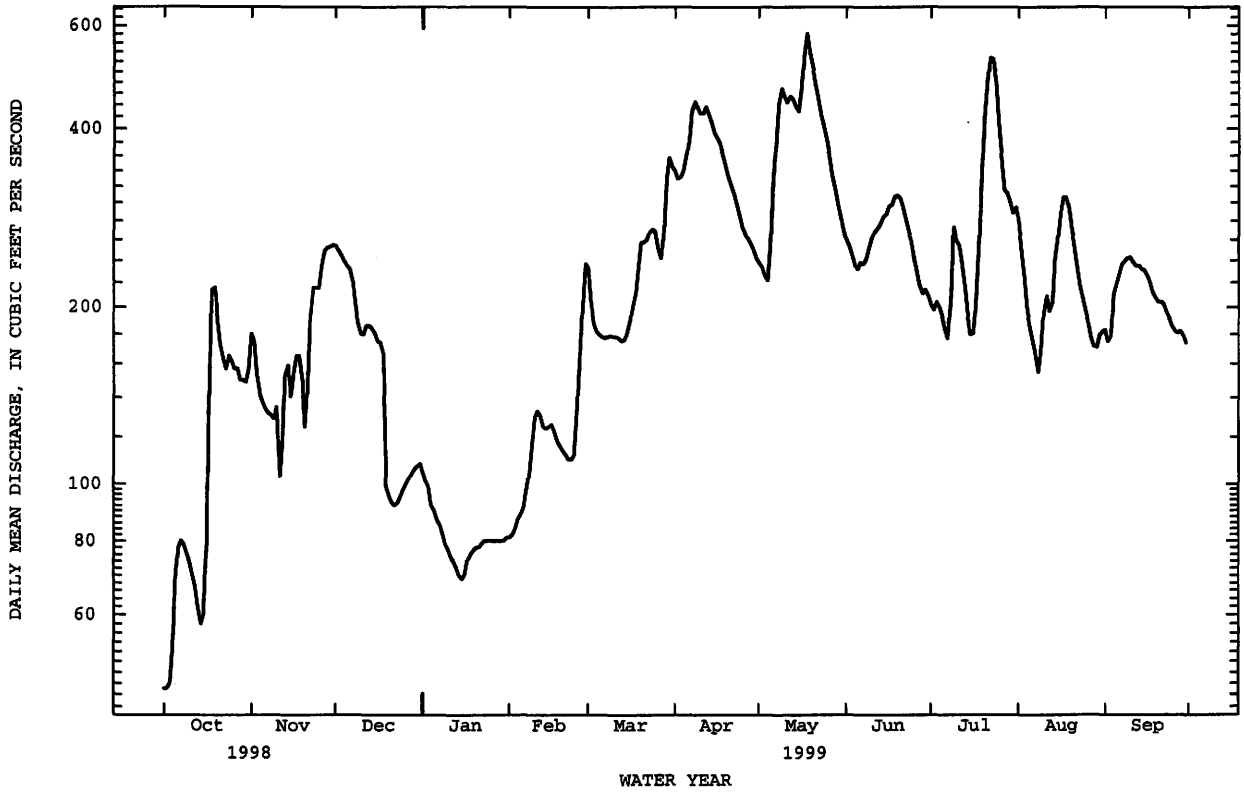
05294000 POMME DE TERRE RIVER AT APPLETON, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	68.8	66.0	44.5	28.7	29.6	165	407	214	167	148	80.2	58.2
MAX	550	402	182	141	163	675	3087	846	516	1382	752	331
(WY)	1996	1996	1987	1987	1998	1995	1997	1969	1965	1993	1993	1986
MIN	.000	3.52	1.00	.000	.000	2.04	20.9	8.09	2.17	.45	.095	.047
(WY)	1989	1989	1937	1937	1936	1969	1934	1934	1933	1988	1988	1988

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1931 - 1999	
ANNUAL TOTAL	71518		78695			
ANNUAL MEAN	196		216		130[a]	
HIGHEST ANNUAL MEAN					420	1997
LOWEST ANNUAL MEAN					21.1	1977
HIGHEST DAILY MEAN	743	Apr 10	582	May 18	6760	Apr 6 1997
LOWEST DAILY MEAN	43	Sep 30	45	Oct 1	.00[b]	Aug 3 1934
ANNUAL SEVEN-DAY MINIMUM	45	Sep 26	59	Oct 1	.00	Feb 1 1936
INSTANTANEOUS PEAK FLOW			591[c]	May 18	8890	Apr 7 1997
INSTANTANEOUS PEAK STAGE			6.92[d]	Mar 3	18.13	Apr 7 1997
INSTANTANEOUS LOW FLOW			28[e]	Dec 19	.00[b]	Aug 3 1934
ANNUAL RUNOFF (AC-FT)	141900		156100		94530	
ANNUAL RUNOFF (CFSM)	.22		.24		.14	
10 PERCENT EXCEEDS	383		378		293	
50 PERCENT EXCEEDS	163		202		51	
90 PERCENT EXCEEDS	73		80		6.7	

a Median of annual mean discharges is 98 ft^3/s.
b Many days, several years.
c Stage, 5.75 ft.
d Result of ice jam.
e Result of freezeup.



05300000 LAC QUI PARLE RIVER NEAR LAC QUI PARLE, MN

LOCATION.--Lat 44°59'42", long 95°55'09", in SW¼SW¼ sec. 27, T.118 N., R.42 W., Lac qui Parle County, Hydrologic Unit 07020003, on right bank 40 ft downstream from highway bridge and 0.5 mi southwest of city of Lac qui Parle.

DRAINAGE AREA.--960 mi^2.

PERIOD OF RECORD.--April 1910 to November 1914; March 1931 to current year (winter records incomplete prior to 1934). Published as "at Lac qui Parle," 1910- 14.

REVISED RECORDS.--WSP 1308: 1912(M), 1935(M).

GAGE.--Water-stage recorder. Datum of gage is 946.98 ft (revised) above sea level (Minnesota Department of Transportation benchmark). Prior to July 26, 1998, gage datum 5.00 ft higher at present location. Apr. 27, 1910 to Nov. 15, 1914, nonrecording gage at site 2 mi downstream at different datum. Mar. 17, 1931 to Mar. 9, 1937,nonrecording gage at site 40 ft upstream at present datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair to poor.

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	3.0	89	190	e24	e15	e170	255	297	238	231	42	33
2	3.1	91	184	e23	e15	e205	248	283	307	221	87	39
3	5.0	89	179	e22	e15	e188	250	268	266	211	89	41
4	17	83	171	e21	e16	e177	254	256	228	198	71	51
5	31	79	167	e20	e16	e168	264	250	228	192	62	52
6	31	76	158	e19	e16	e160	346	259	217	184	52	67
7	21	76	152	e18	e17	e150	417	320	198	167	42	95
8	34	73	145	e17	e19	e143	516	414	204	158	36	94
9	43	74	121	e16	e24	e140	575	471	211	142	33	82
10	42	105	118	e16	e40	e139	542	484	421	121	30	70
11	38	150	117	e15	e66	e137	527	459	684	110	27	58
12	40	e55	117	e15	e112	e136	533	424	621	101	24	51
13	37	e48	117	e14	e110	e135	566	402	520	92	21	45
14	33	47	137	e14	e125	e148	588	391	452	83	21	41
15	42	48	126	e14	e130	e170	580	382	402	79	19	40
16	51	50	115	e14	e122	e194	558	463	361	73	18	38
17	66	67	108	e15	e117	e225	547	583	298	67	17	36
18	77	78	104	e15	e112	e250	523	732	264	62	17	33
19	98	e83	e90	e15	e109	e270	493	794	256	60	22	37
20	94	101	e76	e15	e105	e281	467	656	253	58	22	42
21	98	123	e65	e15	e103	e279	443	574	265	56	21	35
22	108	127	e55	e15	e102	e277	417	570	270	55	21	40
23	73	137	e46	e15	e102	e273	391	559	262	55	20	41
24	47	151	e39	e15	e102	e265	376	504	242	53	19	41
25	61	157	e33	e15	e104	254	359	454	262	51	20	38
26	59	172	e29	e15	e110	240	337	415	293	47	21	38
27	68	184	e26	e15	e118	228	322	384	254	44	20	35
28	67	201	e25	e15	e132	231	312	351	236	43	20	35
29	66	208	e25	e15	---	233	309	320	222	41	18	37
30	74	203	e25	e15	---	242	309	286	227	40	27	36
31	75	---	e24	e15	---	255	---	255	---	51	37	---
TOTAL	1602.1	3225	3084	507	2174	6363	12624	13260	9162	3146	996	1421
MEAN	51.7	108	99.5	16.4	77.6	205	421	428	305	101	32.1	47.4
MAX	108	208	190	24	132	281	588	794	684	231	89	95
MIN	3.0	47	24	14	15	135	248	250	198	40	17	33
AC-FT	3180	6400	6120	1010	4310	12620	25040	26300	18170	6240	1980	2820
CFSM	.05	.11	.10	.02	.08	.21	.44	.45	.32	.11	.03	.05
IN.	.06	.12	.12	.02	.08	.25	.49	.51	.36	.12	.04	.06

e Estimated

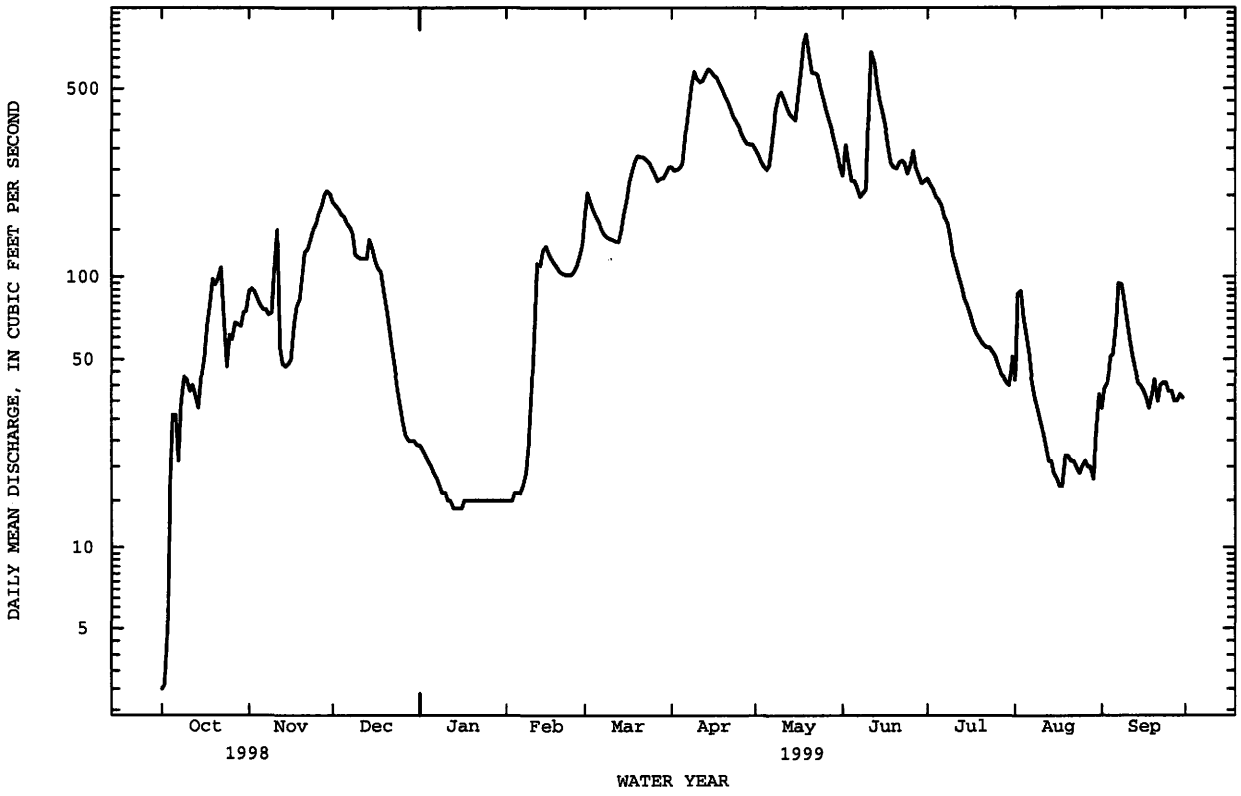
05300000 LAC QUI PARLE RIVER NEAR LAC QUI PARLE, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1910 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	43.2	48.6	26.0	11.7	23.1	300	610	245	269	142	76.8	38.3
MAX	629	378	149	88.1	244	1634	5354	1264	1762	1613	765	535
(WY)	1996	1996	1996	1994	1998	1985	1997	1995	1984	1993	1953	1985
MIN	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
(WY)	1932	1932	1932	1932	1934	1934	1934	1934	1934	1934	1931	1931

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1910 - 1999	
ANNUAL TOTAL	75355.0		57564.1			
ANNUAL MEAN	206		158		161[a]	
HIGHEST ANNUAL MEAN					625	1993
LOWEST ANNUAL MEAN					.000	1934
HIGHEST DAILY MEAN	2060	Apr 11	794	May 19	16000	Apr 10 1969
LOWEST DAILY MEAN	1.8	Sep 29	3.0	Oct 1	.00[b]	Jul 15 1931
ANNUAL SEVEN-DAY MINIMUM	2.2	Sep 24	14	Jan 11	.00	Jul 15 1931
INSTANTANEOUS PEAK FLOW			822	May 19	17100	Apr 10 1969
INSTANTANEOUS PEAK STAGE			8.73	May 19	19.37[c]	Apr 9 1965
INSTANTANEOUS LOW FLOW			2.9[d]	Oct 1	.00[b]	Jul 15 1931
ANNUAL RUNOFF (AC-FT)	149500		114200		116700	
ANNUAL RUNOFF (CFSM)	.22		.16		.17	
ANNUAL RUNOFF (INCHES)	2.92		2.23		2.28	
10 PERCENT EXCEEDS	524		414		353	
50 PERCENT EXCEEDS	73		101		22	
90 PERCENT EXCEEDS	11		17		.50	

a Median of annual mean discharges is 120 ft^3/s.
b Many days, several years.
c From highwater mark, backwater from ice. Datum then in use.
d Rising stage.



05301000 MINNESOTA RIVER NEAR LAC QUI PARLE, MN

LOCATION.--Lat 45°01'17", long 95°52'05", in NW¼NE¼ sec.24, T.118 N., R.42 W., Chippewa County, Hydrologic Unit 07020004, on left bank 200 ft downstream from highway bridge and dam, 2.4 mi northeast of city of Lac Qui Parle, and 3.5 mi west of city of Watson.

DRAINAGE AREA.--4050 mi^2 (approximately).

PERIOD OF RECORD.--October 1942 to September 1994, October 1998 to present.

REVISED RECORDS.--WDR MN-91-2; 1979

GAGE.--Water-stage recorder. Datum of gage is 900.00 ft above sea level (levels by U.S. Army Corps of Engineers). Prior to Nov. 10, 1944, at datum 0.20 ft. lower.

REMARKS.--Records good except those for estimated daily discharges, which are fair to poor. Part of flow from 2,050 mi^2, of Chippewa River basin at times diverted into Minnesota River above station. Some regulation by Big Stone Lake since Apr. 17, 1937, Lac qui Parle since January 1938, Marsh Lake since Nov. 1, 1939, and Odessa Dam since May 1974.

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	78	801	1350	e620	e375	1050	2110	1320	2430	1110	1180	676
2	106	696	1350	e595	e350	1100	2180	1310	2410	1030	1200	501
3	106	690	1340	e570	e350	1210	2000	1310	2340	1040	1200	405
4	107	685	1340	e550	e390	1220	1930	1300	2150	1040	1210	411
5	131	688	1360	e530	e395	1210	1820	1320	1860	1050	1130	417
6	303	683	1340	e510	e420	1210	1810	1420	1670	1010	849	518
7	593	685	1340	e490	e425	1210	1940	1740	1330	960	696	575
8	706	686	1290	e425	e435	1210	1960	1980	1170	964	700	550
9	692	690	1150	e420	e440	1240	2120	2020	1200	1130	708	522
10	595	866	1110	e415	e475	1290	2380	2060	1300	1350	828	486
11	570	754	1080	e415	e560	1350	2550	2150	1770	1350	1100	493
12	530	712	1040	e415	e660	1370	2530	2160	2130	1180	1300	492
13	411	756	1040	e400	e740	1410	2470	2210	2130	715	1170	494
14	245	837	1060	e400	e740	1400	2520	2340	1970	414	985	496
15	160	827	1140	e390	e730	1370	2570	2410	1640	498	974	499
16	160	928	1230	e360	e720	1320	2660	2520	1620	616	713	505
17	293	1090	1250	e350	e720	1320	2720	2660	1610	666	319	505
18	370	1180	1030	e348	e720	1320	2690	2720	1600	671	279	500
19	373	1310	e970	e348	e720	1340	2640	2670	1600	769	281	497
20	402	1340	e920	e345	e720	1390	2530	2680	1600	864	324	466
21	439	1340	e840	e344	e720	1400	2410	2630	1550	848	355	432
22	554	1290	e800	e344	e720	1490	2260	2570	1420	835	361	432
23	719	1290	e750	e348	e740	1740	1960	2600	1340	874	489	426
24	764	1300	e710	e348	817	1950	1620	2500	1380	1090	572	376
25	760	1350	e685	e348	897	1940	1600	2510	1450	1060	577	261
26	756	1350	e675	e375	967	1730	1650	2490	1440	941	578	229
27	796	1350	e665	e450	1050	1390	1780	2490	1420	677	578	230
28	852	1350	e690	e490	1050	1450	1860	2480	1380	654	579	230
29	853	1350	e680	e500	---	1620	1800	2470	1360	827	581	232
30	852	1370	e650	e450	---	1730	1560	2450	1300	860	675	306
31	847	---	e640	e390	---	1860	---	2460	---	874	836	---
TOTAL	15123	30244	31515	13283	18046	43840	64630	67950	49570	27967	23327	13162
MEAN	488	1008	1017	428	644	1414	2154	2192	1652	902	752	439
MAX	853	1370	1360	620	1050	1950	2720	2720	2430	1350	1300	676
MIN	78	683	640	344	350	1050	1560	1300	1170	414	279	229
AC-FT	30000	59990	62510	26350	35790	86960	128200	134800	98320	55470	46270	26110
CFSM	.12	.25	.25	.11	.16	.35	.53	.54	.41	.22	.19	.11
IN.	.14	.28	.29	.12	.17	.40	.59	.62	.46	.26	.21	.12

e Estimated

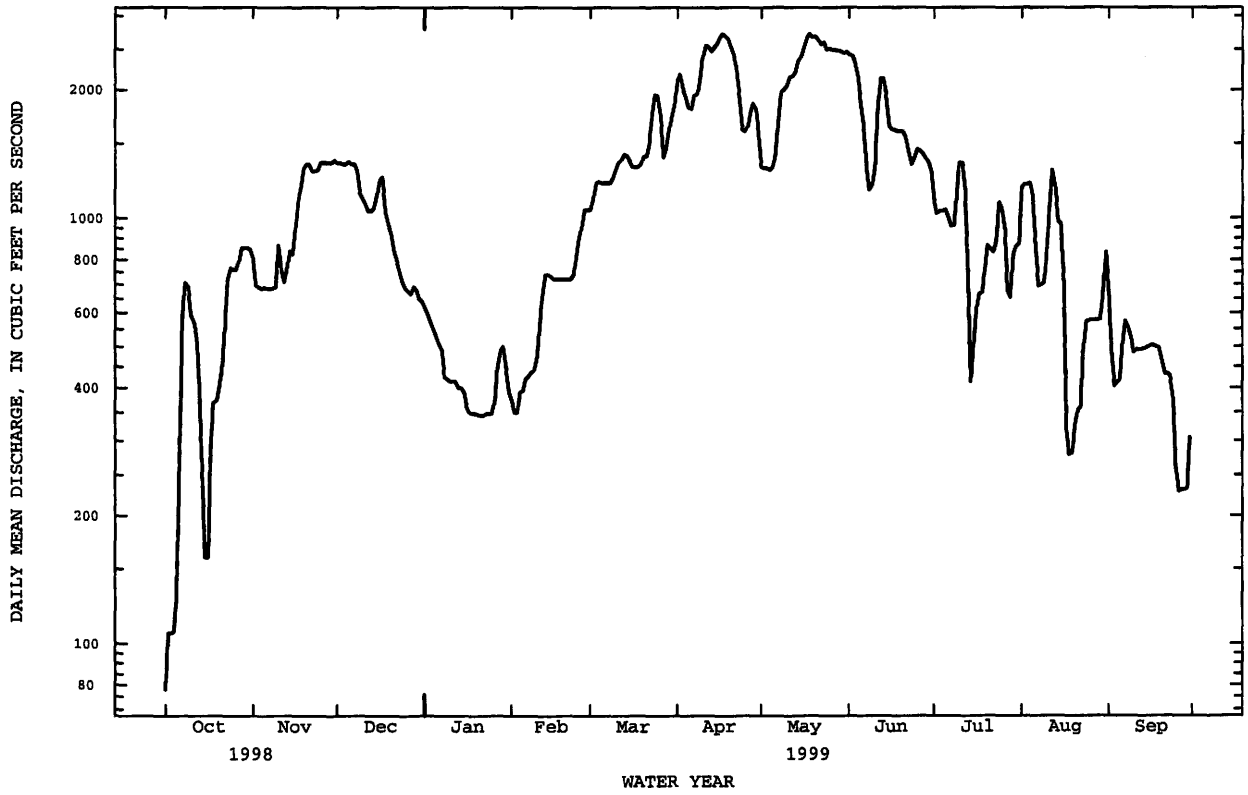
05301000 MINNESOTA RIVER NEAR LAC QUI PARLE, MN

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1943 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	275	288	228	153	186	854	2585	1383	1150	983	541	275
MAX	2924	2327	1204	574	644	4599	10750	5771	4229	7024	6012	2402
(WY)	1987	1985	1985	1987	1999	1994	1986	1986	1984	1993	1993	1986
MIN	4.16	.46	.17	.19	.094	46.5	151	122	29.5	14.7	11.8	5.59
(WY)	1977	1977	1977	1977	1977	1956	1961	1959	1988	1988	1974	1967

SUMMARY STATISTICS	FOR 1999 WATER YEAR		WATER YEARS 1943 - 1999	
ANNUAL TOTAL	398657			
ANNUAL MEAN	1092		742	
HIGHEST ANNUAL MEAN			2507	1986
LOWEST ANNUAL MEAN			75.7	1959
HIGHEST DAILY MEAN	2720	Apr 17, May 18	28700	Apr 12 1969
LOWEST DAILY MEAN	78	Oct 1	.00[a]	Oct 19 1951
ANNUAL SEVEN-DAY MINIMUM	203	Oct 1	.00	Oct 19 1951
INSTANTANEOUS PEAK FLOW	2800	May 18	29400	Apr 12 1969
INSTANTANEOUS PEAK STAGE	29.78	May 18	39.75	Apr 12 1969
INSTANTANEOUS LOW FLOW	39[b]	Oct 1	.00[a]	Oct 19 1951
ANNUAL RUNOFF (AC-FT)	790700		537700	
ANNUAL RUNOFF (CFSM)	.27		.18	
ANNUAL RUNOFF (INCHES)	3.66		2.49	
10 PERCENT EXCEEDS	2170		1820	
50 PERCENT EXCEEDS	941		220	
90 PERCENT EXCEEDS	374		26	

a Many days, several years.
b Result of regulation.



05304500 CHIPPEWA RIVER NEAR MILAN, MN

LOCATION.--Lat 45°06'39", long 95°47'57", in SE¼SE¼ sec. 16, T.119 N., R.41 W., Chippewa County, Hydrologic Unit 07020005, on right bank 20 ft downstream from bridge on State Highway 40, and 5.5 mi east of Milan.

DRAINAGE AREA.--1,880 mi^2.

PERIOD OF RECORD.--March 1937 to current year.

REVISED RECORDS.--WSP 1145: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 959.69 ft above sea level. Prior to June 15, 1942, nonrecording gage on bridge at same datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair to poor. Flow may be influenced by regulation from several small lakes upstream from gage.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 600 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Oct 18	2200	759	2.80	Jul 9	1900	1,420	3.88
Nov 23	1700	798	2.95	Jul 23	1300	785	2.84
Apr 15	1370	1,370	3.80	Jul 31	1900	1,640	4.24
May 17	1600	*2,700	*5.72	Aug 31	2400	610	2.55
Jun 10	2400	1,650	4.25				

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	159	496	679	e265	e208	e435	1010	890	1130	741	1390	593
2	162	483	664	e250	e212	e428	1010	858	1090	722	993	543
3	164	470	647	e235	e220	e420	1020	830	1050	732	778	506
4	180	462	630	e228	e223	e415	1030	808	1010	745	683	498
5	229	451	635	e224	e225	e410	1040	820	998	725	637	532
6	312	440	644	e220	e240	e405	1120	924	999	688	601	549
7	342	430	635	e216	e260	e403	1290	1080	964	654	549	519
8	333	426	616	e212	e285	e402	1320	1200	953	738	516	489
9	317	427	595	e210	e330	e401	1300	1200	1070	1300	744	469
10	299	460	590	e207	e375	e420	1270	1200	1560	1260	e1630	457
11	282	495	599	e204	e395	e420	1310	1490	1580	1030	e1580	444
12	270	e500	588	e202	e410	e418	1350	1710	1400	886	e1240	457
13	262	e560	551	e200	e420	e420	1330	1600	1300	788	e1080	517
14	260	610	552	e198	e427	e428	1320	1580	1220	715	e1120	492
15	265	608	536	e196	e435	e434	1350	1560	1150	659	e1010	469
16	285	616	528	e202	e430	e460	1350	1940	1100	618	e831	452
17	413	602	515	e203	e420	e495	1320	2610	1030	608	e728	437
18	706	606	507	e202	e405	e545	1300	2450	979	584	703	418
19	731	e605	e450	e201	e398	e600	1270	2160	949	567	703	410
20	689	e650	e415	e201	e392	e650	1240	1980	930	580	690	397
21	647	699	e385	e200	e384	e700	1220	1860	915	632	657	387
22	603	730	e345	e200	e380	e710	1190	1750	894	711	616	381
23	569	779	e320	e200	e382	716	1140	1680	933	773	597	373
24	548	785	e310	e200	e386	717	1110	1600	960	773	555	362
25	522	793	e304	e200	e392	700	1080	1530	918	733	523	354
26	510	783	e300	e200	e400	678	1050	1460	867	675	493	371
27	507	757	e302	e200	e420	666	1030	1390	827	626	469	385
28	510	737	e315	e200	e440	758	1000	1330	804	624	447	392
29	511	721	e310	e200	---	948	957	1280	796	627	444	382
30	512	701	e300	e201	---	966	921	1220	771	635	494	373
31	507	---	e288	e205	---	985	---	1170	---	1480	571	---
TOTAL	12606	17882	15055	6482	9894	17553	35248	45160	31147	23629	24072	13408
MEAN	407	596	486	209	353	566	1175	1457	1038	762	777	447
MAX	731	793	679	265	440	985	1350	2610	1580	1480	1630	593
MIN	159	426	288	196	208	401	921	808	771	567	444	354
AC-FT	25000	35470	29860	12860	19620	34820	69910	89570	61780	46870	47750	26590
CFSM	.22	.32	.26	.11	.19	.30	.62	.77	.55	.41	.41	.24
IN.	.25	.35	.30	.13	.20	.35	.70	.89	.62	.47	.48	.27

e Estimated

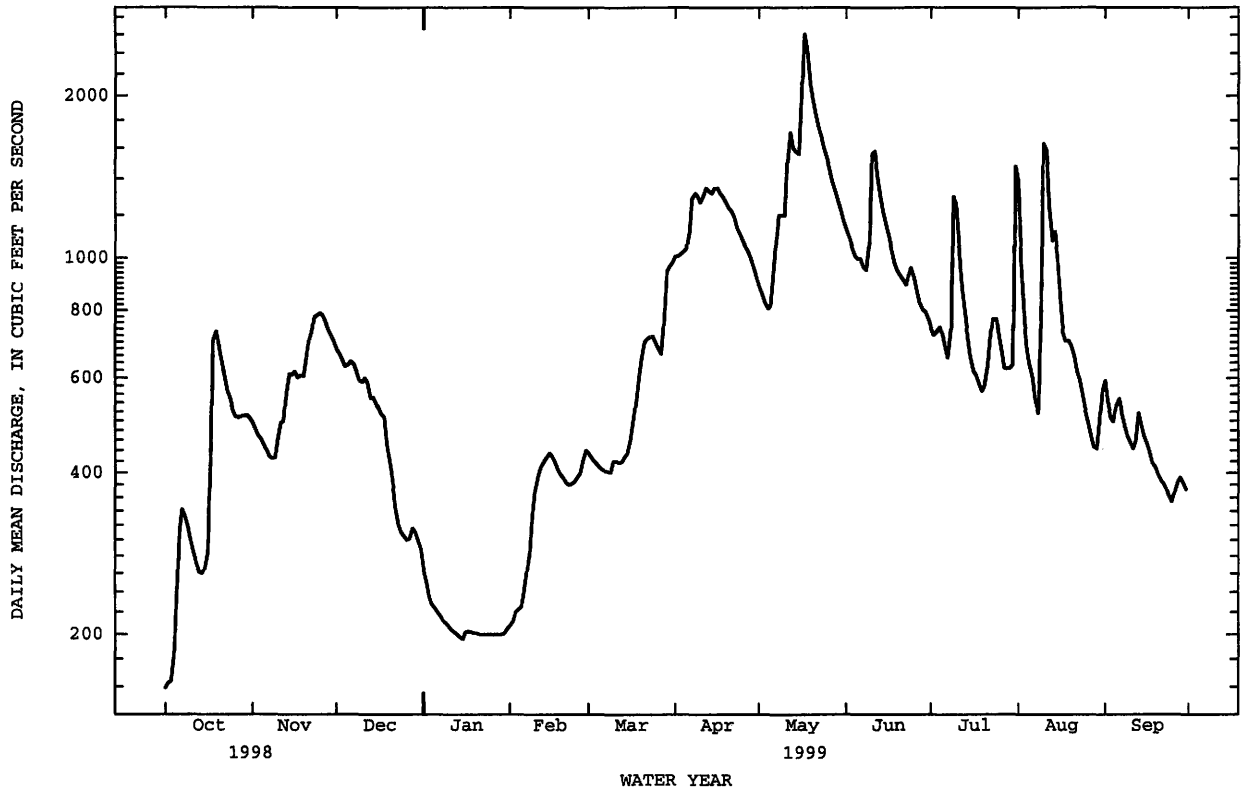
05304500 CHIPPEWA RIVER NEAR MILAN, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1938 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	238	201	126	72.8	76.0	409	1076	687	590	478	278	224
MAX	1996	1318	655	425	432	2141	6606	2462	2248	2507	2183	2273
(WY)	1985	1985	1985	1987	1998	1985	1997	1986	1984	1995	1993	1986
MIN	5.51	8.67	4.77	.094	.000	2.92	90.9	81.6	36.8	15.1	6.19	3.50
(WY)	1977	1977	1977	1940	1940	1965	1959	1939	1940	1940	1976	1976

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1938 - 1999	
ANNUAL TOTAL	211704		252136			
ANNUAL MEAN	580		691		372[a]	
HIGHEST ANNUAL MEAN					1307	1986
LOWEST ANNUAL MEAN					45.4	1940
HIGHEST DAILY MEAN	1720	Apr 3	2610	May 17	13400	Apr 6 1997
LOWEST DAILY MEAN	150	Jan 15	159	Oct 1	.00	Jan 4 1940
ANNUAL SEVEN-DAY MINIMUM	157	Jan 12	200	Jan 21	.00	Jan 4 1940
INSTANTANEOUS PEAK FLOW			2700	May 17	14400	Apr 6 1997
INSTANTANEOUS PEAK STAGE			5.72	May 17	18.03[b]	Apr 6 1997
INSTANTANEOUS LOW FLOW			155	Oct 1	.00[c]	Jan 4 1940
ANNUAL RUNOFF (AC-FT)	419900		500100		269400	
ANNUAL RUNOFF (CFSM)	.31		.37		.20	
ANNUAL RUNOFF (INCHES)	4.19		4.99		2.69	
10 PERCENT EXCEEDS	1040		1300		995	
50 PERCENT EXCEEDS	542		599		140	
90 PERCENT EXCEEDS	180		227		16	

a Median of annual mean discharges is 300 ft^3/s.
b From highwater mark.
c Many days in 1940.



05311000 MINNESOTA RIVER AT MONTEVIDEO, MN

LOCATION.--Lat 44°56'00", long 95°44'00", in NW¼NW¼ sec. 19, T.117 N., R.40 W., Yellow Medicine County, Hydrologic Unit 07020004, on right bank 10 ft upstream from bridge on U.S. Highway 212, at Montevideo, and 490 ft downstream from Chippewa River.

DRAINAGE AREA.--6,180 mi^2 (approximately).

PERIOD OF RECORD.--July 1909 to September 1917, October 1917 to September 1929 (no winter records), October 1929 to current year. Prior to October 1939, published as "near Montevideo." Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WSP 1035: 1919(M). WSP 1085: 1935-36. WSP 1508: 1912, 1925(M), 1929(M).

GAGE.--Water-stage recorder. Datum of gage is 909.12 ft above sea level. July 22, 1909 to Feb. 4, 1932, nonrecording gage at bridge 500 ft downstream at present datum. Feb. 5, 1932 to Nov. 26, 1934, nonrecording gage at bridge at present datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair to poor. Flow regulated by Big Stone Lake since Apr.17, 1937, Lac qui Parle since Jan. 1938, and Marsh Lake since Nov. 1, 1939.

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	124	1030	1750	e730	e480	1100	2410	2010	3190	1710	1720	1070
2	141	921	1740	e710	e460	1110	2600	1920	3170	1560	1890	894
3	162	889	1740	e690	e460	1230	2580	1900	3150	1550	1820	756
4	176	884	1730	e660	e500	1260	2510	1860	3070	1510	1730	744
5	184	887	1740	e630	e510	1260	2480	1890	2820	1490	1690	742
6	217	888	1740	e610	e525	1260	2420	1960	2600	1470	1460	761
7	574	886	1730	e590	e535	1260	2540	2270	2280	1410	1120	927
8	755	889	1710	e520	e540	1260	2590	2610	1910	1420	1060	874
9	812	894	1590	e510	e545	1260	2650	2730	1910	1470	1100	845
10	728	964	1450	e500	e570	1300	2840	2770	1900	1990	1150	795
11	700	1070	1400	e500	e680	1370	2990	2870	2390	2090	1590	789
12	656	920	1350	e500	e770	1390	3100	2950	2830	2000	1950	786
13	636	934	1350	e480	e840	1450	3140	2990	2900	1490	1970	788
14	499	1030	1350	e480	e840	1450	3160	3050	2880	970	1610	792
15	369	1050	1420	e470	e830	1450	3220	3130	2590	873	1510	790
16	339	1070	1540	e455	e820	1470	3260	3240	2470	984	1440	789
17	364	e1260	1660	e440	e820	1510	3320	3380	2420	1050	1060	783
18	547	e1380	1440	e430	e820	1500	3340	3560	2390	1070	915	778
19	578	e1500	1060	e430	e820	1510	3340	3580	2350	1100	844	788
20	589	1580	e1020	e428	e820	1580	3290	3520	2320	1250	718	768
21	644	1650	e990	e428	e820	1610	3220	3460	2300	1190	761	726
22	674	1650	e920	e428	e820	1690	3140	3410	2160	1180	777	718
23	847	1620	e860	e430	e830	1870	2980	3380	2020	1230	799	711
24	940	1630	e820	e430	840	2120	2580	3350	1980	1490	933	709
25	951	1730	e785	e430	909	2160	2420	3310	2070	1550	947	511
26	949	1760	e775	e450	973	2120	2380	3280	2070	1520	942	420
27	960	1750	e760	e540	1070	1770	2470	3260	2050	1200	891	405
28	1020	1750	e800	e590	1090	1740	2550	3240	2040	1040	889	402
29	1040	1750	e795	e600	---	1890	2540	3230	1910	1100	881	398
30	1030	1760	e760	e560	---	2130	2380	3210	1950	1270	931	401
31	1040	---	e740	e500	---	2200	---	3200	---	1200	1140	---
TOTAL	19245	37976	39515	16149	20537	48280	84440	90520	72090	42427	38238	21660
MEAN	621	1266	1275	521	733	1557	2815	2920	2403	1369	1233	722
MAX	1040	1760	1750	730	1090	2200	3340	3580	3190	2090	1970	1070
MIN	124	884	740	428	460	1100	2380	1860	1900	873	718	398
AC-FT	38170	75330	78380	32030	40740	95760	167500	179500	143000	84150	75850	42960
CFSM	.10	.20	.21	.08	.12	.25	.46	.47	.39	.22	.20	.12
IN.	.12	.23	.24	.10	.12	.29	.51	.54	.43	.26	.23	.13

e Estimated

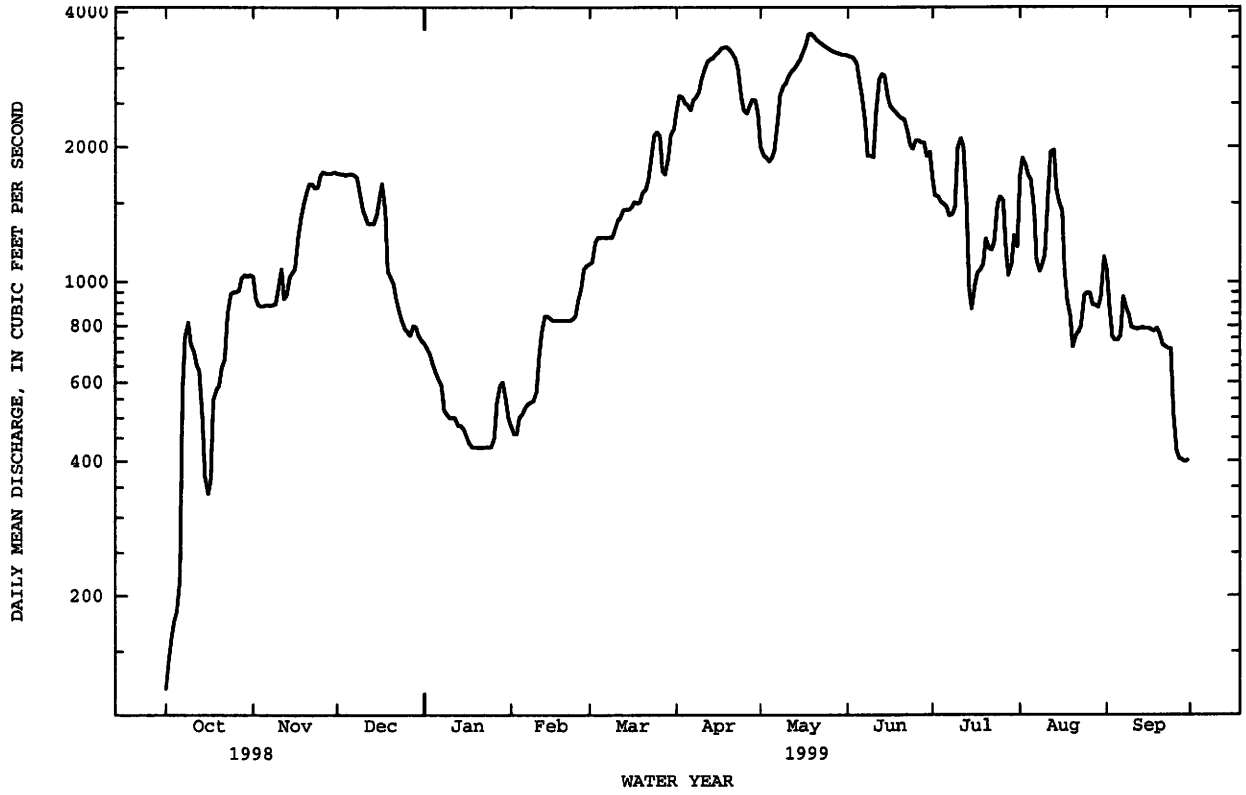
05311000 MINNESOTA RIVER AT MONTEVIDEO, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	364	384	288	185	208	949	2835	1603	1321	1141	593	348
MAX	3675	3797	2052	962	909	5363	22320	7315	5088	7853	7084	2613
(WY)	1996	1996	1996	1996	1996	1994	1997	1986	1984	1993	1993	1986
MIN	.76	1.61	2.35	1.57	1.06	5.06	7.82	3.13	1.40	1.89	.60	.57
(WY)	1934	1935	1935	1934	1937	1934	1934	1934	1934	1933	1933	1933

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1909 - 1999	
ANNUAL TOTAL	570300		531077			
ANNUAL MEAN	1562		1455		899[a]	
HIGHEST ANNUAL MEAN					3166	1997
LOWEST ANNUAL MEAN					4.43	1934
HIGHEST DAILY MEAN	8010	Apr 14	3580	May 19	46800	Apr 7 1997
LOWEST DAILY MEAN	116	Sep 24	124	Oct 1	.00[b]	Aug 14 1933
ANNUAL SEVEN-DAY MINIMUM	119	Sep 23	225	Oct 1	.00	Jul 5 1934
INSTANTANEOUS PEAK FLOW			3610	May 18	47500	Apr 6 1997
INSTANTANEOUS PEAK STAGE			11.72	May 18	23.90	Apr 6 1997
ANNUAL RUNOFF (AC-FT)	1131000		1053000		651400	
ANNUAL RUNOFF (CFSM)	.25		.24		.15	
ANNUAL RUNOFF (INCHES)	3.43		3.20		1.98	
10 PERCENT EXCEEDS	3260		2960		2220	
50 PERCENT EXCEEDS	1240		1230		256	
90 PERCENT EXCEEDS	355		500		36	

a Median of annual mean discharges is 656 ft^3/s
b Many days in 1933, 34, and 36.



05313500 YELLOW MEDICINE RIVER NEAR GRANITE FALLS, MN

LOCATION.--Lat 44°43'18", long 95°31'07", in SW¼ sec. 35, T.115 N., R.39 W., Yellow Medicine County, Hydrologic Unit 07020004, on right bank 50 ft downstream from highway bridge, 6 mi upstream from mouth, and 8 mi south of town of Granite Falls.

DRAINAGE AREA.--664 mi^2.

PERIOD OF RECORD.--March 1931 to September 1935 (no winter records), October 1935 to September 1938, October 1939 to current year. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WSP 1508: 1931, 1934(M), 1937(M), 1946(M), 1950(M).

GAGE.--Water-stage recorder. Datum of gage is 960.64 ft above sea level. Mar. 16, 1931 to June 13, 1938, nonrecording gage, on bridge 50 ft upstream at present datum. Oct. 12, 1939 to Nov. 30, 1952, nonrecording gage 500 ft downstream at present datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair to poor.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in June 1919 reached a stage of 17.5 ft, from information by local residents, discharge, 25,200 ft^3/s.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 260 ft^3/s (revised) and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Dec 1	1800	292	3.51	May 10	0500	527	3.95
Mar 19	1200	472	3.84	Jun 11	1400	936	4.67
Apr 13	0700	*949	*4.70	Jun 24	2200	674	4.21

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	4.2	40	270	e26	e23	e118	182	309	162	220	23	11
2	4.0	46	275	e25	e24	e122	176	290	154	206	22	13
3	4.4	40	247	e24	e24	e123	169	277	150	189	20	15
4	6.0	35	226	e24	e24	e124	169	270	145	179	19	14
5	13	32	212	e24	e24	e125	175	273	138	211	18	12
6	16	27	195	e24	e25	e122	202	282	129	229	17	11
7	17	26	186	e23	e25	e116	252	338	127	192	16	6.9
8	21	25	179	e23	e26	e106	377	423	201	161	15	7.3
9	18	25	166	e23	e28	e101	492	502	332	134	16	7.4
10	14	34	139	e22	e31	e99	587	522	601	113	15	7.4
11	12	23	130	e22	e36	e98	839	502	900	98	13	8.6
12	8.5	21	139	e22	e41	e98	885	462	841	85	14	8.7
13	7.9	26	142	e22	e42	e98	940	432	634	73	13	6.9
14	9.4	25	117	e22	e43	e100	856	406	481	64	12	7.4
15	8.8	21	119	e22	e45	e105	752	389	403	54	12	6.8
16	9.5	25	112	e22	e56	e125	691	368	350	54	11	5.2
17	17	32	105	e23	e98	e170	638	356	315	52	11	4.9
18	15	33	103	e23	e105	243	580	344	289	59	11	5.1
19	16	36	81	e23	e100	413	527	330	275	56	12	9.6
20	24	29	36	e23	e90	393	485	318	266	50	8.6	7.4
21	22	34	e34	e23	e83	356	449	303	266	51	7.4	7.4
22	20	109	e33	e23	e80	341	411	291	260	49	5.5	7.2
23	21	140	e32	e23	e77	323	385	305	293	52	12	6.2
24	21	133	e31	e23	e76	283	365	289	527	49	13	7.3
25	18	168	e30	e23	e76	231	346	272	562	45	10	8.7
26	17	206	e29	e23	e80	196	325	260	404	41	7.8	7.5
27	17	250	e29	e23	e88	183	313	242	332	39	6.5	8.5
28	17	268	e29	e23	e110	195	311	227	293	35	6.5	6.8
29	17	267	e29	e23	---	188	323	211	265	31	5.9	5.8
30	22	258	e28	e23	---	184	323	190	251	29	9.3	5.0
31	27	---	e27	e23	---	188	---	173	---	25	11	---
TOTAL	464.7	2434	3510	715	1580	5667	13525	10156	10346	2925	393.5	246.0
MEAN	15.0	81.1	113	23.1	56.4	183	451	328	345	94.4	12.7	8.20
MAX	27	268	275	26	110	413	940	522	900	229	23	15
MIN	4.0	21	27	22	23	98	169	173	127	25	5.5	4.9
AC-FT	922	4830	6960	1420	3130	11240	26830	20140	20520	5800	781	488
CFSM	.02	.12	.17	.03	.08	.28	.68	.49	.52	.14	.02	.01
IN.	.03	.14	.20	.04	.09	.32	.76	.57	.58	.16	.02	.01

e Estimated

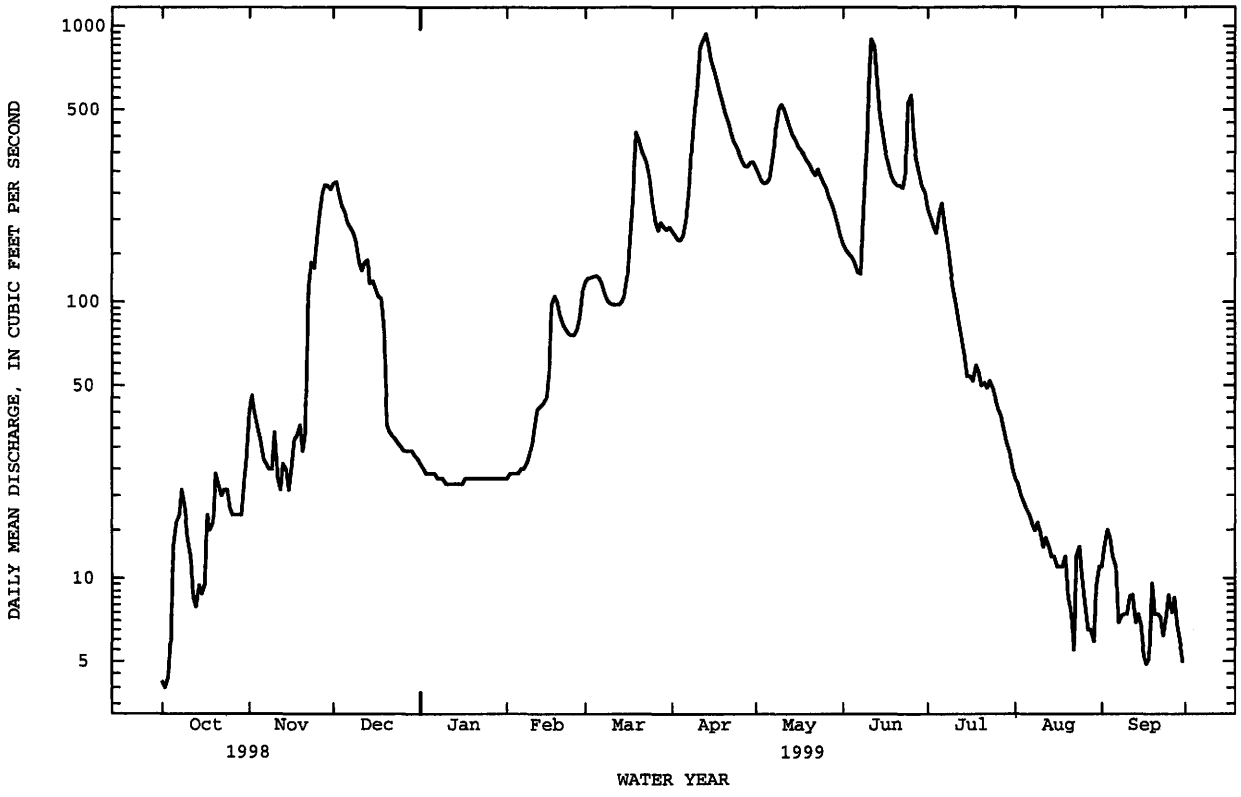
05313500 YELLOW MEDICINE RIVER NEAR GRANITE FALLS, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	43.8	47.2	30.0	13.9	19.5	227	504	204	278	139	69.3	42.5
MAX	561	392	256	88.3	149	933	3302	1087	2484	1600	510	1005
(WY)	1996	1996	1996	1996	1998	1986	1969	1944	1984	1993	1953	1986
MIN	1.41	1.60	1.39	.90	.12	3.67	2.58	1.18	1.18	.34	.38	.47
(WY)	1937	1938	1936	1948	1959	1975	1934	1934	1934	1933	1934	1976

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1931 - 1999	
ANNUAL TOTAL	58922.7		51962.2			
ANNUAL MEAN	161		142		144[a]	
HIGHEST ANNUAL MEAN					566	1993
LOWEST ANNUAL MEAN					8.32	1959
HIGHEST DAILY MEAN	1640	Apr 10	940	Apr 13	16400	Apr 10 1969
LOWEST DAILY MEAN	3.3	Sep 22	4.0	Oct 2	.00[b]	Jul 26 1931
ANNUAL SEVEN-DAY MINIMUM	3.5	Sep 21	6.4	Sep 12	.00	Jan 21 1948
INSTANTANEOUS PEAK FLOW			949	Apr 13	17200	Apr 10 1969
INSTANTANEOUS PEAK STAGE			4.70	Apr 13	14.90	Apr 10 1969
INSTANTANEOUS LOW FLOW			3.9	Oct 1	.00[b]	Jul 26 1931
ANNUAL RUNOFF (AC-FT)	116900		103100		104200	
ANNUAL RUNOFF (CFSM)	.24		.21		.22	
ANNUAL RUNOFF (INCHES)	3.30		2.91		2.94	
10 PERCENT EXCEEDS	371		366		319	
50 PERCENT EXCEEDS	40		52		20	
90 PERCENT EXCEEDS	8.6		8.8		2.4	

a Median of annual mean discharges is 87 ft^3/s.
b Many days, several years.



05315000 REDWOOD RIVER NEAR MARSHALL, MN

LOCATION.--Lat 44°25'49", long 95°50'43", in SE¼SW¼ sec. 12, T.111 N., R.42 W., Lyon County, Hydrologic Unit 07020006, on right bank 2.0 mi upstream from Redwood River diversion structure on southwest edge of town of Marshall, MN. Prior to Apr. 10, 1980, at site 5 mi downstream.

DRAINAGE AREA.--259 mi^2.

PERIOD OF RECORD.--March 1940 to current year. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WDR MN-89-2: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,188.23 ft above sea level. March 1940 to April 9, 1980, nonrecording gage 5.0 mi downstream from present site at datum 43.35 ft lower (crest-stage gage added June 12, 1968). Since March 1964, nonrecording gage and crest-stage gage on diversion channel 1.5 mi downstream at datum 1,100.00 ft above sea level.

REMARKS.--Records fair except those for estimated daily discharges which are poor. Water diverted at medium and high stages into diversion channel 2.0 mi below station. Diversion began Mar. 18, 1964. Unknown amount of natural diversion into Cottonwood River basin occurs at extremely high stages 0.8 mi below 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	9.6	e82	262	e46	e27	e82	114	247	114	e107	52	21
2	12	e81	231	e43	e28	e81	116	237	114	e102	49	19
3	16	e78	211	e40	e28	e79	116	228	113	e100	46	16
4	26	e75	195	e38	e29	e75	122	221	107	e150	43	20
5	38	e72	193	e36	e31	e74	125	228	106	e225	38	19
6	38	e70	189	e34	e32	e73	151	245	104	e200	33	17
7	34	e68	179	e32	e34	e72	213	271	97	e172	30	15
8	30	e67	162	e31	e37	e72	245	288	93	160	27	12
9	26	e68	147	e30	e40	e72	561	278	105	151	24	11
10	25	e73	136	e30	e43	e71	739	259	437	141	21	12
11	27	e81	e130	e29	e48	e69	770	254	e490	133	19	11
12	26	e80	123	e29	e52	e68	789	245	e390	123	17	10
13	26	80	116	e29	e54	e70	627	228	e340	114	15	9.5
14	e27	79	111	e28	e55	e76	540	215	304	112	15	9.4
15	e27	86	107	e28	e55	83	496	208	263	103	14	9.4
16	e32	99	102	e28	e58	118	452	205	e240	102	13	9.4
17	e39	112	100	e28	e61	244	408	202	e220	97	12	9.2
18	e53	123	94	e27	e64	225	384	188	e200	94	12	10
19	e71	e135	e65	e27	e64	166	356	171	e178	94	11	14
20	e69	e155	e60	e27	e64	167	327	170	e162	97	11	11
21	e62	e175	e57	e27	e64	168	307	177	e148	97	10	9.3
22	59	197	e56	e27	e64	160	296	169	134	97	9.9	9.3
23	55	243	e58	e27	e65	147	285	165	144	98	9.9	8.0
24	53	281	e59	e27	e68	135	269	155	153	92	9.8	7.7
25	51	309	e60	e27	e72	125	255	149	143	86	9.7	e7.8
26	49	320	e61	e27	e75	116	249	144	120	80	9.4	e7.9
27	e51	302	e62	e27	e79	110	267	138	e125	74	9.0	e7.6
28	e57	282	e61	e27	e81	121	289	131	e123	70	8.8	e7.4
29	e62	275	e57	e27	---	124	276	120	e118	65	8.8	e7.2
30	e66	283	e54	e27	---	119	258	115	e110	60	16	e7.0
31	e72	---	e52	e27	---	118	---	113	---	56	23	---
TOTAL	1288.6	4431	3550	937	1472	3480	10402	6164	5495	3452	626.3	344.1
MEAN	41.6	148	115	30.2	52.6	112	347	199	183	111	20.2	11.5
MAX	72	320	262	46	81	244	789	288	490	225	52	21
MIN	9.6	67	52	27	27	68	114	113	93	56	8.8	7.0
AC-FT	2560	8790	7040	1860	2920	6900	20630	12230	10900	6850	1240	683
CFSM	.16	.57	.44	.12	.20	.43	1.34	.77	.71	.43	.08	.04
IN.	.19	.64	.51	.13	.21	.50	1.49	.89	.79	.50	.09	.05

e Estimated

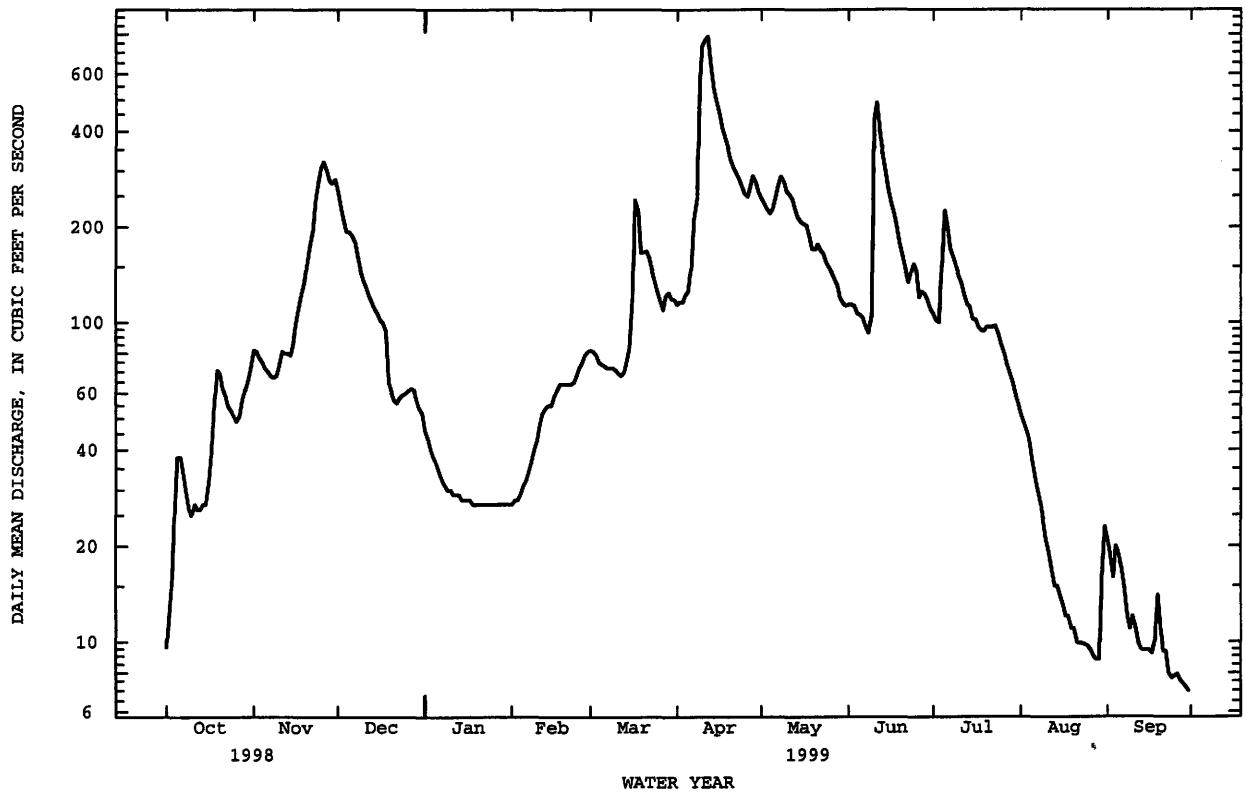
05315000 REDWOOD RIVER NEAR MARSHALL, MN--Continued

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

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	28.3	28.0	16.1	8.96	16.3	125	233	123	118	70.1	34.6	26.1
MAX	310	202	115	59.4	101	571	1152	1205	936	1161	610	292
(WY)	1996	1996	1999	1994	1983	1983	1969	1993	1993	1993	1993	1986
MIN	.029	.58	.87	.000	.090	2.70	7.36	3.90	.83	.058	.042	.007
(WY)	1977	1977	1977	1977	1979	1965	1990	1981	1976	1976	1941	1941

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1940 - 1999	
ANNUAL TOTAL	28897.2		41642.0			
ANNUAL MEAN	79.2		114		69.5[a]	
HIGHEST ANNUAL MEAN					421	1993
LOWEST ANNUAL MEAN					5.13	1981
HIGHEST DAILY MEAN	575	Apr 8	789	Apr 12	5300	May 9 1993
LOWEST DAILY MEAN	7.0	Sep 21	7.0[b]	Sep 30	.00[c]	Jul 28 1940
ANNUAL SEVEN-DAY MINIMUM	7.8	Sep 17	7.5	Sep 24	.00	Jul 28 1940
INSTANTANEOUS PEAK FLOW			855	Apr 12	6380	May 9 1993
INSTANTANEOUS PEAK STAGE			12.54	Apr 12	17.00	May 9 1993
INSTANTANEOUS LOW FLOW					.00[c]	Jul 28 1940
ANNUAL RUNOFF (AC-FT)	57320		82600		50360	
ANNUAL RUNOFF (CFSM)	.31		.44		.27	
ANNUAL RUNOFF (INCHES)	4.15		5.98		3.65	
10 PERCENT EXCEEDS	199		260		163	
50 PERCENT EXCEEDS	39		75		13	
90 PERCENT EXCEEDS	11		12		1.9	

a Median of annual mean discharges is 44 ft^3/s.
b Estimated daily discharge.
c Many days, several years.



05316500 REDWOOD RIVER NEAR REDWOOD FALLS, MN

LOCATION.--Lat 44°31'25", long 95°10'20", in SE¼NE¼ sec. 9, T.112 N., R.36 W., Redwood County, Hydrologic Unit 07020006, on right bank 4 ft upstream from highway bridge, 3 mi west of town of Redwood Falls, and 8.5 mi upstream from mouth.

DRAINAGE AREA.--629 mi^2.

PERIOD OF RECORD.--July 1909 to September 1914 (no winter records except 1911-12). August 1930 to September 1935 (no winter records), October 1935 to current year.

REVISED RECORDS.--WDR MN-89-2: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 972.33 ft above sea level. July 1909 to September 1914, nonrecording gage at bridge 20 ft downstream at datum 0.22 ft lower. August 1930 to Oct. 25, 1949, nonrecording gage, at bridge 20 ft downstream at present datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair to poor. Natural discharge affected by unknown amount of interbasin flow between Yellow Medicine, Redwood, and Cottonwood River basins during extreme floods.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 400 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Nov 27	1400	460	3.22	May 8	1500	766	3.83
Mar 20	2400	479	3.26	Jun 13	1300	672	3.63
Apr 12	1500	*1,100	4.48				

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	e25	106	404	e94	e48	e138	227	422	256	273	66	84
2	22	105	e390	e89	e49	e139	223	392	257	267	61	57
3	22	98	e365	e80	e51	e140	218	377	247	260	58	45
4	25	92	337	e73	e54	e141	219	360	238	249	55	42
5	36	88	325	e68	e57	e142	216	383	227	294	52	40
6	90	85	314	e63	e62	e142	243	479	220	337	49	46
7	65	84	303	e58	e66	e142	305	689	209	292	47	37
8	54	84	292	e54	e71	e143	365	757	197	247	43	34
9	48	84	277	e53	e78	e144	640	741	210	221	51	30
10	41	e90	261	e52	e87	e144	854	706	237	201	44	27
11	38	e100	247	e51	e93	e147	1000	675	388	186	40	25
12	34	e108	232	e50	e96	e151	1100	646	610	169	36	25
13	31	118	216	e51	e96	e158	1100	609	662	156	34	24
14	30	126	221	e51	e97	e170	1100	562	639	146	31	23
15	31	118	213	e50	e99	e181	1090	529	570	136	29	22
16	34	132	208	e50	e102	e196	1020	511	495	131	28	22
17	47	149	201	e49	e106	e220	925	493	450	126	27	20
18	70	176	199	e48	e111	e295	839	470	415	119	26	19
19	59	228	e184	e48	e113	e360	772	439	399	117	25	22
20	66	268	e170	e48	e112	e360	716	417	390	118	25	22
21	79	296	e157	e47	e111	352	667	436	378	120	25	30
22	74	347	e148	e47	e110	321	622	464	369	120	24	26
23	66	342	e142	e47	e110	297	581	457	348	121	30	24
24	60	349	e136	e47	e112	276	538	425	345	114	24	22
25	56	400	e128	e47	e116	252	502	392	388	109	23	20
26	55	434	e122	e47	e122	233	473	361	385	100	21	19
27	65	455	e120	e47	e130	225	453	334	333	92	21	18
28	67	454	e118	e47	e138	230	447	319	289	87	21	18
29	69	439	e113	e47	---	237	461	301	292	81	19	17
30	78	414	e105	e47	---	241	457	282	283	76	28	17
31	86	---	e96	e47	---	237	---	267	---	71	50	---
TOTAL	1623	6369	6744	1697	2597	6554	18373	14695	10726	5136	1113	877
MEAN	52.4	212	218	54.7	92.8	211	612	474	358	166	35.9	29.2
MAX	90	455	404	94	138	360	1100	757	662	337	66	84
MIN	22	84	96	47	48	138	216	267	197	71	19	17
AC-FT	3220	12630	13380	3370	5150	13000	36440	29150	21280	10190	2210	1740
CFSM	.08	.34	.35	.09	.15	.34	.97	.75	.57	.26	.06	.05
IN.	.10	.38	.40	.10	.15	.39	1.09	.87	.63	.30	.07	.05

e Estimated

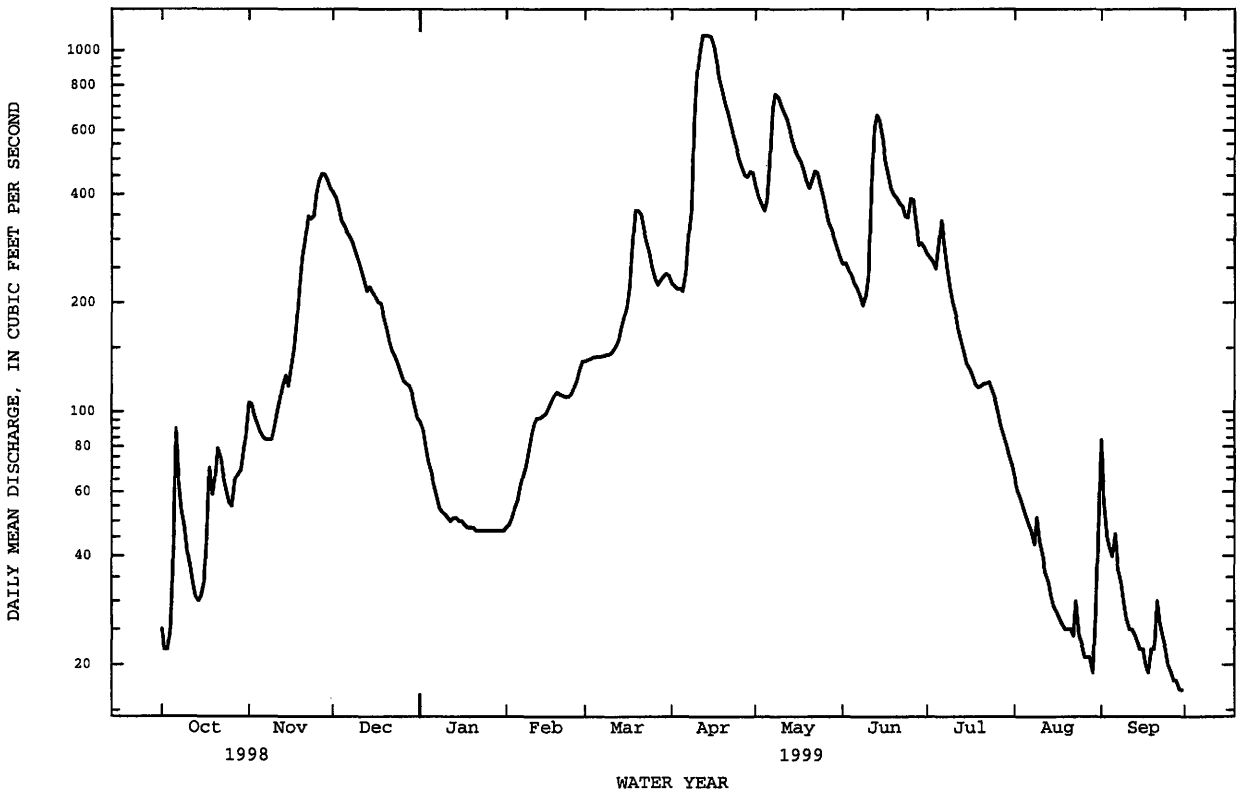
05316500 REDWOOD RIVER NEAR REDWOOD FALLS, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	57.2	61.8	37.3	17.6	23.7	244	442	223	259	148	78.6	51.5
MAX	509	541	245	104	167	1289	2880	1530	2724	1994	934	673
(WY)	1996	1980	1983	1994	1983	1983	1969	1993	1993	1993	1993	1986
MIN	.84	.96	.46	.19	.20	1.54	14.6	2.75	1.01	.44	.51	.31
(WY)	1937	1936	1936	1940	1937	1965	1934	1934	1934	1934	1934	1976

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1909 - 1999	
ANNUAL TOTAL	66694		76504			
ANNUAL MEAN	183		210		151[a]	
HIGHEST ANNUAL MEAN					789	1993
LOWEST ANNUAL MEAN					10.8	1959
HIGHEST DAILY MEAN	1420	Apr 2	1100[d]	Apr 12	13200	Apr 9 1969
LOWEST DAILY MEAN	13	Sep 21	17	Sep 29	.00[b]	Jan 17 1940
ANNUAL SEVEN-DAY MINIMUM	14	Sep 18	19	Sep 24	.01	Jan 25 1940
INSTANTANEOUS PEAK FLOW			1100	Apr 12	19700	Jun 18 1957
INSTANTANEOUS PEAK STAGE			5.69[d]	Jan 16	18.01[d]	Mar 29 1997
INSTANTANEOUS LOW FLOW			17	Sep 28	.00[b]	Jan 17 1940
ANNUAL RUNOFF (AC-FT)	132300		151700		109500	
ANNUAL RUNOFF (CFSM)	.29		.33		.24	
ANNUAL RUNOFF (INCHES)	3.94		4.52		3.27	
10 PERCENT EXCEEDS	402		466		328	
50 PERCENT EXCEEDS	92		122		29	
90 PERCENT EXCEEDS	28		28		2.2	

a Median of annual mean discharges is 100 ft^3/s.
b Many days in 1940 and 1959.
c Gage height 4.48 ft.
d Backwater from ice.



05317000 COTTONWOOD RIVER NEAR NEW ULM, MN

LOCATION.--Lat 44°17'29", long 94°26'24", in SW¼NE¼ sec. 33, T.110 N., R.30 W., Brown County, Hydrologic Unit 07020008, on left bank 600 ft upstream from highway bridge, 1.8 mi south of New Ulm, and 3.2 mi upstream from mouth.

DRAINAGE AREA.--1,300 mi^2.

PERIOD OF RECORD.--July 1909 to December 1913, March 1931 to March 1938, August 1938 to current year (winter records incomplete prior to 1936).

REVISED RECORDS.--WSP 355: 1912.

GAGE.--Water-stage recorder. Datum of gage is 796.83 ft above sea level. July 1, 1909 to Dec. 13, 1913, nonrecording gage at site 2.7 mi upstream at different datum. Mar. 15, 1931 to Mar. 31, 1938, nonrecording gage 2.2 mi upstream at datum 11.41 ft higher. Aug. 23, 1938 to June 25, 1948, nonrecording gage at present site and datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,100 ft^3/s (revised) and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Apr 12	2100	*2,900	*9.51	Jun 11	0900	1,460	7.23
May 9	1800	1,510	7.33	Jul 3	1600	1,230	6.78
May 23	0400	1,390	7.10	Jul 8	0800	1,190	6.70

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	63	222	489	e108	e101	e238	483	821	700	643	174	57
2	53	214	476	e108	e104	e250	474	790	674	594	155	54
3	52	202	463	e106	e107	e260	459	762	659	916	140	58
4	52	190	448	e103	e110	e270	446	745	651	1160	126	71
5	65	180	440	e101	e111	e280	447	751	641	1150	114	70
6	64	169	426	e99	e111	e280	459	796	628	1020	105	62
7	60	162	409	e99	e110	e280	464	920	594	827	98	57
8	77	157	395	e98	e110	e280	569	1180	559	835	93	54
9	127	164	383	e97	e115	e280	887	1480	546	686	227	54
10	115	251	368	e96	e120	e278	1740	1480	651	582	181	55
11	101	332	e348	e95	e130	e278	2620	1400	1360	508	150	54
12	92	443	e340	e94	e145	e277	2820	1310	1150	450	134	50
13	82	453	e350	e93	e150	e280	2830	1210	992	404	117	47
14	83	520	e368	e92	e152	e290	2550	1130	840	365	104	44
15	88	562	370	e92	e154	e310	2280	1070	729	336	96	44
16	97	546	354	e92	e156	e370	2010	1030	657	315	89	46
17	121	564	347	e93	e160	e500	1780	1040	606	276	82	48
18	121	593	336	e96	e170	e660	1630	998	571	285	79	45
19	118	605	268	e95	e182	e850	1520	953	575	279	74	46
20	123	606	156	e93	e185	e880	1410	963	559	332	70	44
21	132	678	139	e91	e188	e860	1310	977	584	435	71	41
22	139	708	e110	e91	e189	e750	1230	1250	602	517	69	40
23	131	676	e92	e93	e190	677	1150	1360	598	521	75	43
24	121	628	e94	e94	e191	595	1090	1250	567	476	71	42
25	120	605	e98	e96	e196	536	1020	1130	525	428	69	39
26	113	599	e103	e97	e205	496	971	1030	503	378	66	35
27	161	582	e107	e97	e215	475	936	945	809	339	62	34
28	184	560	e110	e98	e228	470	902	878	731	312	89	33
29	240	533	e112	e98	---	466	872	822	691	263	106	32
30	241	509	e114	e99	---	469	853	770	678	229	67	31
31	231	---	e111	e99	---	479	---	724	---	201	62	---
TOTAL	3567	13213	8724	3003	4285	13664	38212	31965	20630	16062	3215	1430
MEAN	115	440	281	96.9	153	441	1274	1031	688	518	104	47.7
MAX	241	708	489	108	228	880	2830	1480	1360	1160	227	71
MIN	52	157	92	91	101	238	446	724	503	201	62	31
AC-FT	7080	26210	17300	5960	8500	27100	75790	63400	40920	31860	6380	2840
CFSM	.09	.34	.22	.07	.12	.34	.98	.79	.53	.40	.08	.04
IN.	.10	.38	.25	.09	.12	.39	1.09	.91	.59	.46	.09	.04

e Estimated

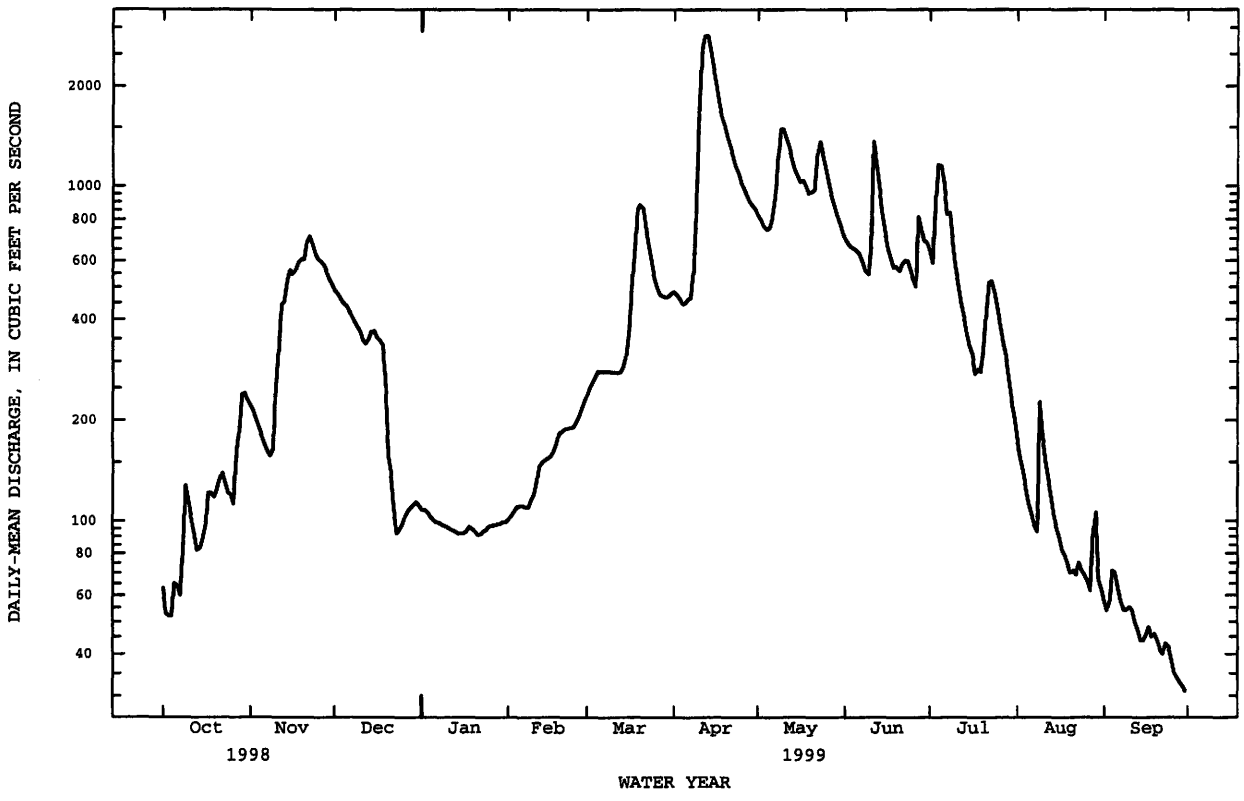
05317000 COTTONWOOD RIVER NEAR NEW ULM, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	177	163	109	57.2	101	664	1026	582	617	367	191	153
MAX	3208	1099	572	282	628	3350	7075	3497	5831	3815	1791	2438
(WY)	1969	1980	1980	1992	1983	1997	1969	1993	1993	1993	1993	1986
MIN	4.57	7.97	5.77	1.61	1.47	13.9	40.0	7.57	8.58	4.37	1.05	3.28
(WY)	1934	1940	1936	1940	1940	1965	1959	1934	1911	1934	1934	1933

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1909 - 1999	
ANNUAL TOTAL	179445		157970			
ANNUAL MEAN	492		433		378[a]	
HIGHEST ANNUAL MEAN					1796	1993
LOWEST ANNUAL MEAN					41.1	1940
HIGHEST DAILY MEAN	5920	Apr 2	2830	Apr 13	27100	Apr 9 1969
LOWEST DAILY MEAN	52	Oct 3	31	Sep 30	.60	Aug 1 1934
ANNUAL SEVEN-DAY MINIMUM	58	Oct 1	35	Sep 24	.64	Feb 1 1940
INSTANTANEOUS PEAK FLOW			2900	Apr 12	28700	Apr 10 1969
INSTANTANEOUS PEAK STAGE			9.51	Apr 12	20.86	Apr 8 1965
INSTANTANEOUS LOW FLOW			29	Sep 30	.50	Nov 27 1952
ANNUAL RUNOFF (AC-FT)	355900		313300		273800	
ANNUAL RUNOFF (CFSM)	.38		.33		.29	
ANNUAL RUNOFF (INCHES)	5.13		4.52		3.95	
10 PERCENT EXCEEDS	859		1010		850	
50 PERCENT EXCEEDS	311		277		84	
90 PERCENT EXCEEDS	74		65		12	

a Median of annual mean discharges is 240 ft^3/s.



05317200 LITTLE COTTONWOOD RIVER NEAR COURTLAND, MN

LOCATION.--Lat 44°14'47", long 94°20'19", in SW¼NE¼ sec.17, T.109 N., R.29 W., Blue Earth County, Hydrologic Unit 07020007, on right bank 30 ft downstream from bridge on State Highway 68, 0.7 mi above mouth, 1.5 mi south of Courtland.

DRAINAGE AREA.--170 mi^2.

PERIOD OF RECORD.--October 1973 to current year. September 1969 to September 1973, operated as a low-flow station only.

GAGE.--Water-stage recorder. Datum of gage is 788.25 ft above sea level.

REMARKS.--Records good except those for estimated days, which are fair to poor.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 200 ft^3/s (revised) and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Apr 17	0300	347	5.33	Jul 3	2400	*548	*6.13
Jun 27	1700	394	5.48	Jul 8	0900	442	5.70

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	5.6	25	32	e11	e10	e36	57	100	81	155	41	14
2	5.5	23	31	e11	e11	e37	55	96	82	133	39	13
3	5.9	20	30	e11	e11	e38	54	93	80	414	36	12
4	6.1	19	29	e10	e12	e39	53	89	78	479	34	11
5	7.2	18	29	e10	e12	e40	54	90	76	338	31	10
6	7.3	17	29	e10	e12	e41	80	93	79	266	29	10
7	8.5	17	27	e10	e14	e42	85	100	74	235	28	10
8	7.2	17	25	e10	e16	e43	85	104	69	284	26	10
9	7.6	18	28	e9.8	e17	e44	216	108	66	205	40	9.8
10	6.9	31	26	e9.8	e17	e45	238	115	75	155	42	9.1
11	6.8	67	25	e9.8	e17	e47	291	123	119	125	38	8.6
12	6.9	68	26	e9.6	e16	e50	276	128	132	104	33	8.2
13	6.7	65	31	e9.4	e18	e54	250	130	115	89	29	7.6
14	7.0	57	29	e9.4	e20	e60	257	124	103	78	26	7.6
15	8.7	52	27	e9.4	e20	e75	272	119	93	69	25	7.6
16	9.2	49	28	e9.6	e21	e100	318	124	86	63	23	8.2
17	15	45	26	e9.9	e21	e123	334	166	81	56	22	7.8
18	18	43	26	e10	e21	92	285	159	77	56	20	6.7
19	15	43	14	e10	e21	100	242	141	80	70	20	6.4
20	14	30	e13	e10	e20	117	212	144	81	156	18	6.2
21	14	37	e12	e10	e20	110	190	169	80	191	18	5.7
22	13	44	e12	e10	e21	94	178	160	77	166	18	5.7
23	11	39	e12	e10	e22	87	166	150	75	140	19	5.3
24	11	37	e12	e9.8	e23	82	152	139	70	116	19	5.4
25	10	35	e12	e9.7	e25	73	140	128	66	96	17	5.0
26	11	34	e12	e9.6	e27	68	129	117	63	80	16	4.7
27	14	33	e12	e9.6	e30	64	123	108	295	70	16	4.5
28	18	35	e12	e9.6	e33	63	116	101	314	64	15	4.7
29	26	36	e11	e9.7	---	61	110	94	245	56	19	4.4
30	33	36	e11	e9.6	---	60	105	87	187	51	17	4.2
31	29	---	e11	e9.8	---	58	---	82	---	45	15	---
TOTAL	365.1	1090	660	307.1	528	2043	5123	3681	3199	4605	789	233.4
MEAN	11.8	36.3	21.3	9.91	18.9	65.9	171	119	107	149	25.5	7.78
MAX	33	68	32	11	33	123	334	169	314	479	42	14
MIN	5.5	17	11	9.4	10	36	53	82	63	45	15	4.2
AC-FT	724	2160	1310	609	1050	4050	10160	7300	6350	9130	1560	463
CFSM	.07	.21	.13	.06	.11	.39	1.00	.70	.63	.87	.15	.05
IN.	.08	.24	.14	.07	.12	.45	1.12	.81	.70	1.01	.17	.05

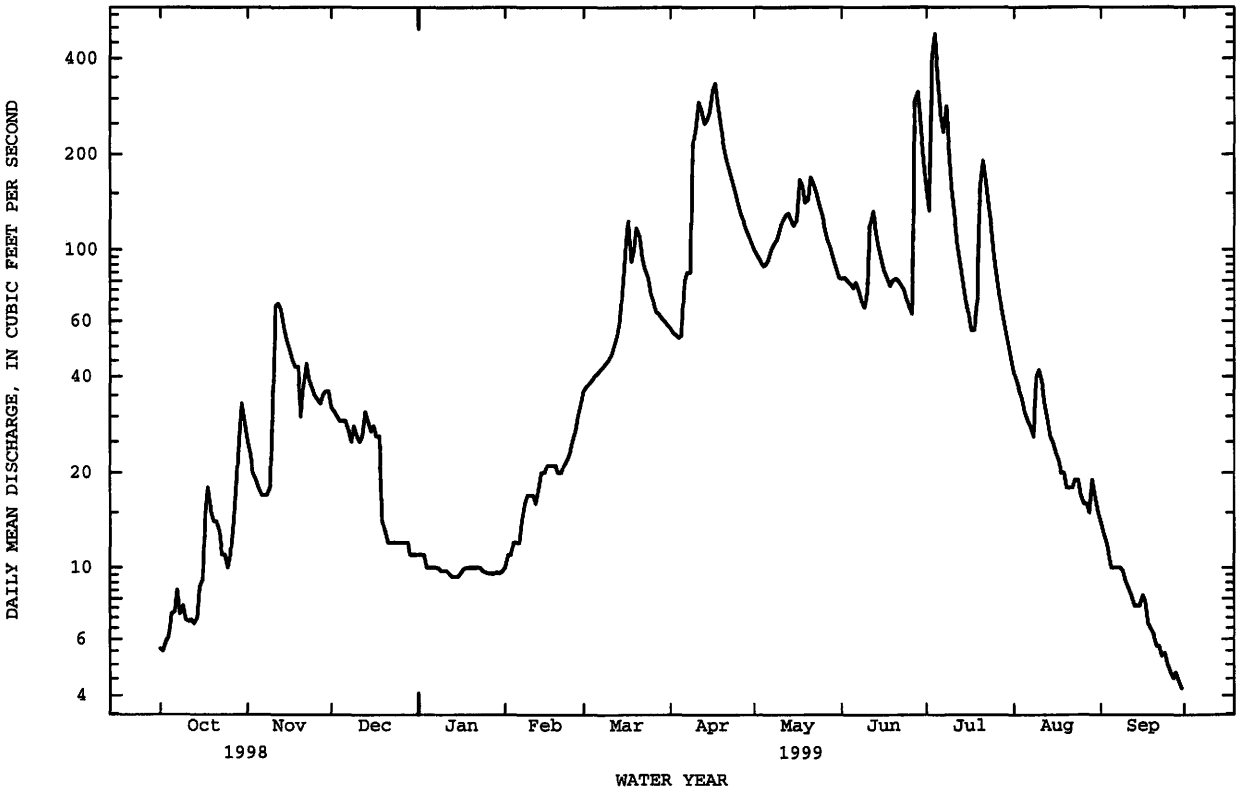
e Estimated

05317200 LITTLE COTTONWOOD RIVER NEAR COURTLAND, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1974 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	41.8	47.6	27.9	15.0	23.3	132	173	120	134	92.2	53.7	42.1
MAX	163	134	118	80.1	105	392	463	418	750	553	248	262
(WY)	1987	1983	1992	1992	1983	1997	1983	1993	1993	1993	1993	1986
MIN	.75	.70	.21	.15	.38	5.79	9.64	4.17	2.39	.63	.81	.54
(WY)	1976	1977	1977	1977	1977	1975	1990	1981	1976	1988	1976	1976

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1974 - 1999	
ANNUAL TOTAL	23804.7		22623.6			
ANNUAL MEAN	65.2		62.0		75.3	
HIGHEST ANNUAL MEAN					239	1993
LOWEST ANNUAL MEAN					9.18	1989
HIGHEST DAILY MEAN	811	Apr 2	479	Jul 4	2850	Jun 20 1993
LOWEST DAILY MEAN	3.1	Sep 17	4.2	Sep 30	.02	Sep 12 1977
ANNUAL SEVEN-DAY MINIMUM	3.4	Sep 12	4.7	Sep 24	.08	Sep 11 1977
INSTANTANEOUS PEAK FLOW			548	Jul 3	3520	Jun 20 1993
INSTANTANEOUS PEAK STAGE			6.13	Jul 3	10.45	Jun 20 1993
INSTANTANEOUS LOW FLOW			4.1	Sep 29	.01	Sep 17 1977
ANNUAL RUNOFF (AC-FT)	47220		44870		54530	
ANNUAL RUNOFF (CFSM)	.38		.36		.44	
ANNUAL RUNOFF (INCHES)	5.21		4.95		6.02	
10 PERCENT EXCEEDS	121		151		196	
50 PERCENT EXCEEDS	31		32		28	
90 PERCENT EXCEEDS	5.7		9.2		1.4	



05319500 WATONWAN RIVER NEAR GARDEN CITY, MN

LOCATION.--Lat 44°02'47", long 94°11'43", in SW¼NE¼ sec. 28, T.107 N., R.28 W., Blue Earth County, Hydrologic Unit 07020010, on left bank 25 ft downstream from bridge on County Highway 13, 1.5 miles west of Garden City, 7.3 mi upstream from mouth, and 9.2 mi downstream from Perch Creek.

DRAINAGE AREA.--851 mi^2.

PERIOD OF RECORD.--March 1940 to September 1945, September 1976 to current year. 1953, 1960, 1961, and 1969 (one or more discharge measurements each year).

REVISED RECORDS.--WDR MN-78-2: 1977. WRIR 97-4249: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 905.05 ft above sea level. Prior to September 30, 1945, nonrecording gage at site 200 ft upstream and at datum 0.17 ft higher.

REMARKS.--Records fair except those for the periods of estimated daily discharge, which are poor.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 7, 1965, reached a stage of 18.89 ft at datum 0.17 ft higher, from floodmarks, discharge, 19,000 ft^3/s.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,200 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Apr 13	0500	*2,670	*6.48	May 22	0200	1,330	4.26
Apr 17	2400	2,410	6.07	Jul 6	0900	2,410	6.08
Apr 21	1000	1,590	4.73	Jul 9	0500	1,370	4.35
Apr 24	1300	1,210	4.03				

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	29	e339	e178	e53	e47	e140	325	e812	569	1310	226	e53
2	27	e291	e172	e51	e48	e144	313	e730	559	1180	201	e46
3	28	e252	e172	e49	e50	e146	299	e660	553	1440	179	e43
4	30	e222	e169	e47	e50	e150	289	e632	537	2100	162	e39
5	34	e200	e165	e46	e50	e154	294	e588	527	2330	149	e41
6	37	e181	e153	e44	e51	e157	498	e592	515	2360	139	e45
7	37	e168	e143	e43	e54	e159	724	e648	510	2100	135	e40
8	35	e160	e133	e42	e56	e160	721	e696	486	1630	126	e37
9	29	e158	e125	e41	e58	e160	1120	e775	e450	1270	162	e34
10	25	e221	e124	e41	e60	e165	1850	e835	e477	1030	182	e32
11	24	e402	e117	e41	e62	e170	2330	e847	e722	851	152	e31
12	23	e519	e124	e42	e70	e175	2580	e857	1040	713	129	e31
13	20	e515	e125	e43	e78	e180	2630	e892	1080	615	110	e26
14	23	e479	e123	e43	e87	e190	2500	e855	977	530	107	e28
15	60	e443	e121	e45	e92	e200	2280	e793	856	465	96	e30
16	141	e398	e118	e46	e96	e250	2210	e761	741	389	e90	e30
17	239	e368	e114	e47	e99	405	2340	979	660	331	e82	e29
18	331	e337	e113	e48	e100	417	2340	1220	598	309	e79	e28
19	367	e319	e79	e48	e100	433	2120	e1170	e601	e349	e66	e25
20	e300	e290	e67	e49	e105	491	1830	e1130	e610	e583	e65	e24
21	e253	e247	e62	e49	e110	507	1550	e1230	e561	e837	e74	e22
22	e209	e265	e56	e50	e115	473	1380	1310	e543	875	e85	e24
23	e175	e262	e50	e49	e120	440	1300	1260	e525	783	e88	e22
24	e156	e240	e50	e48	e120	409	1220	1140	e499	666	e81	e22
25	e140	e224	e51	e48	e122	378	1120	1010	e463	571	e85	e20
26	e126	e219	e51	e47	e127	e338	1010	888	e392	492	e84	e19
27	e148	e207	e52	e47	e130	e316	970	790	e425	419	e74	e20
28	e258	e195	e53	e47	e134	e316	954	723	e824	368	e67	e22
29	e401	e193	e55	e46	---	335	906	671	1240	329	e74	e25
30	e432	e188	e56	e47	---	329	855	622	1350	299	e80	e26
31	e391	---	e55	e46	---	325	---	588	---	264	e64	---
TOTAL	4528	8502	3226	1433	2391	8612	40858	26704	19890	27788	3493	914
MEAN	146	283	104	46.2	85.4	278	1362	861	663	896	113	30.5
MAX	432	519	178	53	134	507	2630	1310	1350	2360	226	53
MIN	20	158	50	41	47	140	289	588	392	264	64	19
AC-FT	8980	16860	6400	2840	4740	17080	81040	52970	39450	55120	6930	1810
CFSM	.17	.33	.12	.05	.10	.33	1.60	1.01	.78	1.05	.13	.04
IN.	.20	.37	.14	.06	.10	.38	1.79	1.17	.87	1.21	.15	.04

e Estimated

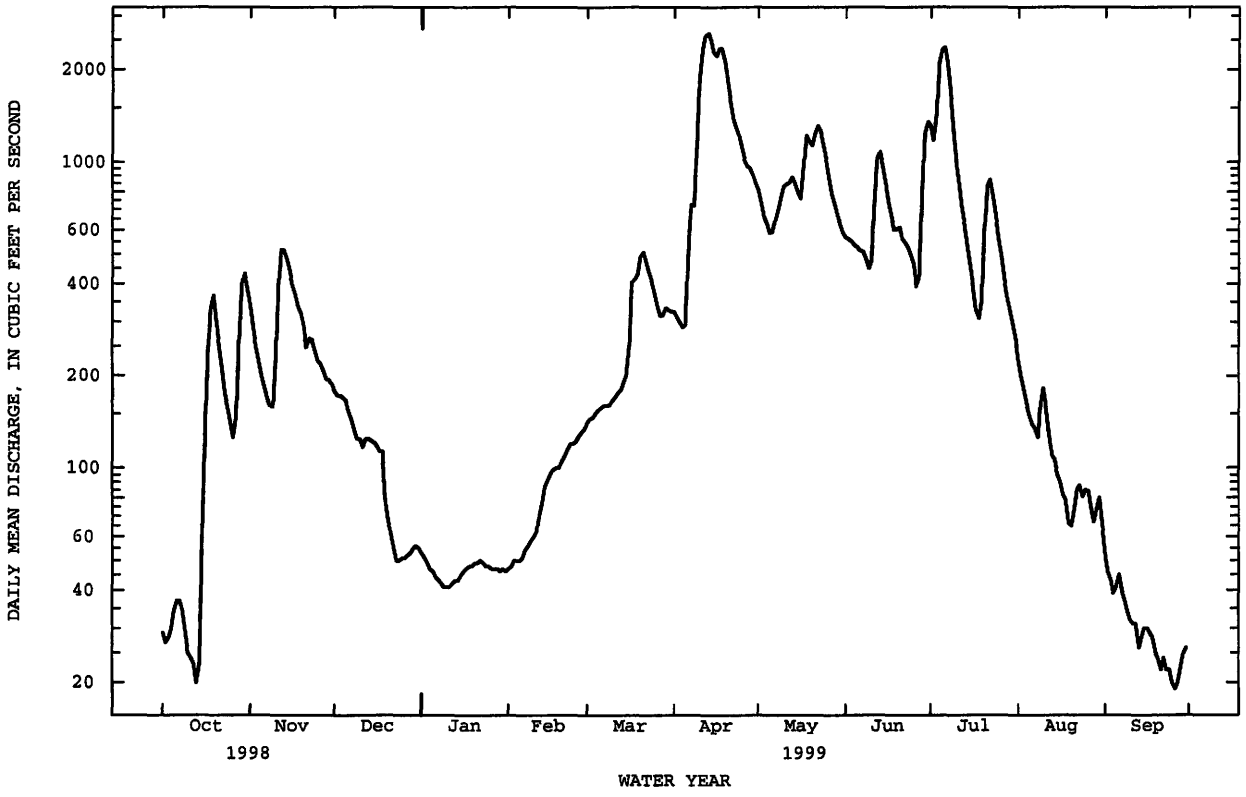
05319500 WATONWAN RIVER NEAR GARDEN CITY, MN--Continued

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

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	201	250	149	72.4	111	615	900	623	869	487	248	200
MAX	686	826	530	319	626	2105	2696	2025	4494	2389	1095	819
(WY)	1993	1993	1992	1992	1983	1992	1993	1993	1993	1993	1979	1993
MIN	5.37	7.69	3.76	2.70	2.39	19.3	33.7	16.1	17.3	8.27	6.56	3.63
(WY)	1990	1977	1990	1977	1977	1940	1990	1940	1989	1940	1989	1976

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1940 - 1999	
ANNUAL TOTAL	122859		148339			
ANNUAL MEAN	337		406		406	
HIGHEST ANNUAL MEAN					1330	1993
LOWEST ANNUAL MEAN					43.7	1989
HIGHEST DAILY MEAN	3510	Apr 1	2630	Apr 13	13400	Jun 20 1993
LOWEST DAILY MEAN	15	Sep 21	19a	Sep 26	1.8	Dec 24 1989
ANNUAL SEVEN-DAY MINIMUM	18	Sep 19	21	Sep 21	1.9	Jan 20 1977
INSTANTANEOUS PEAK FLOW			2670	Apr 13	13900	Jun 20 1993
INSTANTANEOUS PEAK STAGE			6.48	Apr 13	15.91	Jun 20 1993
INSTANTANEOUS LOW FLOW			19	Oct 13	1.8	Dec 24 1989
ANNUAL RUNOFF (AC-FT)	243700		294200		294000	
ANNUAL RUNOFF (CFSM)	.40		.48		.48	
ANNUAL RUNOFF (INCHES)	5.37		6.48		6.48	
10 PERCENT EXCEEDS	670		1060		1090	
50 PERCENT EXCEEDS	189		178		146	
90 PERCENT EXCEEDS	35		37		12	

a Estimated daily discharge.



05320000 BLUE EARTH RIVER NEAR RAPIDAN, MN

LOCATION.--Lat 44°05'44", long 94°06'33", in SE¼SE¼ sec. 6, T.107 N., R.27 W., Blue Earth County, Hydrologic Unit 07020009, on left bank 0.2 mi downstream from power plant (reactivated in 1984) operated by Rapidan Redevelopment Limited Partnership, 2 mi west of Rapidan, 3.5 mi downstream from Watonwan River, and 7.8 mi upstream from Le Sueur River.

DRAINAGE AREA.--2,410 mi^2.

PERIOD OF RECORD.--July 1909 to November 1910 (published as "at Rapidan Mills," no winter records), October 1939 to September 1945, July 1949 to current year. Annual maximums only, 1912 to 1939.

REVISED RECORDS.-- WSP 1508: 1910.

GAGE.--Water-stage recorder. Datum of gage is 807.83 ft above sea level. July 20, 1909 to Apr. 28, 1910, nonrecording gage at site 0.2 mi upstream at different datum. Apr. 29 to Nov. 12, 1910, nonrecording gage at site 800 ft upstream at different datum. Oct. 4 to Nov. 14, 1939, nonrecording gage at present site and datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair.

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	130	3800	1300	e350	284	793	1060	4390	2680	3620	1690	195
2	153	3310	1250	e340	281	850	1090	4030	2630	3570	1450	179
3	153	2860	1180	e330	319	796	1050	3680	2540	3980	1270	181
4	178	2580	1170	e310	337	885	956	3450	2450	4670	1200	181
5	273	2350	1110	e300	255	822	1030	3240	2310	4890	1070	154
6	271	2170	1040	e290	300	829	1630	3110	2290	5120	956	163
7	310	2010	1070	e280	295	867	3120	3040	2470	4620	800	161
8	411	1950	1060	e250	325	714	4000	2980	3490	3940	773	160
9	459	1840	948	e250	358	524	5300	2930	3960	3310	804	155
10	453	1880	859	e240	414	550	6850	2870	4430	2850	797	154
11	399	2310	872	e240	635	602	7920	2850	5350	2470	547	138
12	386	2930	913	e240	1170	842	8500	2900	6720	1920	603	152
13	354	3150	883	e240	1510	718	8710	3140	8310	1900	428	180
14	330	3060	807	e245	1510	714	8550	3580	9570	1540	467	171
15	483	2870	782	e250	1400	752	8090	4010	9440	1560	482	149
16	984	2640	768	e250	1410	803	7900	4390	8430	1290	431	132
17	2460	2510	762	e260	1410	1400	8020	4550	7490	1190	366	129
18	3350	2400	798	284	1340	1940	8190	4780	6690	1110	353	124
19	3840	2210	613	262	1310	1930	8170	4680	6030	1350	370	110
20	4040	2060	480	257	1180	1640	7990	4440	5320	2530	321	112
21	4170	2060	398	256	1140	1680	7430	4590	4700	2910	308	114
22	3740	1910	326	247	1040	1570	6630	4950	4230	3740	314	106
23	2880	1770	e320	243	963	1480	6020	5130	3920	4110	311	98
24	2610	1790	e330	225	884	1400	5930	5220	3710	4540	293	98
25	2180	1660	e340	212	855	1320	6320	5060	3410	4850	287	99
26	1990	1570	e355	241	812	1190	6850	4520	3080	4610	278	97
27	1940	1550	e375	258	824	1180	6760	4020	2880	3710	269	94
28	2380	1360	e400	284	800	1130	6140	3540	3310	2950	262	95
29	3440	1390	e375	230	---	1090	5370	3370	3590	2510	252	92
30	3980	1390	e360	271	---	1110	4790	3040	3750	2150	270	120
31	4140	---	e350	305	---	1100	---	2840	---	1890	287	---
TOTAL	52867	67340	22594	8240	23361	33221	170366	119320	139180	95400	18309	4093
MEAN	1705	2245	729	266	834	1072	5679	3849	4639	3077	591	136
MAX	4170	3800	1300	350	1510	1940	8710	5220	9570	5120	1690	195
MIN	130	1360	320	212	255	524	956	2840	2290	1110	252	92
AC-FT	104900	133600	44820	16340	46340	65890	337900	236700	276100	189200	36320	8120
CFSM	.70	.92	.30	.11	.34	.44	2.34	1.58	1.91	1.27	.24	.06
IN.	.81	1.03	.35	.13	.36	.51	2.61	1.83	2.13	1.46	.28	.06

e Estimated

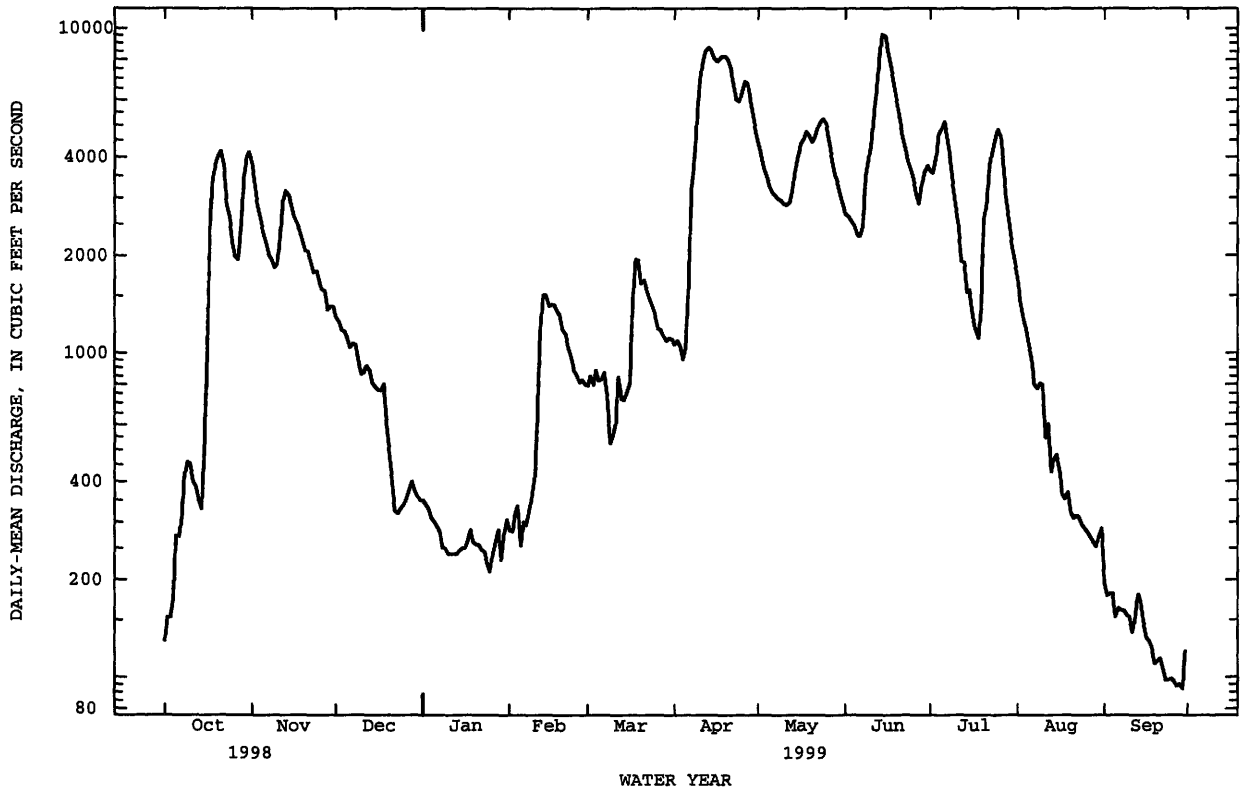
05320000 BLUE EARTH RIVER NEAR RAPIDAN, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	575	580	360	208	271	1441	2713	1754	2150	1371	690	524
MAX	5121	2878	1724	1093	1793	6277	13230	5775	11700	8540	5541	4313
(WY)	1969	1993	1992	1992	1983	1983	1965	1991	1993	1993	1979	1993
MIN	22.5	26.7	16.0	14.8	14.2	92.4	142	53.4	110	30.9	37.7	22.1
(WY)	1940	1940	1956	1977	1959	1968	1977	1940	1976	1940	1976	1976

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1909 - 1999	
ANNUAL TOTAL	495691		754291			
ANNUAL MEAN	1358		2067		1071	
HIGHEST ANNUAL MEAN					4518	1993
LOWEST ANNUAL MEAN					105	1940
HIGHEST DAILY MEAN	7960	Mar 31	9570	Jun 14	42500	Apr 9 1965
LOWEST DAILY MEAN	87	Jan 22	92	Sep 29	7.4	Oct 28 1955
ANNUAL SEVEN-DAY MINIMUM	89	Jan 20	96	Sep 23	8.1	Oct 24 1955
INSTANTANEOUS PEAK FLOW			10100	Jun 14	43100	Apr 9 1965
INSTANTANEOUS PEAK STAGE			8.92	Jun 14	21.36[a]	Apr 9 1965
INSTANTANEOUS LOW FLOW			73[b]	Aug 18	6.9	Oct 12 1955
ANNUAL RUNOFF (AC-FT)	983200		1496000		775500	
ANNUAL RUNOFF (CFSM)	.56		.85		.44	
ANNUAL RUNOFF (INCHES)	7.59		11.55		5.99	
10 PERCENT EXCEEDS	3170		4910		2860	
50 PERCENT EXCEEDS	1050		1190		364	
90 PERCENT EXCEEDS	130		228		43	

a From floodmark.
b Result of regulation.



05320270 LITTLE COBB RIVER NEAR BEAUFORD, MN

LOCATION.--Lat 43°59'48", long 93°54'30", in SE¼SE¼ sec. 11, T.106 N., R.26 W., Blue Earth County, Hydrologic Unit 07020011, on left bank at downstream end of bridge on County Road No. 16, 1.6 mi upstream from mouth, 2.6 mi east of Beauford, and 5.3 mi northeast of Mapleton.

DRAINAGE AREA.--130 mi^2 (revised).

PERIOD OF RECORD.--April 1996 to current year.

REVISED RECORDS.-- WDR MN-99-1: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 980 ft above sea level (from topographic map).

REMARKS.--Records fair except those for estimated daily discharges, which are poor.

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	.00	36	18	e.94	e.66	67	53	233	187	67	146	6.7
2	.00	32	17	e.90	.69	71	49	208	171	61	124	5.4
3	.00	29	16	e.80	.66	54	48	184	157	117	100	4.4
4	.00	26	14	e.60	e.64	74	47	165	144	142	79	4.1
5	.00	24	14	e.50	e.62	68	61	149	134	123	65	5.0
6	.00	22	14	e.47	.76	48	237	142	127	107	54	3.9
7	.00	20	12	e.44	.82	43	298	139	123	88	45	4.1
8	.00	18	9.8	e.40	.90	49	310	133	130	108	38	6.8
9	.00	18	11	e.39	1.1	47	479	126	128	157	69	5.4
10	.00	41	10	e.38	2.7	68	661	119	132	136	95	6.6
11	.00	104	7.8	e.37	43	51	748	117	332	127	103	5.3
12	.00	84	10	e.36	44	42	811	183	489	110	116	4.2
13	.00	76	7.8	e.37	64	43	771	290	459	92	108	4.2
14	.00	70	5.8	e.38	66	44	721	331	509	76	96	4.1
15	.27	63	5.8	e.40	79	50	646	526	523	65	80	3.6
16	.88	57	5.3	e.43	118	87	610	658	441	56	67	3.0
17	52	50	5.2	.53	137	128	589	602	352	49	57	2.3
18	126	46	5.0	.43	145	113	560	531	285	56	49	2.0
19	92	43	3.5	.44	141	111	545	460	248	89	43	2.2
20	57	35	e2.0	.40	129	95	495	451	220	145	38	1.9
21	41	31	e1.5	.38	113	86	445	551	195	212	34	1.5
22	33	39	e1.3	.41	98	77	402	569	171	267	31	1.4
23	29	31	e1.1	.43	86	67	362	612	153	316	29	1.2
24	25	28	e1.1	.40	79	60	347	618	136	363	26	.94
25	23	26	e1.0	e.42	71	53	362	567	121	344	23	.53
26	19	24	e.99	e.42	72	48	381	468	108	283	20	.53
27	22	22	e.98	e.48	67	45	373	383	97	229	18	.64
28	35	21	e.98	.55	67	48	332	317	87	189	15	.36
29	44	20	e.97	.55	---	54	292	272	80	165	12	.15
30	43	19	e.99	.61	---	55	259	240	73	163	9.7	.06
31	40	---	e1.0	e.63	---	57	---	214	---	163	8.1	---
TOTAL	682.15	1155	205.91	15.21	1628.55	2003	12294	10558	6512	4665	1797.8	92.51
MEAN	22.0	38.5	6.64	.49	58.2	64.6	410	341	217	150	58.0	3.08
MAX	126	104	18	.94	145	128	811	658	523	363	146	6.8
MIN	.00	18	.97	.36	.62	42	47	117	73	49	8.1	.06
AC-FT	1350	2290	408	30	3230	3970	24390	20940	12920	9250	3570	183
CFSM	.17	.30	.05	.00	.45	.50	3.15	2.62	1.67	1.16	.45	.02
IN.	.20	.33	.06	.00	.47	.57	3.52	3.02	1.86	1.33	.51	.03

e Estimated

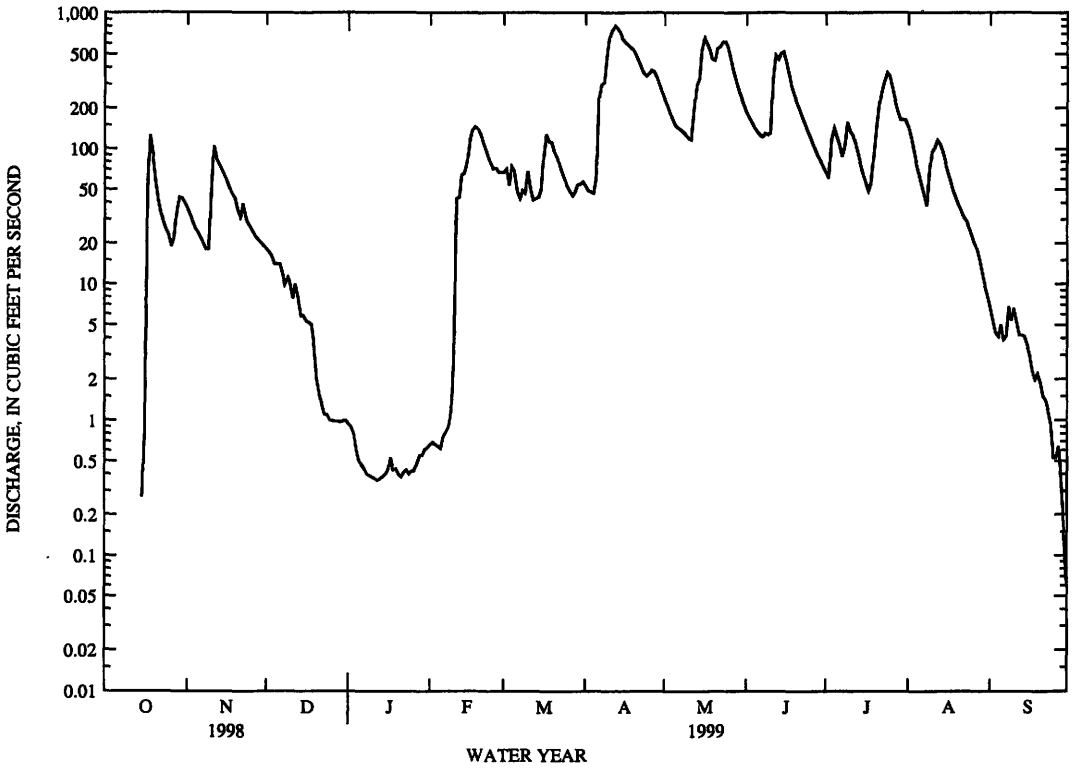
05320270 LITTLE COBB RIVER NEAR BEAUFORD, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1996 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	17.2	47.7	23.6	7.65	44.5	152	240	162	140	100	32.7	7.66
MAX	23.2	89.7	54.0	18.2	58.2	278	410	341	217	150	58.0	17.2
(WY)	1998	1997	1997	1997	1999	1997	1999	1999	1999	1999	1999	1997
MIN	6.22	15.0	6.64	.49	18.4	64.6	119	77.3	83.1	28.4	4.34	.11
(WY)	1997	1998	1999	1999	1997	1999	1996	1996	1998	1996	1998	1998

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1996 - 1999	
ANNUAL TOTAL	25434.09		41609.13			
ANNUAL MEAN	69.7		114		88.3	
HIGHEST ANNUAL MEAN					114	1999
LOWEST ANNUAL MEAN					68.1	1998
HIGHEST DAILY MEAN	665	Apr 2	811	Apr 12	811	Apr 12 1999
LOWEST DAILY MEAN	.00	Sep 6	.00	Oct 1-14	.00a	Sep 6 1998
ANNUAL SEVEN-DAY MINIMUM	.00	Sep 12	.00	Oct 1	.00	Sep 12 1998
INSTANTANEOUS PEAK FLOW			852	Apr 12	852	Apr 12 1999
INSTANTANEOUS PEAK STAGE			10.98	Apr 12	11.38	Mar 14 1997
INSTANTANEOUS LOW FLOW			.00	Oct 1	.00a	Sep 5 1998
ANNUAL RUNOFF (AC-FT)	50450		82530		63960	
ANNUAL RUNOFF (CFSM)	.54		.88		.68	
ANNUAL RUNOFF (INCHES)	7.28		11.91		9.23	
10 PERCENT EXCEEDS	183		362		210	
50 PERCENT EXCEEDS	28		49		42	
90 PERCENT EXCEEDS	.00		.44		2.3	

a Many days in 1998 and 1999.
b Backwater from ice.



05320270 LITTLE COBB RIVER NEAR BEAUFORD, MN--Continued
(National Water-Quality Assessment Program)

WATER QUALITY RECORDS

PERIOD OF RECORD.--Water years 1996 to current year.

PERIOD OF DAILY RECORD:

WATER TEMPERATURES.-- April 1996 to September 1998.

SPECIFIC CONDUCTANCE.-- April 1996 to September 1998.

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)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM) (90095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	PH WATER WHOLE LAB (STAND-ARD UNITS) (00403)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
MAR										
25...	1410	53	536	561	8.4	8.2	6.7	748	13.2	110
APR										
07...	1445	294	553	581	7.6	7.8	9.0	733	10.9	97
MAY										
12...	1300	186	574	586	7.9	8.0	12.9	740	8.7	85
25...	1230	555	582	596	7.8	8.2	15.4	738	8.7	90
JUN										
11...	1350	358	355	366	7.4	7.6	17.6	740	6.9	75
29...	1355	81	631	630	8.1	8.2	20.0	736	7.9	89
JUL										
29...	0900	165	356	624	8.0	8.0	27.0	--	--	--
AUG										
19...	0930	44	576	570	8.0	8.1	20.9	742	6.5	74
SEP										
30...	1000	.05	545	563	7.0	7.8	11.6	738	5.2	49

DATE	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	ALKA-LINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)	BICAR-BONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN,AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)
MAR										
25...	280	210	256	<.020	.021	.64	.98	5.47	.079	.028
APR										
07...	290	87	106	.058	.076	1.0	1.5	15.6	.281	.147
MAY										
12...	280	193	235	.131	.083	.87	2.3	14.6	.339	.110
25...	290	--	--	.021	.063	.94	1.0	18.5	.170	.124
JUN										
11...	--	98	120	.080	.059	1.1	2.5	14.1	.611	.333
29...	310	231	282	.036	.048	.76	1.6	12.3	.204	.074
JUL										
29...	310	298	244	.050	.070	.86	2.1	9.34	.302	.134
AUG										
19...	280	277	227	.039	.035	.68	1.1	8.31	.188	.056
SEP										
30...	260	531	282	<.020	<.010	.76	1.2	<.050	.166	.122

05320270 LITTLE COBB RIVER NEAR BEAUFORD, MN--Continued
(National Water-Quality Assessment Program)

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

DATE	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (00689)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)
MAR									
25...	.017	6.7	.60	72	25	9.4	.2	2.0	16
APR									
07...	.120	7.4	2.4	76	23	6.8	.2	2.8	16
MAY									
12...	.095	6.0	4.6	73	24	9.8	.3	2.1	17
25...	.108	7.4	1.2	76	24	7.6	.2	2.0	14
JUN									
11...	.267	8.0	8.1	43	14	3.9	.1	2.8	8.3
29...	.063	5.9	4.5	78	28	9.9	.2	1.5	16
JUL									
29...	.113	7.5	5.6	81	27	9.2	.2	2.3	13
AUG									
19...	.047	6.9	--	66	29	11	.3	2.2	15
SEP									
30...	.085	--	--	58	28	19	.5	3.8	23

DATE	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
MAR									
25...	40	.35	12	E9.1	53	345	326	21	56
APR									
07...	29	.36	21	<10	122	388	297	111	90
MAY									
12...	25	.39	18	<10	6.7	368	350	160	97
25...	21	.41	23	E5.3	6.1	397	--	35	93
JUN									
11...	8.9	.28	23	10	E2.0	280	225	392	97
29...	22	.51	24	<10	3.7	410	373	224	89
JUL									
29...	18	.54	30	<10	<3.0	397	--	249	95
AUG									
19...	22	.45	29	<10	E1.5	363	322	69	97
SEP									
30...	31	.47	15	16	140	339	317	53	100

05320500 LE SUEUR RIVER NEAR RAPIDAN, MN

LOCATION.--Lat 44°06'40", long 94°02'28", in SW¼ sec. 35, T.108 N., R.27 W., Blue Earth County, Hydrologic Unit 07020011, on right bank 600 ft downstream from highway bridge, 1.8 mi northeast of Rapidan, and 2.3 mi upstream from mouth.

DRAINAGE AREA.--1,110 mi^2.

PERIOD OF RECORD.--October 1939 to September 1945, July 1949 to current year.

GAGE.--Water-stage recorder. Datum of gage is 775.76 ft above sea level. Prior to Nov. 15, 1939, nonrecording gage at same site and datum.

REMARKS.--Records good except those for estimated daily discharges, which are poor.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,600 ft^3/s (revised) and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Feb 18	1200	1,610	3.89	Jun 13	0700	5,490	8.09
Apr 11	2400	*7,040	*9.29	Jul 4	0400	1,670	4.10
May 23	1800	4,740	7.34	Jul 23	2300	3,840	6.65

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	29	740	290	e103	e78	e445	555	1980	1630	856	989	121
2	29	659	280	e102	e79	e450	541	1780	1500	797	850	112
3	32	589	276	e101	e80	e450	516	1620	1360	1280	721	106
4	34	529	270	e100	e82	e430	508	1470	1250	1590	617	100
5	37	472	269	e98	e84	e390	541	1360	1200	1360	527	99
6	41	438	286	e96	e86	e345	2010	1280	1160	1190	456	92
7	40	413	285	e92	e90	e290	3300	1240	1150	1010	401	85
8	52	389	275	e82	e99	e260	3540	1170	1500	1060	360	112
9	48	376	263	e80	e110	e235	4650	1100	1580	1120	580	120
10	49	518	256	e82	e125	e250	5360	1030	1590	1150	694	121
11	60	828	241	e82	e150	e260	6640	1020	3570	1100	655	106
12	56	868	255	e83	e350	e260	6890	1460	5160	940	708	96
13	55	837	283	e84	e600	e250	6270	2970	5370	813	619	84
14	53	798	263	e85	e700	e260	5450	3550	4550	716	544	76
15	103	737	256	e87	e880	e300	4800	3820	3760	631	476	73
16	159	685	245	e89	1190	e600	4740	4110	3200	559	402	70
17	450	625	238	e90	1370	e1000	4650	4140	2740	506	352	66
18	844	580	221	e88	1440	e1200	4430	3790	2390	509	318	62
19	1040	542	148	e86	1210	1110	4110	3450	2150	753	287	59
20	1070	501	115	e83	1040	957	3770	3510	1970	1520	261	57
21	906	425	e96	e81	931	819	3450	4490	1780	2240	252	53
22	690	434	e90	e80	853	709	3240	4610	1630	2890	241	51
23	544	425	e84	e79	654	635	3230	4710	1570	3680	234	49
24	439	408	e85	e78	565	577	3540	4650	1420	3740	224	46
25	385	384	e86	e77	570	523	3730	4070	1380	3100	214	43
26	343	360	e90	e76	460	488	3540	3410	1320	2340	202	40
27	355	332	e94	e75	452	467	3270	2980	1190	1780	188	37
28	430	314	e97	e76	446	472	2900	2580	1110	1490	177	36
29	609	304	e100	e76	---	491	2530	2260	1020	1290	162	35
30	770	299	e105	e76	---	522	2210	2000	933	1240	146	35
31	792	---	e104	e77	---	541	---	1790	---	1110	133	---
TOTAL	10544	15809	6046	2644	14774	15986	104911	83400	62133	44360	12990	2242
MEAN	340	527	195	85.3	528	516	3497	2690	2071	1431	419	74.7
MAX	1070	868	290	103	1440	1200	6890	4710	5370	3740	989	121
MIN	29	299	84	75	78	235	508	1020	933	506	133	35
AC-FT	20910	31360	11990	5240	29300	31710	208100	165400	123200	87990	25770	4450
CFSM	.31	.47	.18	.08	.48	.46	3.15	2.42	1.87	1.29	.38	.07
IN.	.35	.53	.20	.09	.50	.54	3.52	2.80	2.08	1.49	.44	.08

e Estimated

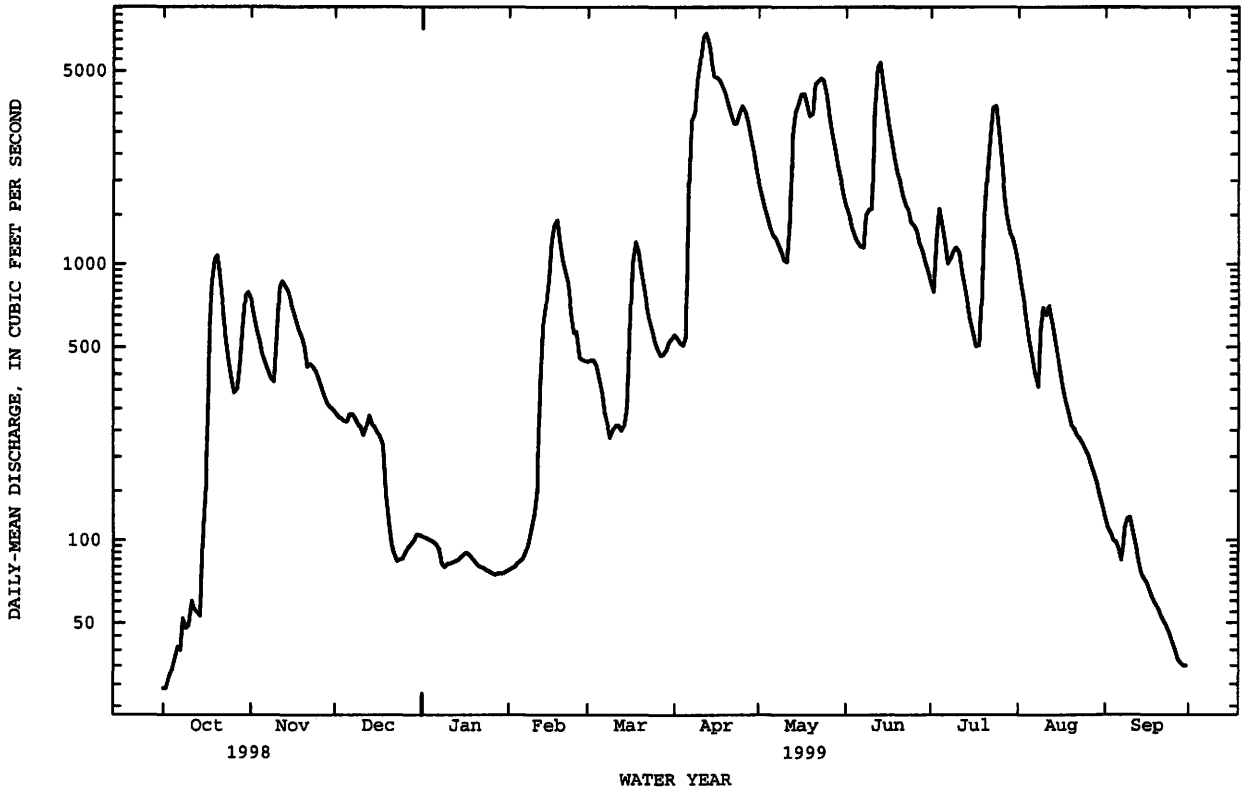
05320500 LE SUEUR RIVER NEAR RAPIDAN, MN--Continued

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

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	328	280	152	85.1	141	819	1382	943	986	647	410	248
MAX	3300	1561	698	493	1299	3465	6563	3706	3913	2760	3656	1526
(WY)	1969	1993	1992	1992	1984	1983	1965	1960	1993	1993	1993	1993
MIN	7.41	11.1	5.04	2.96	1.68	33.0	48.3	18.8	40.4	20.6	8.20	7.55
(WY)	1990	1956	1959	1957	1959	1964	1957	1940	1950	1988	1989	1976

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1940 - 1999	
ANNUAL TOTAL	234769		375839			
ANNUAL MEAN	643		1030		537	
HIGHEST ANNUAL MEAN					2035	1993
LOWEST ANNUAL MEAN					51.4	1977
HIGHEST DAILY MEAN	5150	Apr 2	6890	Apr 12	23400	Apr 8 1965
LOWEST DAILY MEAN	24	Sep 19	29	Oct 1, 2	1.6	Feb 9 1959
ANNUAL SEVEN-DAY MINIMUM	25	Sep 18	35	Oct 1	1.6	Feb 9 1959
INSTANTANEOUS PEAK FLOW			7040	Apr 11	24700	Apr 8 1965
INSTANTANEOUS PEAK STAGE			9.29	Apr 11	22.72a	May 22 1960
INSTANTANEOUS LOW FLOW			29	Oct 1	1.6	Feb 9 1959
ANNUAL RUNOFF (AC-FT)	465700		745500		389000	
ANNUAL RUNOFF (CFSM)	.58		.93		.48	
ANNUAL RUNOFF (INCHES)	7.87		12.60		6.57	
10 PERCENT EXCEEDS	1580		3430		1490	
50 PERCENT EXCEEDS	385		491		156	
90 PERCENT EXCEEDS	50		77		17	

a From highwater mark.



05325000 MINNESOTA RIVER AT MANKATO, MN

LOCATION.--Lat 44°10''08", long 94°00'11", in SE¼SW¼ sec. 7, T. 108 N., R. 26 W., Blue Earth County, Hydrologic Unit 07020007, on right bank 300 ft downstream from Memorial bridge in Mankato, 2.0 mi downstream from Blue Earth River and at mile 106.2 upstream from Mississippi River.

DRAINAGE AREA.--14,900 mi^2 (approximately).

PERIOD OF RECORD.--May 1903 to current year (no winter records 1904, 1906-10, 1918-29). Monthly discharge only for some periods, published in WSP 1308. Published as "near Mankato": 1903-21.

REVISED RECORDS.--WSP 875: 1917. WSP 955: Drainage area. WSP 1085: 1929. WSP 1238: 1903, 1908, 1919. WSP 1508: 1916(M), 1918(M), 1926(M), 1928, 1930, 1932(M), 1938(M). WDR-MN-76-1: 1881(M).

GAGE.--Water-stage recorder. Datum of gage is 747.92 ft above sea level. Prior to Oct. 19, 1921, nonrecording gage, at site 1.8 mi upstream at datum 6.4 ft higher. Mar. 15, 1922 to Nov. 30, 1924, nonrecording gage, and Dec. 1, 1924 to May 24, 1971, recorder at site 0.2 mi upstream at present datum. May 25, 1971 to Aug. 14, 1977, recorder at site 0.5 mi upstream at present datum. Aug. 14, 1977 to July 27, 1978, nonrecording gage; and from July 28, 1978 to Sept. 30, 1993, recording gage at site 0.7 mi upstream of present site.

REMARKS.--Records fair except those for estimated daily discharges, which are poor.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage, 29.9 ft, Apr. 26, 1881, near present site and datum, from floodmark (discharge, 110,000 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	638	5800	4250	e1800	e1700	3140	5500	11400	10500	10500	4890	1940
2	672	5540	4190	e1700	e1700	3440	5570	10800	10200	9930	4450	2210
3	686	4510	4110	e1700	e1700	3730	5600	10200	9830	10800	4160	2180
4	667	4200	4090	e1700	e1700	3780	5500	9660	9450	12500	4090	2080
5	758	3900	4020	e1600	e1700	3830	5720	9220	9170	12200	4100	1960
6	822	3630	3930	e1600	e1700	3760	7750	8960	9000	11800	3910	1810
7	810	3450	3920	e1600	e1600	3880	10200	8890	8980	10800	3660	1700
8	971	3320	3860	e1500	e1600	3570	11400	8990	9810	10500	3450	1650
9	1130	3270	3760	e1500	e1600	3200	14500	9300	10200	9980	4030	1610
10	1170	3520	3610	e1500	e1600	3360	17900	9650	10700	9080	4220	1610
11	1200	4160	3530	e1500	e1700	3450	22200	9940	13700	8270	3590	1600
12	1390	4910	3470	e1500	e1800	3430	23500	10500	17300	7350	3540	1570
13	1490	5370	3420	e1500	e2100	3460	23700	11900	19400	6960	3460	1550
14	1440	5380	3280	e1500	e3000	3440	23200	13000	20400	6520	3380	1550
15	1600	5170	3250	e1500	3670	3580	22400	13800	19700	6030	3500	1550
16	1830	4860	3180	e1500	3770	3990	22200	14600	17900	5400	3420	1490
17	3120	4660	e3000	e1600	4060	5470	22100	15200	16200	4710	3100	1450
18	4160	4570	e2800	e1600	4140	6400	21600	15000	14800	4340	2900	1420
19	4880	4440	e2500	e1600	4120	7430	20800	14500	13700	4640	2760	1410
20	5110	4310	e2400	e1600	4050	8080	19900	14600	12600	6530	2520	1380
21	5180	4380	e2300	e1600	3890	8000	18500	16200	11700	8020	2300	1360
22	4780	4530	e2200	e1700	3630	7400	16900	16600	11100	9790	2170	1370
23	4020	4470	e2200	e1700	3280	6770	16000	17200	10800	10900	2070	1350
24	3560	4470	e2100	e1700	3160	6320	15900	17300	10300	11400	1960	1320
25	3290	4490	e2100	e1700	3130	5980	16100	16500	9990	11000	1900	1270
26	3040	4370	e2100	e1700	2940	5770	16100	15200	9690	10100	1880	1260
27	3150	4340	e2100	e1700	2950	5660	15600	14100	9680	8700	1890	1250
28	3480	4290	e2000	e1700	3030	5640	14400	13200	10600	7720	1920	1210
29	4690	4270	e2000	e1700	---	5540	13200	12500	10900	6630	1940	1120
30	5480	4370	e1900	e1700	---	5450	12100	11600	10900	6100	1920	1030
31	5800	---	e1800	e1700	---	5470	---	11000	---	5290	1920	---
TOTAL	81014	132950	93370	50200	75020	152420	466040	391510	369200	264490	95000	46260
MEAN	2613	4432	3012	1619	2679	4917	15530	12630	12310	8532	3065	1542
MAX	5800	5800	4250	1800	4140	8080	23700	17300	20400	12500	4890	2210
MIN	638	3270	1800	1500	1600	3140	5500	8890	8980	4340	1880	1030
AC-FT	160700	263700	185200	99570	148800	302300	924400	776600	732300	524600	188400	91760
CFSM	.18	.30	.20	.11	.18	.33	1.04	.85	.83	.57	.21	.10
IN.	.20	.33	.23	.13	.19	.38	1.16	.98	.92	.66	.24	.12

e Estimated

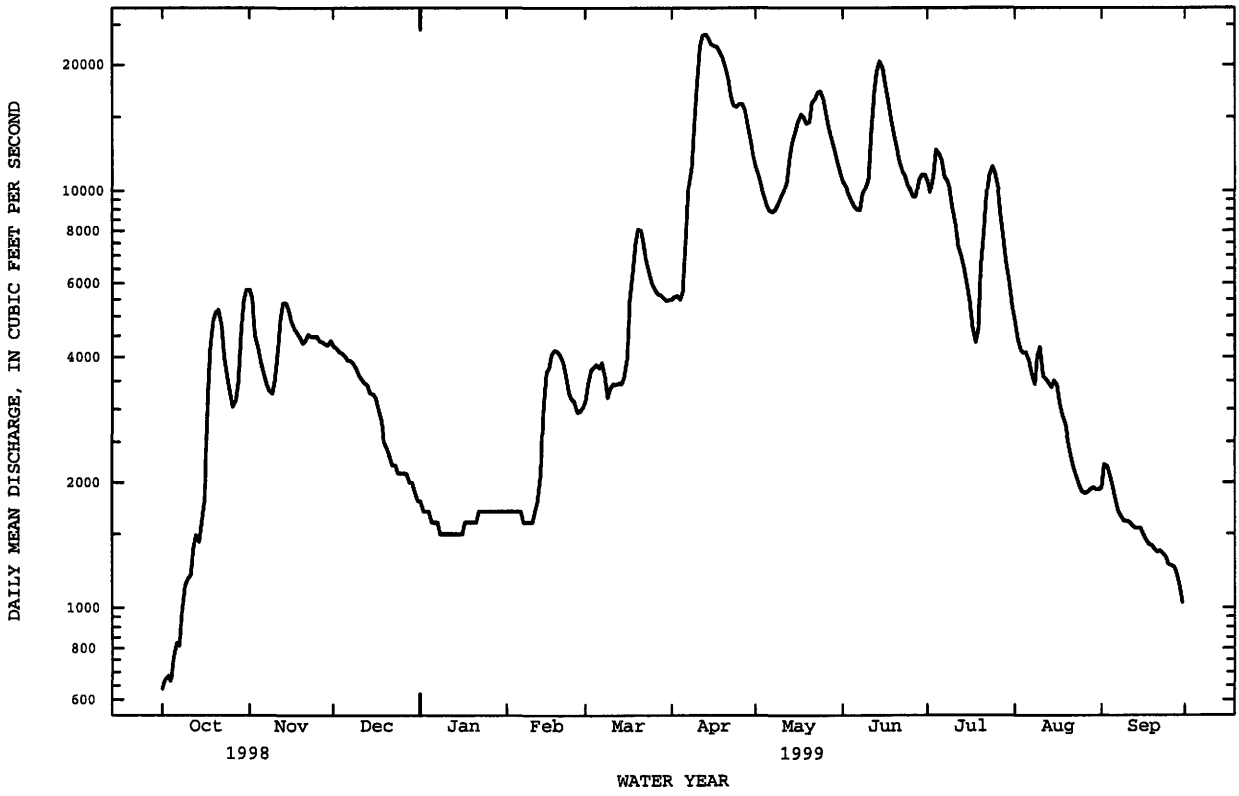
05325000 MINNESOTA RIVER AT MANKATO, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1903 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	1648	1591	1049	651	803	4598	9482	5846	6157	4578	2372	1655
MAX	14600	8569	4770	3009	4505	18230	46150	22540	34230	33130	23520	11070
(WY)	1969	1996	1983	1992	1983	1983	1997	1993	1993	1993	1993	1993
MIN	66.1	83.5	80.9	61.5	58.4	132	609	101	194	58.3	37.4	56.6
(WY)	1934	1934	1934	1940	1940	1934	1931	1934	1934	1934	1934	1934

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1903 - 1999	
ANNUAL TOTAL	1916484		2217474			
ANNUAL MEAN	5251		6075		3527[a]	
HIGHEST ANNUAL MEAN					14890	1993
LOWEST ANNUAL MEAN					136	1934
HIGHEST DAILY MEAN	28200	Apr 3	23700	Apr 13	92700	Apr 10 1965
LOWEST DAILY MEAN	505	Sep 25	638	Oct 1	31	Aug 3 1934
ANNUAL SEVEN-DAY MINIMUM	535	Sep 22	722	Oct 1	33	Jul 29 1934
INSTANTANEOUS PEAK FLOW			24200	Apr 12	94100	Apr 10 1965
INSTANTANEOUS PEAK STAGE			16.16	Apr 12	30.11	Jun 21 1993
INSTANTANEOUS LOW FLOW			634	Oct 1	26[b]	Aug 4 1934
ANNUAL RUNOFF (AC-FT)	3801000		4398000		2555000	
ANNUAL RUNOFF (CFSM)	.35		.41		.24	
ANNUAL RUNOFF (INCHES)	4.78		5.54		3.22	
10 PERCENT EXCEEDS	11400		14500		9220	
50 PERCENT EXCEEDS	4110		4050		1290	
90 PERCENT EXCEEDS	994		1500		190	

a Median of annual mean discharges is 2860 ft^3/s.
b Minimum observed.



WATER-QUALITY RECORDS

PERIOD OF RECORD.-- Water years 1963-66, 1968 to current year.

PERIOD OF DAILY RECORD:
WATER TEMPERATURES.-- October 1967 to September 30, 1981, October 1982 to current year (fragmentary records).
SUSPENDED-SEDIMENT DISCHARGE.-- October 1967 to current year.

REMARKS.--Sediment samples were collected approximately daily by an observer during the open-water period. In general, daily concentrations and loads for the open-water period are considered fair. Sediment records for the winter period are considered fair to poor. Water temperatures were obtained by the observer at the time of sediment sampling, and monthly by U.S. Geological Survey personnel during the winter period.

EXTREMES FOR PERIOD OF DAILY RECORD:
WATER TEMPERATURES.-- Maximum observed, 31.0 C, July 4-9, 1989; minimum observed, 0.0 C on many days most winters.
SEDIMENT CONCENTRATIONS.-- Maximum daily mean, 2850 mg/L, Aug. 7, 1968; minimum daily mean, 9 mg/L, Jan. 15-19, 1991.
SEDIMENT LOADS.-- Maximum daily, 414,000 tons, June 21, 1993; minimum daily, 5.2 tons, Nov. 6, 1976.

EXTREMES FOR CURRENT YEAR:
WATER TEMPERATURES.-- Maximum observed, 28.0 C, July 15, 27-30; minimum observed, 1.0 C, Feb. 22. (assumed to be 0.0 C, many days during winter).
SEDIMENT CONCENTRATIONS.-- Maximum daily mean, 940 mg/L, June 13; minimum daily mean, 40 mg/L, Oct. 1, 3-5.
SEDIMENT LOADS.-- Maximum daily, 49,200 tons, June 13; minimum daily, 69 tons, Oct. 1.

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	---	---	---	23.0	---	24.0
2	13.0	---	---	---	---	---	---	---	---	---	25.0	23.0
3	---	---	---	---	---	---	---	---	18.0	---	24.0	23.0
4	---	---	---	---	---	---	---	---	---	---	24.0	22.0
5	---	---	---	---	---	---	---	---	---	---	---	22.0
6	---	---	---	---	---	---	---	14.0	---	---	25.0	---
7	12.0	---	---	---	---	---	---	---	---	---	24.0	20.0
8	---	---	---	---	---	---	---	---	23.0	---	24.0	20.0
9	10.0	---	---	---	---	---	---	---	---	---	23.0	19.0
10	---	---	---	---	---	---	---	---	---	---	24.0	20.0
11	---	---	---	---	---	---	---	---	---	---	25.0	20.0
12	10.0	---	---	---	---	---	8.0	11.0	---	25.0	23.0	---
13	9.0	---	---	---	---	---	---	---	---	25.0	---	14.0
14	---	---	---	---	---	---	---	---	---	27.0	---	14.0
15	---	---	---	---	---	---	9.0	---	---	28.0	24.0	15.0
16	---	---	---	---	---	---	---	---	---	25.0	24.0	15.0
17	---	---	---	---	---	---	---	---	19.0	26.0	24.0	15.0
18	---	---	---	---	---	---	---	14.0	---	24.0	22.0	16.0
19	---	---	---	---	---	---	---	---	---	24.0	---	17.0
20	---	---	---	---	---	---	---	---	21.0	22.0	---	16.0
21	---	---	---	---	2.0	---	---	---	22.0	23.0	23.0	16.0
22	---	---	---	---	1.0	---	7.0	---	22.0	---	23.0	17.0
23	---	---	---	---	---	---	---	---	24.0	27.0	22.0	16.0
24	---	---	---	---	---	---	---	---	25.0	27.0	---	19.0
25	---	---	---	---	---	---	---	16.0	26.0	27.0	23.0	19.0
26	---	---	---	---	---	---	---	---	25.0	27.0	23.0	17.0
27	---	---	---	---	---	---	---	---	24.0	28.0	25.0	15.0
28	---	---	---	---	---	---	---	---	22.0	28.0	25.0	14.0
29	---	---	---	---	---	---	11.0	---	22.0	28.0	23.0	14.0
30	---	---	---	---	---	---	---	---	21.0	27.0	23.0	14.0
31	---	---	---	---	---	---	---	---	---	---	24.0	---
MEAN	---	---	---	---	---	---	---	---	---	---	---	---
MAX	---	---	---	---	---	---	---	---	---	---	---	---
MIN	---	---	---	---	---	---	---	---	---	---	---	---

05325000 MINNESOTA RIVER AT MANKATO, MN--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	40	69	160	2510	170	1950	160	778	120	551	160	1360
2	45	82	140	2090	170	1920	160	734	120	551	160	1490
3	40	74	130	1580	170	1890	160	734	120	551	160	1610
4	40	72	130	1470	170	1880	160	734	120	551	160	1630
5	40	82	120	1260	170	1850	160	691	120	551	160	1650
6	45	100	110	1080	170	1800	160	691	120	551	150	1520
7	50	109	100	932	170	1800	150	648	120	518	150	1570
8	60	157	100	896	170	1770	150	608	120	518	140	1350
9	70	214	100	883	170	1730	150	608	120	518	140	1210
10	80	253	120	1140	170	1660	150	608	120	518	140	1270
11	85	275	140	1570	160	1520	150	608	120	551	140	1300
12	85	319	160	2120	160	1500	150	608	130	632	140	1300
13	90	362	180	2610	160	1480	150	608	140	794	140	1310
14	90	350	180	2610	160	1420	140	567	140	1130	150	1390
15	110	475	180	2510	160	1400	140	567	140	1390	150	1450
16	130	642	180	2360	160	1370	140	567	150	1530	170	1830
17	180	1520	180	2260	160	1300	140	605	150	1640	260	3840
18	230	2580	180	2220	160	1210	130	562	170	1900	320	5530
19	240	3160	180	2160	160	1080	130	562	180	2000	370	7420
20	250	3450	180	2090	160	1040	130	562	170	1860	400	8730
21	240	3360	180	2130	160	994	130	562	170	1790	400	8640
22	220	2840	180	2200	160	950	130	597	170	1670	380	7590
23	200	2170	180	2170	160	950	130	597	160	1420	360	6580
24	180	1730	180	2170	160	907	130	597	160	1370	350	5970
25	170	1510	180	2180	160	907	130	597	160	1350	340	5490
26	160	1310	180	2120	160	907	130	597	160	1270	340	5300
27	140	1190	180	2110	160	907	120	551	160	1270	330	5040
28	140	1320	180	2080	160	864	120	551	160	1310	320	4870
29	130	1650	170	1960	160	864	120	551	---	---	320	4790
30	140	2070	170	2010	160	821	120	551	---	---	310	4560
31	160	2510	---	---	160	778	120	551	---	---	300	4430
TOTAL	---	36005	---	57481	---	41419	---	18952	---	30255	---	112020

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	290	4310	230	7080	260	7370	360	10200	270	3560	130	681
2	280	4210	220	6420	260	7160	340	9120	250	3000	130	776
3	280	4230	220	6060	250	6640	460	13400	210	2360	130	765
4	280	4160	230	6000	250	6380	640	21600	200	2210	130	730
5	300	4630	250	6220	240	5940	570	18800	210	2320	130	688
6	350	7370	260	6290	250	6080	490	15600	210	2220	130	635
7	430	11800	260	6240	270	6550	380	11100	200	1980	130	597
8	490	15100	260	6310	320	8480	480	13600	180	1680	120	535
9	570	22300	250	6280	350	9640	600	16200	810	9090	120	522
10	600	29000	250	6510	420	12100	570	14000	470	5360	120	522
11	630	37800	250	6710	650	24200	500	11200	270	2620	120	518
12	615	39000	280	7940	880	41100	400	7940	200	1910	120	509
13	580	37100	340	10900	940	49200	360	6770	180	1680	110	460
14	520	32600	390	13700	800	44100	360	6340	160	1460	110	460
15	490	29600	380	14200	660	35100	360	5860	150	1420	100	418
16	520	31200	380	15000	500	24200	360	5250	150	1390	100	402
17	530	31600	460	18900	370	16200	370	4710	150	1260	100	392
18	490	28600	470	19000	310	12400	380	4450	150	1170	100	383
19	450	25300	440	17200	285	10500	450	5640	140	1040	100	381
20	420	22600	500	19700	260	8850	570	10100	140	953	100	373
21	390	19500	540	23600	230	7270	540	11700	140	869	100	367
22	370	16900	500	22400	210	6290	480	12700	130	762	95	351
23	380	16400	450	20900	270	7870	440	12900	130	727	95	346
24	390	16700	400	18700	350	9730	450	13900	130	688	95	339
25	400	17400	360	16000	400	10800	430	12800	130	667	95	326
26	380	16500	310	12700	410	10700	410	11200	120	609	95	323
27	350	14700	300	11400	420	11000	380	8930	120	612	95	321
28	300	11700	290	10300	440	12600	340	7090	120	622	95	310
29	250	8910	280	9450	430	12700	320	5730	130	681	95	287
30	230	7510	280	8770	410	12100	310	5110	130	674	95	264
31	---	---	270	8020	---	---	300	4280	130	674	---	---
TOTAL	---	568730	---	368900	---	443250	---	318220	---	56268	---	13981
YEAR		2065481										

05327000 HIGH ISLAND CREEK NEAR HENDERSON, MN

LOCATION.--Lat 44°34'19", long 93°55'18", in NE$^1/_4$NW$^1/_4$ sec. 26, T.113 N., R.26 W., Sibley County, Hydrologic Unit 07020012, on left bank 20 ft downstream from bridge on County Road 6, 1.6 mi upstream from mouth, and 3.1 mi north of Henderson.

DRAINAGE AREA.--238 mi^2.

PERIOD OF RECORD.--October 1973 to current year. May 1970 to September 1973, operated as a low-flow station only.

REVISED RECORDS.--WDR-MN-80-2: 1974-75, 1977-79, WRD MN-98: 1993.

GAGE.--Water-stage recorder. Datum of gage is 728.56 ft above mean sea level.

REMARKS.--Records good except those for estimated daily discharges, which are fair to poor.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 370 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Apr 9	1400	618	5.85	May 17	0500	*1,570	*7.71
Apr 11	1400	758	6.21	May 20	2300	1,130	7.06
May 12	2400	682	6.06	Jul 3	1900	522	5.53

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	5.6	32	44	e12	7.3	41	124	128	197	110	22	7.3
2	5.6	32	e43	e11	7.6	47	122	122	189	111	20	6.4
3	5.6	30	e40	e10	7.3	e52	118	115	175	342	18	6.2
4	5.5	37	e39	e10	e7.4	e52	115	110	162	383	16	6.3
5	e6.0	30	e37	e10	e7.4	49	122	125	150	234	15	7.0
6	e7.0	27	e34	e9.9	e7.5	47	266	121	145	163	13	7.3
7	e6.5	25	e32	e9.8	7.6	e40	261	121	140	127	12	6.9
8	5.9	24	e30	e9.6	8.2	e40	251	123	136	152	10	6.1
9	5.8	25	e28	e9.3	8.6	e40	532	117	133	187	22	5.8
10	5.6	43	e28	e9.3	9.7	e39	455	115	135	159	22	5.4
11	5.7	53	e28	e9.2	e10	e39	672	136	167	135	24	5.6
12	5.6	69	e28	e9.4	e11	e39	555	422	189	119	26	7.0
13	5.5	90	e28	e9.0	e13	44	468	569	200	104	29	5.4
14	5.5	105	e28	e8.4	14	44	430	423	197	90	25	5.1
15	6.0	107	e28	e8.0	16	43	415	349	185	78	22	4.9
16	7.1	102	e28	e7.6	e16	50	477	442	168	71	25	4.7
17	25	91	e28	e7.2	e17	152	442	1060	150	64	27	4.8
18	42	83	e26	e7.0	e16	188	374	535	137	58	24	4.5
19	46	75	e23	e6.7	e16	167	343	392	137	54	20	4.9
20	47	54	e21	e6.2	e16	182	312	598	135	51	16	5.0
21	46	65	e19	6.1	e16	218	286	850	135	50	15	4.4
22	43	68	e17	6.0	e17	273	259	526	141	47	14	4.3
23	40	60	e17	6.0	e18	232	236	554	178	47	12	4.0
24	34	55	e17	6.1	e19	202	216	471	197	42	9.4	4.0
25	29	52	e17	e6.2	e20	173	197	415	177	38	7.6	3.8
26	25	49	e18	e6.3	21	144	190	379	155	37	6.6	3.7
27	27	48	e18	6.5	25	128	172	347	134	31	6.1	3.7
28	26	46	e19	6.6	33	145	161	311	126	31	6.1	3.5
29	27	46	e20	6.8	---	142	150	279	118	28	5.9	3.3
30	27	45	e16	7.1	---	137	137	241	113	26	6.0	3.3
31	28	---	e13	e7.0	---	132	---	213	---	25	10	---
TOTAL	606.5	1668	812	250.3	392.6	3321	8858	10709	4701	3194	506.7	154.6
MEAN	19.6	55.6	26.2	8.07	14.0	107	295	345	157	103	16.3	5.15
MAX	47	107	44	12	33	273	672	1060	200	383	29	7.3
MIN	5.5	24	13	6.0	7.3	39	115	110	113	25	5.9	3.3
AC-FT	1200	3310	1610	496	779	6590	17570	21240	9320	6340	1010	307
CFSM	.08	.23	.11	.03	.06	.45	1.25	1.46	.66	.43	.07	.02
IN.	.10	.26	.13	.04	.06	.52	1.39	1.68	.74	.50	.08	.02

e Estimated

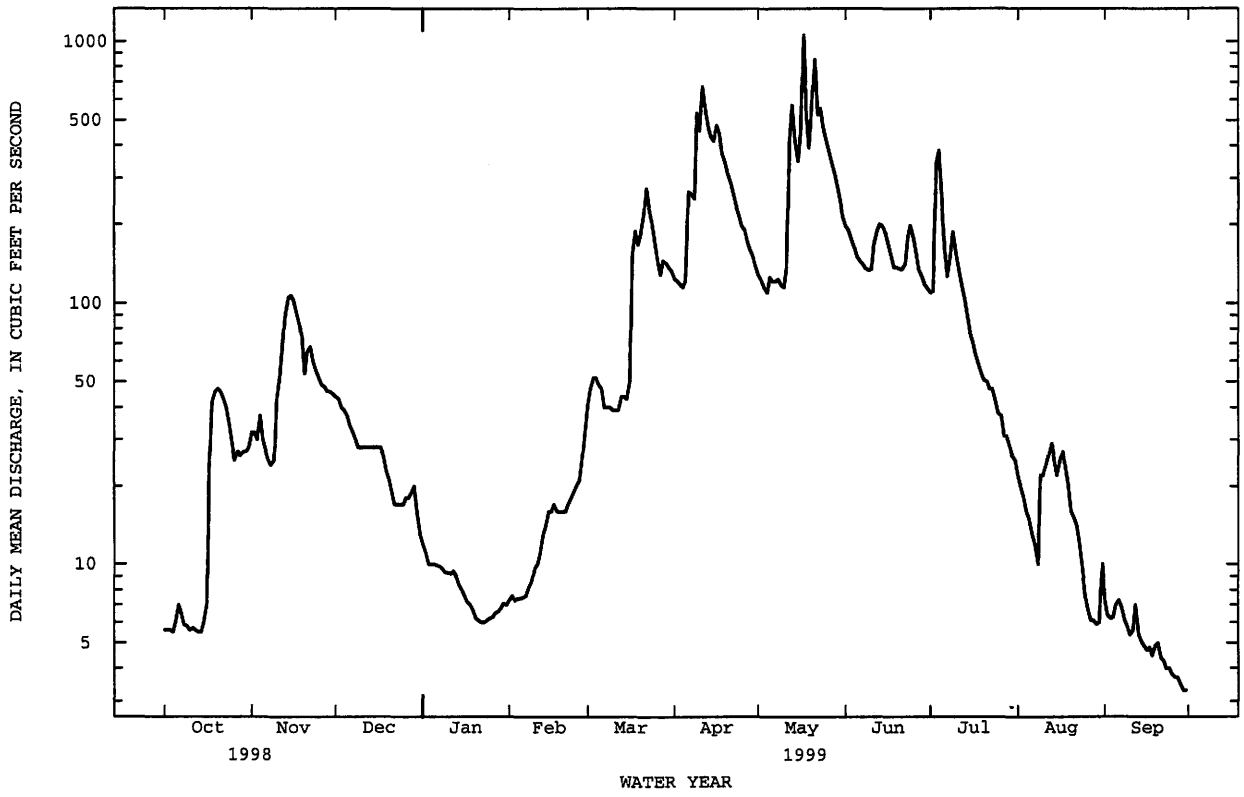
05327000 HIGH ISLAND CREEK NEAR HENDERSON, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1974 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	75.3	64.1	35.6	15.6	24.2	172	262	160	161	131	81.5	101
MAX	298	219	111	72.5	121	547	593	478	646	783	380	592
(WY)	1986	1993	1983	1992	1984	1992	1983	1993	1993	1993	1997	1991
MIN	1.51	2.11	1.37	.98	1.28	6.27	6.69	3.32	1.58	.80	1.16	1.18
(WY)	1990	1990	1976	1977	1989	1975	1990	1976	1976	1976	1976	1974

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1974 - 1999	
ANNUAL TOTAL	44667.2		35173.7			
ANNUAL MEAN	122		96.4		107	
HIGHEST ANNUAL MEAN					293	1993
LOWEST ANNUAL MEAN					9.23	1976
HIGHEST DAILY MEAN	2000	Apr 1	1060	May 17	2070	Jul 25 1997
LOWEST DAILY MEAN	5.3	Sep 18	3.3	Sep 29, 30	.46	Oct 3 1976
ANNUAL SEVEN-DAY MINIMUM	5.6	Sep 22	3.6	Sep 24	.59	Jul 10 1976
INSTANTANEOUS PEAK FLOW			1570	May 17	2830	Jul 25 1997
INSTANTANEOUS PEAK STAGE			7.71	May 17	9.72	Jun 17 1993
INSTANTANEOUS LOW FLOW			3.3	Sep 29	.20a	Jan 4 1981
ANNUAL RUNOFF (AC-FT)	88600		69770		77570	
ANNUAL RUNOFF (CFSM)	.52		.41		.45	
ANNUAL RUNOFF (INCHES)	7.01		5.52		6.14	
10 PERCENT EXCEEDS	287		260		306	
50 PERCENT EXCEEDS	46		34		32	
90 PERCENT EXCEEDS	7.1		6.0		1.9	

a Result of freezeup.



05330000 MINNESOTA RIVER NEAR JORDAN, MN

LOCATION.--Lat 44°41'35", long 93°38'30", in NW¼SW¼ sec. 7, T.114 N., R.23 W., Carver County, Hydrologic Unit 07020012, on pier at center downstream side of bridge, 1.5 mi northwest of Jordan, and at mile 39.4 uptream from Mississippi River.

DRAINAGE AREA.--16,200 mi^2 (approximately).

PERIOD OF RECORD.--September 1934 to current year. Prior to Oct. 1, 1966, published as "near Carver, Minn".

REVISED RECORDS.--WSP 955: Drainage area. WSP 1508: 1935. WDR MN-87-2: 1976 (cal. yr. summary).

GAGE.--Water-stage recorder. Datum of gage is 690 ft above sea level. Prior to Oct. 1, 1966, water-stage recorder 2.8 mi downstream with auxiliary nonrecording gage at present site and present datum.

REMARKS.--Records good to fair except those for estimated daily discharges, which are fair to poor.

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	938	6130	4930	e2300	e1900	e3600	5890	15500	13900	11100	5370	2000
2	928	6070	4860	e2250	e1900	e3700	5850	13900	12600	10800	4930	1970
3	917	5700	4770	e2200	e2000	e3900	5900	12600	11700	10700	4530	2150
4	940	5250	4680	e2200	e2000	e4000	5940	11600	11000	12400	4260	2230
5	975	4910	4660	e2150	e2000	e4100	5890	10800	10400	13400	4060	2190
6	987	4530	4600	e2100	e2000	e4100	6630	10200	10100	13500	4070	2110
7	1060	4210	4510	e2000	e2000	e4100	8800	9740	9740	12900	3950	1980
8	1090	4010	4450	e1950	e2000	e4000	10700	9510	9530	12200	3720	1870
9	1100	3840	4410	e1800	e2000	3790	12400	9460	10000	11900	3640	1800
10	1220	3910	4330	e1800	e2000	3920	14600	9660	10700	11100	4240	1750
11	1330	4130	4180	e1700	e2100	e3800	16400	10200	11700	9850	4640	1710
12	1390	4760	4080	e1700	e2200	e3700	18000	11400	13600	8780	4030	1780
13	1450	5450	4020	e1700	e2300	e3700	19800	13500	15500	7800	3820	1700
14	1600	5990	3950	e1700	e2400	e3600	21800	14900	16800	7180	3700	1660
15	1670	6070	3820	e1700	e2800	3480	23700	15500	17900	6760	3520	1650
16	1750	5940	3730	e1800	e3600	3670	24800	16000	18900	6210	3580	1660
17	1980	5660	3630	e1800	e4200	4650	25000	17100	19400	5710	3540	1630
18	2910	5440	3580	e1800	e4400	6340	24800	18300	19400	5050	3320	1580
19	4250	5300	3490	e1800	e4500	7220	24400	18900	18900	4680	3100	1580
20	5110	5140	2880	e1800	e4400	8060	24000	19000	17900	4760	2950	1530
21	5480	4970	e2600	e1900	e4300	8620	23300	19300	16500	6040	2790	1500
22	5600	5060	e2500	e1900	e4300	8680	22500	19800	14800	7550	2620	1490
23	5390	5170	e2400	e1900	e4200	8240	21700	20400	13300	8910	2550	1480
24	4810	5130	e2400	e1900	e4100	7540	20800	20800	12600	10100	2440	1480
25	4220	5110	e2300	e1900	e3900	6970	19800	20900	11700	10800	2280	1460
26	3960	5130	e2400	e1900	e3700	6540	19100	20600	10900	10900	2150	1430
27	3660	5030	e2450	e1900	e3600	6260	18600	20100	10300	10200	2080	1390
28	3640	4960	e2400	e1900	e3600	6230	18300	19400	10100	8940	2030	1390
29	3890	4930	e2300	e1900	---	6270	17800	18400	10500	7780	2020	1380
30	4830	4850	e2300	e1900	---	6160	16900	17100	11000	6720	2020	1350
31	5680	---	e2300	e1900	---	6010	---	15500	---	6110	2040	---
TOTAL	84755	152780	109910	59150	84400	164950	504100	480070	401370	280830	103990	50880
MEAN	2734	5093	3545	1908	3014	5321	16800	15490	13380	9059	3355	1696
MAX	5680	6130	4930	2300	4500	8680	25000	20900	19400	13500	5370	2230
MIN	917	3840	2300	1700	1900	3480	5850	9460	9530	4680	2020	1350
AC-FT	168100	303000	218000	117300	167400	327200	999900	952200	796100	557000	206300	100900
CFSM	.17	.31	.22	.12	.19	.33	1.04	.96	.83	.56	.21	.10
IN.	.19	.35	.25	.14	.19	.38	1.16	1.10	.92	.64	.24	.12

e Estimated

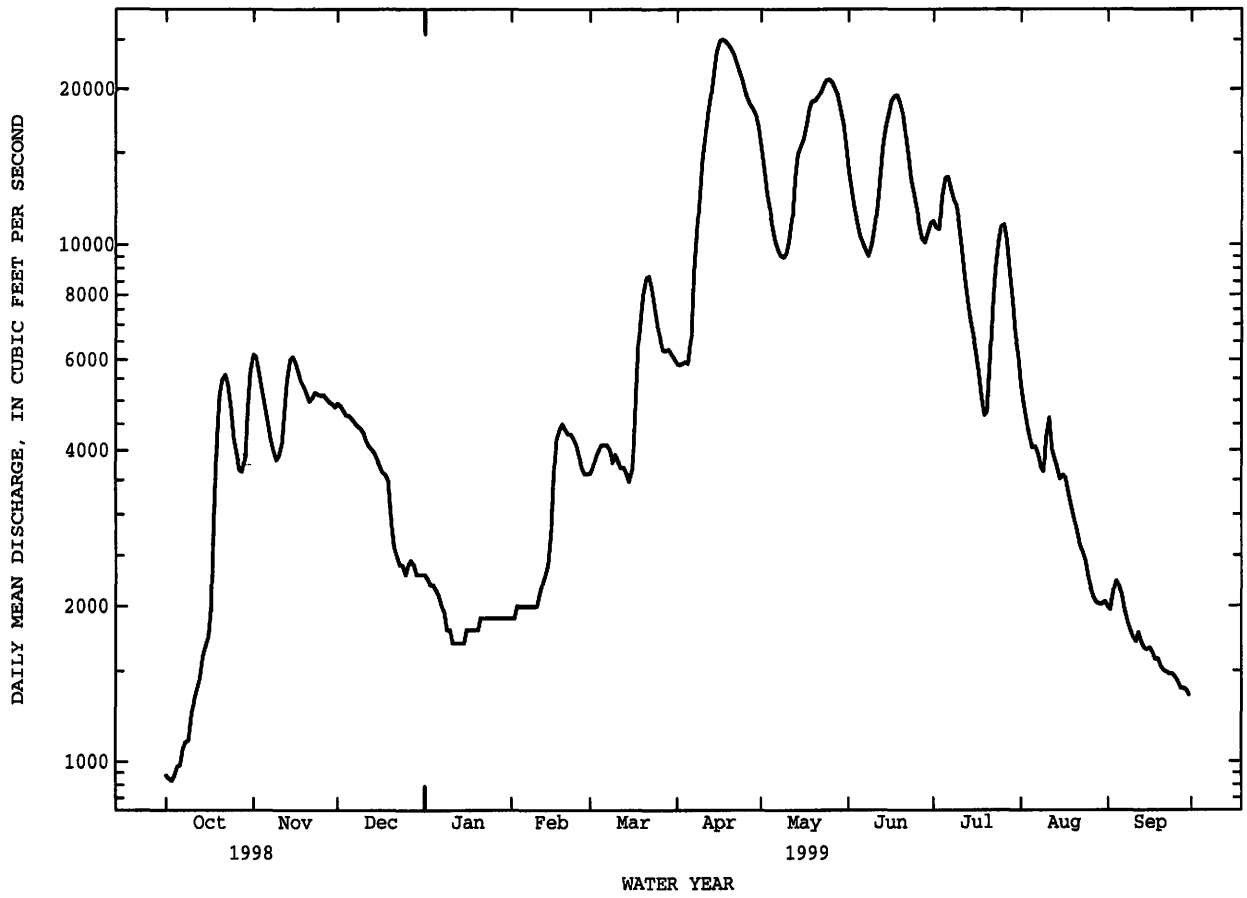
05330000 MINNESOTA RIVER NEAR JORDAN, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1935 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	2234	2195	1533	934	1022	5263	12470	8039	7729	5946	3336	2286
MAX	16030	9463	5216	3344	3992	21170	48210	25510	41460	38640	25660	14460
(WY)	1969	1996	1983	1992	1983	1983	1969	1993	1993	1993	1993	1993
MIN	167	178	158	111	130	322	926	923	633	279	178	183
(WY)	1935	1935	1977	1940	1940	1940	1959	1959	1976	1936	1936	1976

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1935 - 1999	
ANNUAL TOTAL	2272591		2477185			
ANNUAL MEAN	6226		6787		4422[a]	
HIGHEST ANNUAL MEAN					16910	1993
LOWEST ANNUAL MEAN					687	1940
HIGHEST DAILY MEAN	32000	Apr 5	25000	Apr 17	112000	Apr 11 1965
LOWEST DAILY MEAN	917	Oct 3	917	Oct 3	85	Jan 21 1940
ANNUAL SEVEN-DAY MINIMUM	945	Sep 29	964	Oct 1	89	Jan 20 1940
INSTANTANEOUS PEAK FLOW			25200	Apr 17	117000	Apr 11 1965
INSTANTANEOUS PEAK STAGE			24.28	Apr 17	35.07	Apr 12 1965
INSTANTANEOUS LOW FLOW			903	Oct 3	79	Nov 17 1955
ANNUAL RUNOFF (AC-FT)	4508000		4913000		3204000	
ANNUAL RUNOFF (CFSM)	.38		.42		.27	
ANNUAL RUNOFF (INCHES)	5.22		5.69		3.71	
10 PERCENT EXCEEDS	14700		17400		11900	
50 PERCENT EXCEEDS	4850		4410		1860	
90 PERCENT EXCEEDS	1300		1700		318	

a Median of annual mean discharges is 3700 ft^3/s.



05331000 MISSISSIPPI RIVER AT ST. PAUL, MN

LOCATION.--LAT 44°56'01", long 93°06'20", in $NE^1/_4NE^1/_4$ sec.13, T. 28 N., R. 22 W., Ramsey County, Hydrologic Unit 07010206, on left bank in St. Paul, 100 ft upstream from Smith Ave Bridge, 4.8 mi downstream from Minnesota River, and at mile 840.5 upstream from Ohio River.

DRAINAGE AREA.--36,800 mi^2 (approximately).

PERIOD OF RECORD.--Water year 1867-69, 1872-92 (annual maximums), March 1892 to current year (prior to 1901, fragmentary during some winters). Records prior to March 1892, published in the 19th Annual Report, Part 4, have been found to be unreliable and should not be used. Monthly discharge only for some periods, published in WSP 1308. Gage-height records (winter records incomplete) collected at same site since 1866 are contained in reports of U.S. Weather Bureau, War Department and MIssissippi River Commission.

REVISED RECORDS.--WSP 285: 1892-96. WSP 715: Drainage area. WSP 875: 1938. WSP 895: 1939. WSP 1308: 1867(M). WSP 1508: 1897, 1898(M). 1903(M), 1917-18(M). 1928(M), 1929. WRD MN-74: 1973.

GAGE.--Water-stage recorder. Datum of gage is 683.62 ft above sea level. Prior to Mar. 18, 1925, nonrecording gage at several sites within 300 ft of each other and 1.2 miles downstream of present site at present datum. Mar. 19, 1925 to June 24, 1999, recording gage 1.2 miles downstream of present site at present datum. Since September 1938, auxiliary water-stage recorder 5.6 mi downstream.

REMARKS.--Records good to fair except those for estimated days, which are fair to poor. Slight regulation except during extreme floods by reservoirs on headquarters and by power plants. Beginning July 20,1939, sewage from Minnespolis and St. Paul, which formerly entered the river above station, was diverted to a wastewater treatment plant, thence to river below station. Figures do not include this diversion.

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	3540	16100	15200	e8470	e7520	e9410	17600	31500	40100	22000	18600	14000
2	3770	16100	15100	e8400	e7530	e9380	18000	28800	36800	22500	17700	13400
3	4050	16500	15300	e8400	e7550	e9510	18500	26000	34100	21800	16500	13800
4	3670	15600	15500	e8240	e7520	e9350	18800	23000	33200	22200	15400	13300
5	3760	15000	15200	e8160	e7130	e9890	19800	22200	32300	23900	15200	13000
6	3980	14000	15400	e7960	e7860	e10100	19800	21400	30800	24800	15000	13300
7	4430	13800	15600	e7840	e7590	e10400	21900	21000	28900	24800	14800	13500
8	4150	13300	15500	e7700	e7610	e10600	25500	21100	28600	23800	14200	14000
9	4560	12900	15400	e7550	e7790	e10400	29800	21600	28900	22800	13700	14400
10	4140	12500	15100	e7450	e7630	10300	32600	22600	29100	22900	13200	14000
11	4800	13100	14800	e7310	e7760	10100	36000	28500	31400	22000	13200	14200
12	4670	13600	14300	e7050	e7750	e10300	38100	34100	31700	20600	13900	14000
13	5090	14400	14300	e7040	e7640	e10400	39300	40000	32000	20100	13000	14100
14	5150	14500	14300	e6830	e8630	e10100	40300	45000	32800	18900	14200	14100
15	4970	15700	14000	e6830	e8780	e10200	41900	49000	33300	18700	14100	14400
16	5390	15000	14300	e6840	e8360	10100	43600	52400	33500	18300	14400	14000
17	6110	15300	13800	e6840	e8980	e10100	44800	56200	34200	17800	15400	14300
18	6390	15200	13700	e6830	e9880	e11300	45200	58100	34200	17700	16000	13900
19	7780	14700	12800	e6930	e10400	e14000	46100	60000	33600	17600	16100	13600
20	9920	15000	11500	e6930	e10700	15600	45900	61500	33300	18100	16300	13200
21	13100	15200	9430	e6930	e10500	16700	45300	61600	32000	18400	15400	12900
22	14400	14300	e7510	e6940	e10200	17600	44600	60600	30000	19900	15300	12000
23	16300	14300	e6590	e6920	e10400	18200	43500	59400	29700	21400	16800	11700
24	15800	15100	e7390	e7140	e10300	18400	42300	57800	30200	22900	16100	11400
25	15700	14600	e7700	e7150	e9930	18000	40700	56100	24300	23900	15900	11000
26	15300	15200	e8040	e7260	e9630	17400	39000	54400	23500	24400	16100	10500
27	15300	15700	e8150	e7260	e9560	16700	36900	52900	22500	25600	15700	10500
28	15700	15000	e8400	e7320	e9480	16000	35800	51100	22300	24000	15100	10200
29	14700	15200	e8640	e7330	---	16400	34400	49100	22200	22000	14800	10800
30	14400	15300	e8680	e7440	---	16900	33200	46700	22200	20400	14400	10700
31	14800	---	e8480	e7440	---	17300	---	43300	---	19300	13500	---
TOTAL	265820	442200	380110	228630	244610	401140	1039300	1317000	911700	663500	470000	388200
MEAN	8575	14740	12260	7375	8736	12940	34640	42480	30390	21400	15160	12940
MAX	16300	16500	15600	8470	10700	18400	46100	61600	40100	25600	18600	14400
MIN	3540	12500	6590	6830	7130	9350	17600	21000	22200	17600	13000	10200
AC-FT	527300	877100	753900	453500	485200	795700	2061000	2612000	1808000	1316000	932200	770000
CFSM	.23	.40	.33	.20	.24	.35	.94	1.15	.83	.58	.41	.35
IN.	.27	.45	.38	.23	.25	.41	1.05	1.33	.92	.67	.48	.39

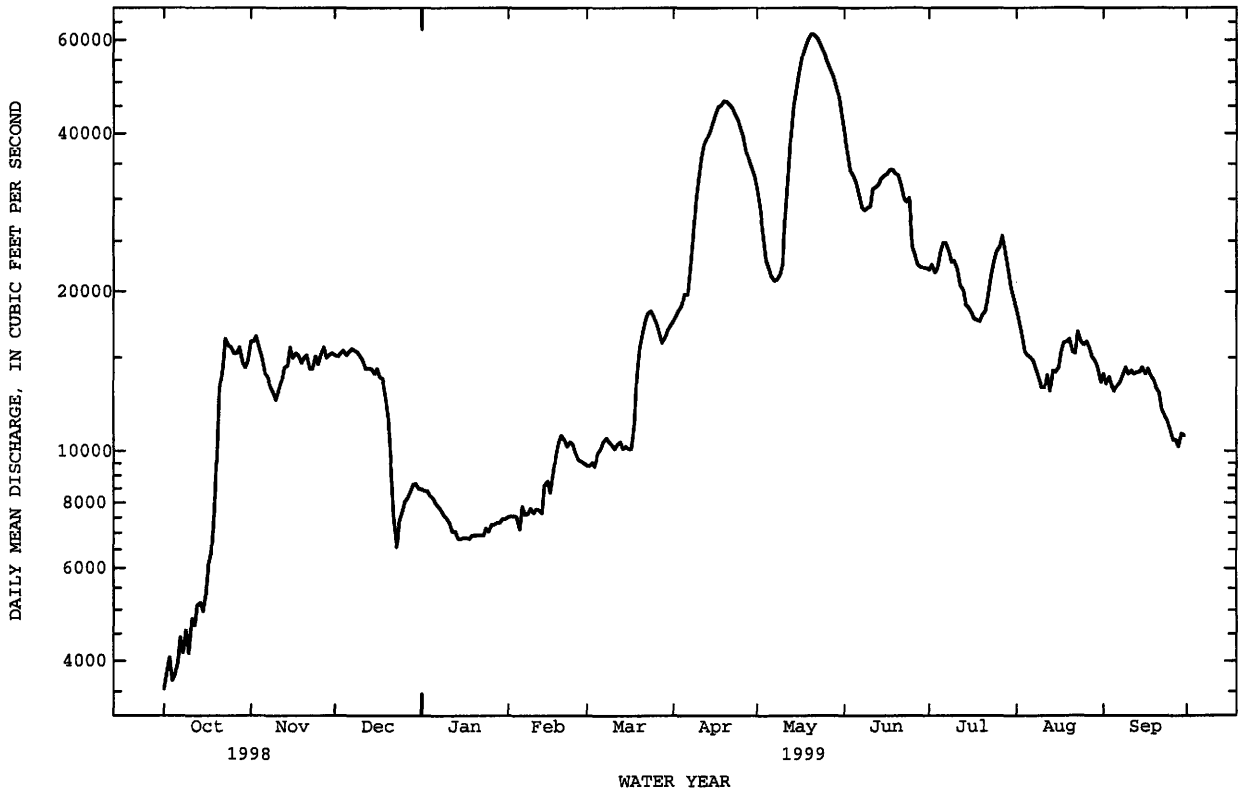
e Estimated

05331000 MISSISSIPPI RIVER AT ST. PAUL, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1892 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	8576	7889	5716	4611	4586	11210	26140	20990	18210	14480	8960	8106
MAX	38210	27660	16080	11500	14700	43240	91610	66470	57170	73590	42550	34380
(WY)	1987	1972	1983	1983	1966	1983	1969	1986	1993	1993	1993	1986
MIN	1289	1348	1277	1097	1300	1757	3421	3085	1980	1272	864	1143
(WY)	1937	1937	1935	1935	1895	1940	1895	1934	1934	1934	1934	1934

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1892 - 1999	
ANNUAL TOTAL	5663800		6752210			
ANNUAL MEAN	15520		18500		11700	
HIGHEST ANNUAL MEAN					29580	1986
LOWEST ANNUAL MEAN					1935	1934
HIGHEST DAILY MEAN	53900	Apr 9	61600	May 21	171000	Apr 16 1965
LOWEST DAILY MEAN	3540	Oct 1	3540	Oct 1	632	Aug 26 1934
ANNUAL SEVEN-DAY MINIMUM	3800	Sep 30	3890	Oct 1	741	Aug 26 1934
INSTANTANEOUS PEAK FLOW			62600	May 20	171000	Apr 16 1965
INSTANTANEOUS PEAK STAGE			12.57	May 20	26.01	Apr 16 1965
ANNUAL RUNOFF (AC-FT)	11230000		13390000		8474000	
ANNUAL RUNOFF (CFSM)	.42		.50		.32	
ANNUAL RUNOFF (INCHES)	5.73		6.83		4.32	
10 PERCENT EXCEEDS	30100		36800		27500	
50 PERCENT EXCEEDS	14400		15000		7210	
90 PERCENT EXCEEDS	5230		7290		2720	



05331580 MISSISSIPPI RIVER BELOW LOCK AND DAM 2, AT HASTINGS, MN

LOCATION.--Lat 44°44'48", long 92°51'08", SE¼SE¼ sec. 21, T.115 N., R.17 W., Dakota County, Hydrologic Unit 07010206, near bridge on U.S. Highway 61 in Hastings, 1.2 mi downstream from Lock and Dam 2, 2.5 mi upstream from St. Croix River, and at mile 813.8 upstream from Ohio River.

DRAINAGE AREA.--37,050 mi^2.

PERIOD OF RECORD.--October 1996 to current year.

REMARKS.-- Records considered fair. Water-discharge computed on the basis of routed discharge for Mississippi River at St. Paul (station 05331000) adjusted for inflow and travel time.

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

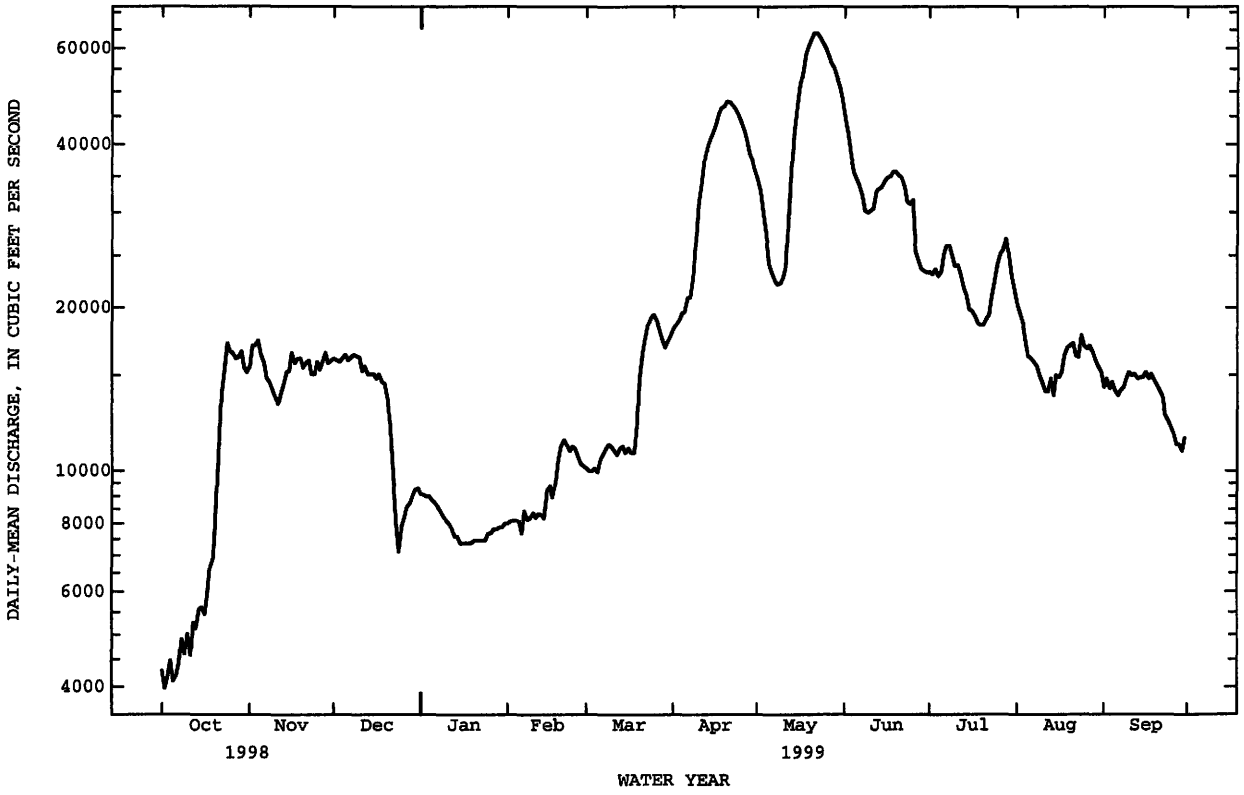
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4290	15600	16100	9070	8000	10100	18300	34700	45100	23300	20300	14300
2	3980	17000	16000	9040	8090	10000	18600	32900	41800	23100	19600	14800
3	4210	17000	15900	8970	8100	9990	19000	30100	38400	23600	18700	14200
4	4480	17400	16100	8990	8120	10100	19500	27200	35600	22900	17400	14600
5	4100	16400	16400	8820	8080	9950	19700	24200	34700	23300	16300	14100
6	4210	15800	16000	8740	7690	10500	20900	23300	33800	25100	16100	13800
7	4430	14800	16200	8570	8430	10700	20900	22500	32200	26000	15900	14100
8	4900	14600	16400	8410	8150	11000	23000	22100	30300	26000	15600	14300
9	4600	14100	16300	8260	8190	11200	26700	22200	30000	25000	15000	14800
10	5020	13700	16200	8110	8360	11100	31100	22700	30300	23900	14600	15200
11	4580	13300	15300	8000	8210	10900	34100	23700	30500	24000	14000	15000
12	5260	13900	15600	7860	8350	10700	37600	29900	32900	23100	14000	15100
13	5140	14400	15100	7590	8300	11000	39800	35900	33200	21700	14800	14800
14	5570	15200	15100	7580	8190	11100	41000	41800	33400	21100	13800	14900
15	5630	15300	15100	7360	9210	10800	42000	47000	34300	19900	15000	14900
16	5460	16500	14800	7370	9390	11000	43700	51100	34800	19700	14900	15200
17	5950	15800	15100	7380	8940	10800	45500	54600	35000	19300	15200	14800
18	6640	16100	14600	7370	9590	10800	46700	58600	35700	18700	16300	15100
19	6940	16100	14500	7380	10500	12000	47100	60500	35700	18600	16900	14700
20	8380	15500	13500	7470	11100	14800	48000	62500	35100	18600	17000	14400
21	10600	15800	12200	7470	11400	16500	47800	64100	34800	19100	17200	14000
22	13900	16000	10100	7460	11200	17600	47200	64200	33500	19400	16300	13700
23	15200	15100	8070	7470	10900	18600	46500	63100	31400	20900	16200	12700
24	17200	15100	7120	7450	11100	19200	45300	61800	31100	22500	17800	12400
25	16600	15900	7930	7670	11000	19400	44100	60200	31600	24000	17000	12100
26	16500	15400	8220	7690	10600	18900	42400	58400	25500	25200	16800	11700
27	16100	16000	8590	7810	10300	18300	40700	56600	24600	25600	17000	11200
28	16200	16500	8710	7810	10200	17600	38500	55100	23600	26800	16600	11200
29	16600	15800	8990	7870	---	16900	37400	53200	23400	25200	16000	10900
30	15500	16000	9230	7880	---	17300	35900	51100	23200	23100	15600	11500
31	15200	---	9280	8000	---	17800	---	48600	---	21500	15200	---
TOTAL	273370	466100	408740	246920	259690	416640	1069000	1363900	975500	700200	503100	414500
MEAN	8818	15540	13190	7965	9275	13440	35630	44000	32520	22590	16230	13820
MAX	17200	17400	16400	9070	11400	19400	48000	64200	45100	26800	20300	15200
MIN	3980	13300	7120	7360	7690	9950	18300	22100	23200	18600	13800	10900
AC-FT	542200	924500	810700	489800	515100	826400	2120000	2705000	1935000	1389000	997900	822200
CFSM	.24	.42	.36	.21	.25	.36	.96	1.19	.88	.61	.44	.37
IN.	.27	.47	.41	.25	.26	.42	1.07	1.37	.98	.70	.50	.42

05331580 MISSISSIPPI RIVER BELOW LOCK AND DAM 2, AT HASTINGS, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1996 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	12820	16270	12190	8597	9169	17360	53940	35480	25440	25050	14340	9033
MAX	25600	24960	13290	9657	10040	20360	93250	44000	32520	36910	23560	13820
(WY)	1996	1996	1997	1996	1998	1998	1997	1999	1999	1997	1997	1999
MIN	6771	10400	9937	7509	8476	13440	35630	19660	16100	16490	8121	5247
(WY)	1997	1998	1998	1998	1996	1999	1999	1998	1997	1996	1998	1998

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1996 - 1999	
ANNUAL TOTAL	5975460		7097660			
ANNUAL MEAN	16370		19450		19990	
HIGHEST ANNUAL MEAN					24330	1997
LOWEST ANNUAL MEAN					15780	1998
HIGHEST DAILY MEAN	56100	Apr 10	64200	May 22	138000	Apr 13 1997
LOWEST DAILY MEAN	3980	Oct 2	3980	Oct 2	3980	Oct 2 1998
ANNUAL SEVEN-DAY MINIMUM	4240	Oct 1	4240	Oct 1	4240	Oct 1 1998
ANNUAL RUNOFF (AC-FT)	11850000		14080000		14480000	
ANNUAL RUNOFF (CFSM)	.44		.52		.54	
ANNUAL RUNOFF (INCHES)	5.99		7.12		7.32	
10 PERCENT EXCEEDS	31500		38400		40400	
50 PERCENT EXCEEDS	15200		15800		14800	
90 PERCENT EXCEEDS	5740		7810		7420	



05331580 MISSISSIPPI RIVER AT HASTINGS, MN--Continued
(National Water-Quality Assessment Program)

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1996 to current year. NASQAN samples previously collected at Mississippi River at Ninninger (station no. 05331570), January 1977 to September 1995.

PERIOD OF DAILY RECORD:

WATER TEMPERATURES.-- 1996 to 1998 (non-winter months).

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

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM) (90095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	PH WATER WHOLE LAB (STAND-ARD UNITS) (00403)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)
MAR										
11...	1140	617	653	8.0	8.2	1.0	757	15.1	107	280
APR										
05...	1110	678	532	8.3	8.0	10.0	--	--	--	230
MAY										
11...	1320	582	592	8.2	8.2	16.1	744	8.9	93	270
26...	1200	526	533	8.0	8.0	16.9	748	--	--	250
JUN										
22...	1320	638	633	8.1	8.2	21.1	742	8.2	95	280
JUL										
13...	1300	601	618	8.1	7.8	24.7	742	7.5	93	280
AUG										
04...	1030	477	476	8.1	8.4	25.6	748	7.7	96	220
SEP										
14...	1215	415	418	8.1	8.1	17.0	749	8.4	89	190
15...	1240	401	--	8.1	--	17.2	752	6.7	70	--

DATE	ALKA-LINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)	BICAR-BONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN,AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)
MAR									
11...	210	256	.070	.042	.60	.87	2.67	.182	.117
APR									
05...	175	214	.051	.022	.60	1.1	1.48	.169	.071
MAY									
11...	186	227	--	--	--	--	--	--	--
26...	--	--	.023	.033	.97	1.5	5.10	.212	.068
JUN									
22...	198	242	<.020	.041	.68	1.1	6.32	.236	.111
JUL									
13...	190	232	.030	.045	.69	1.1	4.52	.264	.126
AUG									
04...	167	204	.057	.033	.66	1.3	2.06	.265	.132
SEP									
14...	151	184	.108	.021	.71	1.2	.773	.183	.102
15...	--	--	--	--	--	--	--	--	--

05331580 MISSISSIPPI RIVER AT HASTINGS, MN--Continued
(National Water-Quality Assessment Program)

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

DATE	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (00689)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)
MAR									
11...	.119	6.4	.70	69	26	21	.5	3.8	28
APR									
05...	.047	7.5	1.1	58	22	14	.4	3.5	20
MAY									
11...	--	7.6	>2.5	66	26	15	.4	3.4	20
26...	.053	11	2.3	61	23	11	.3	2.6	17
JUN									
22...	.094	8.1	2.5	69	26	13	.3	2.8	21
JUL									
13...	.105	7.9	1.3	66	27	15	.4	3.0	22
AUG									
04...	.090	9.4	1.9	56	21	14	.4	2.5	18
SEP									
14...	.086	--	--	46	18	15	.5	2.7	19
15...	--	12	.20	--	--	--	--	--	--

DATE	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
MAR									
11...	70	.24	12	30	35	406	369	15	80
APR									
05...	58	.20	9.9	57	30	332	297	31	98
MAY									
11...	70	.24	8.1	E6.6	9.1	372	320	63	99
26...	54	.20	13	34	16	346	--	106	94
JUN									
22...	74	.31	15	E5.9	12	416	369	2	33
JUL									
13...	64	.33	17	<10	11	391	348	77	99
AUG									
04...	37	.23	17	14	4.9	305	276	58	97
SEP									
14...	28	.16	13	27	<2.2	258	236	60	97
15...	--	--	--	--	--	--	--	--	--

05333579 UPPER TAMARACK RIVER AT COUNTY ROAD 25 NEAR MARKVILLE, MN

LOCATION.--Lat 46°05'30", long 92°18'32", in NW¼SE¼ sec. 25, T. 42 N., R. 16 W., Pine County, Hydrologic Unit 07030001, at County Hughway 25 bridge, 1 mile east of Markville.

DRAINAGE AREA.--63.4 mi^2.

PERIOD OF RECORD.--October 1998 to November 1999.

GAGE.--Water-stage recorder.

REMARKS.--Records good except those for estimated daily discharges, which are poor.

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	e27	e33	e37	e13	11	15	280	45	19	101	665	58
2	e30	e33	e35	e13	12	15	257	39	19	91	573	50
3	e31	e32	33	e13	12	15	230	34	17	94	536	44
4	e28	e31	32	e14	12	14	326	31	15	112	627	41
5	e28	e30	45	e13	11	13	406	35	32	144	540	55
6	e39	e29	72	e12	10	13	548	79	115	172	393	77
7	e34	e28	87	e11	10	12	618	186	207	168	300	75
8	e32	e27	e80	e11	12	11	586	238	198	160	246	147
9	e30	e27	e70	e10	13	12	502	223	152	148	182	215
10	e29	e52	e60	e9.6	14	12	408	183	112	140	126	219
11	e28	e80	e52	e9.0	15	12	367	151	123	134	139	151
12	e35	e72	e49	e9.4	16	11	335	171	182	112	175	132
13	e35	e66	e45	e10	15	11	311	174	175	89	381	135
14	e27	e58	e40	e11	15	12	266	160	137	75	324	134
15	e25	e54	e35	e11	15	14	176	135	99	63	270	116
16	e40	e50	e28	e12	15	19	224	115	75	59	198	96
17	e64	e46	e26	e14	15	22	237	110	58	69	97	83
18	e74	e44	e24	e15	14	25	223	108	46	90	107	73
19	e56	e54	e22	e14	14	31	201	98	37	100	123	70
20	e47	e66	e21	e13	13	37	178	93	32	82	115	75
21	e39	e52	e20	e12	12	49	159	89	25	69	102	71
22	e36	e54	e18	e12	11	56	142	80	53	58	93	64
23	e37	e60	e17	e12	11	67	125	74	123	75	151	55
24	e30	e74	e17	e12	10	76	111	70	178	138	254	48
25	e32	e68	e16	e11	11	80	97	65	184	153	209	43
26	e35	e62	e17	e10	11	83	85	56	175	444	159	54
27	e37	e60	e16	e10	12	90	76	47	148	760	131	79
28	e34	e54	e15	e11	13	161	67	39	121	869	112	85
29	e35	e48	e16	13	---	291	60	33	112	594	95	76
30	e40	e42	e15	12	---	290	52	26	104	415	79	65
31	e39	---	e14	11	---	302	---	22	---	576	68	---
TOTAL	1133	1486	1074	364.0	355	1871	7653	3009	3073	6354	7570	2686
MEAN	36.5	49.5	34.6	11.7	12.7	60.4	255	97.1	102	205	244	89.5
MAX	74	80	87	15	16	302	618	238	207	869	665	219
MIN	25	27	14	9.0	10	11	52	22	15	58	68	41
AC-FT	2250	2950	2130	722	704	3710	15180	5970	6100	12600	15020	5330

e Estimated

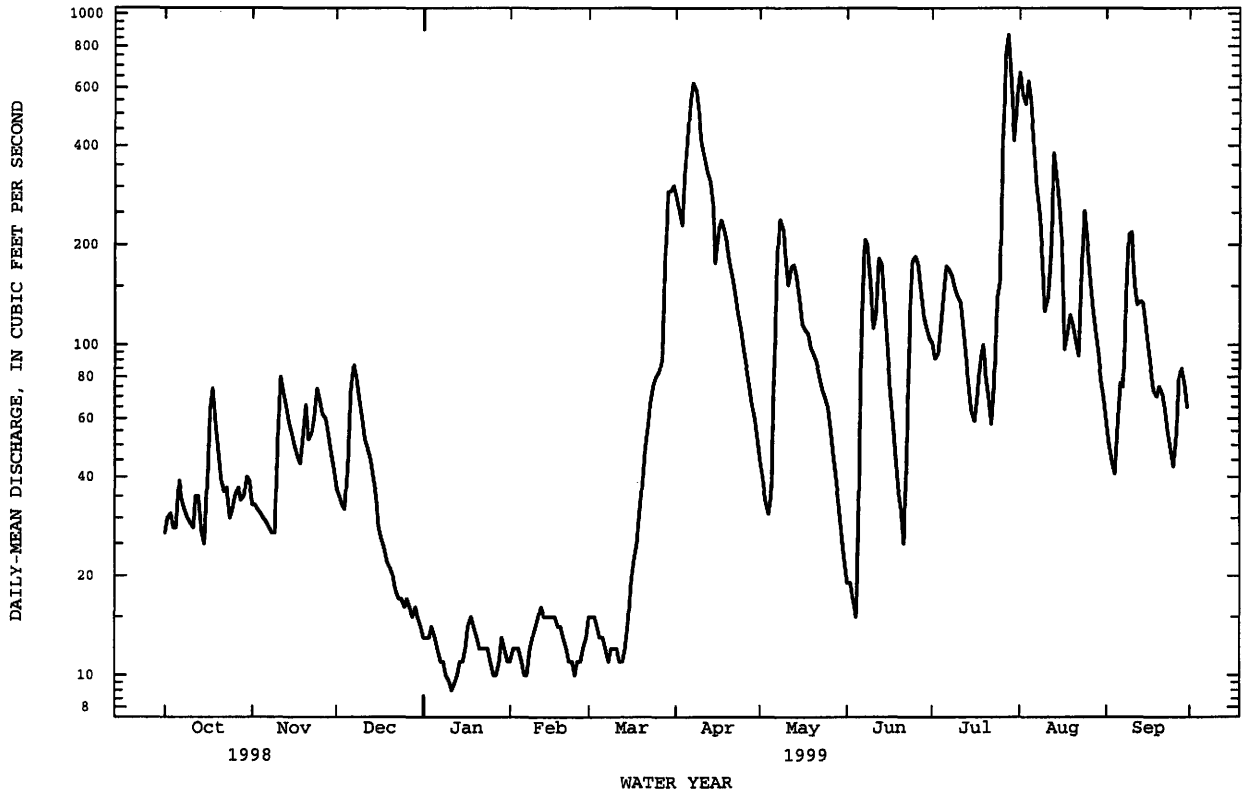
05333579 UPPER TAMARACK RIVER AT COUNTY ROAD 25 NEAR MARKVILLE, MN--Continued

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

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	36.5	49.5	34.6	11.7	12.7	60.4	255	97.1	102	205	244	89.5
MAX	36.5	49.5	34.6	11.7	12.7	60.4	255	97.1	102	205	244	89.5
(WY)	1999	1999	1999	1999	1999	1999	1999	1999	1999	1999	1999	1999
MIN	36.5	49.5	34.6	11.7	12.7	60.4	255	97.1	102	205	244	89.5
(WY)	1999	1999	1999	1999	1999	1999	1999	1999	1999	1999	1999	1999

SUMMARY STATISTICS	FOR 1999 WATER YEAR	
ANNUAL TOTAL	36628.0	
ANNUAL MEAN	100	
HIGHEST DAILY MEAN	869	Jul 28
LOWEST DAILY MEAN	9.0	Jan 11a
ANNUAL SEVEN-DAY MINIMUM	10	Jan 7
INSTANTANEOUS PEAK FLOW	937	Jul 28
INSTANTANEOUS PEAK STAGE	8.21	Jul 28
ANNUAL RUNOFF (AC-FT)	72650	
10 PERCENT EXCEEDS	233	
50 PERCENT EXCEEDS	55	
90 PERCENT EXCEEDS	12	

a Estimated daily-mean.



05333579 UPPER TAMARACK RIVER AT CO. RD. 25 NR MARKVILLE, MN--Continued
(National Water Quality Assessment Program)

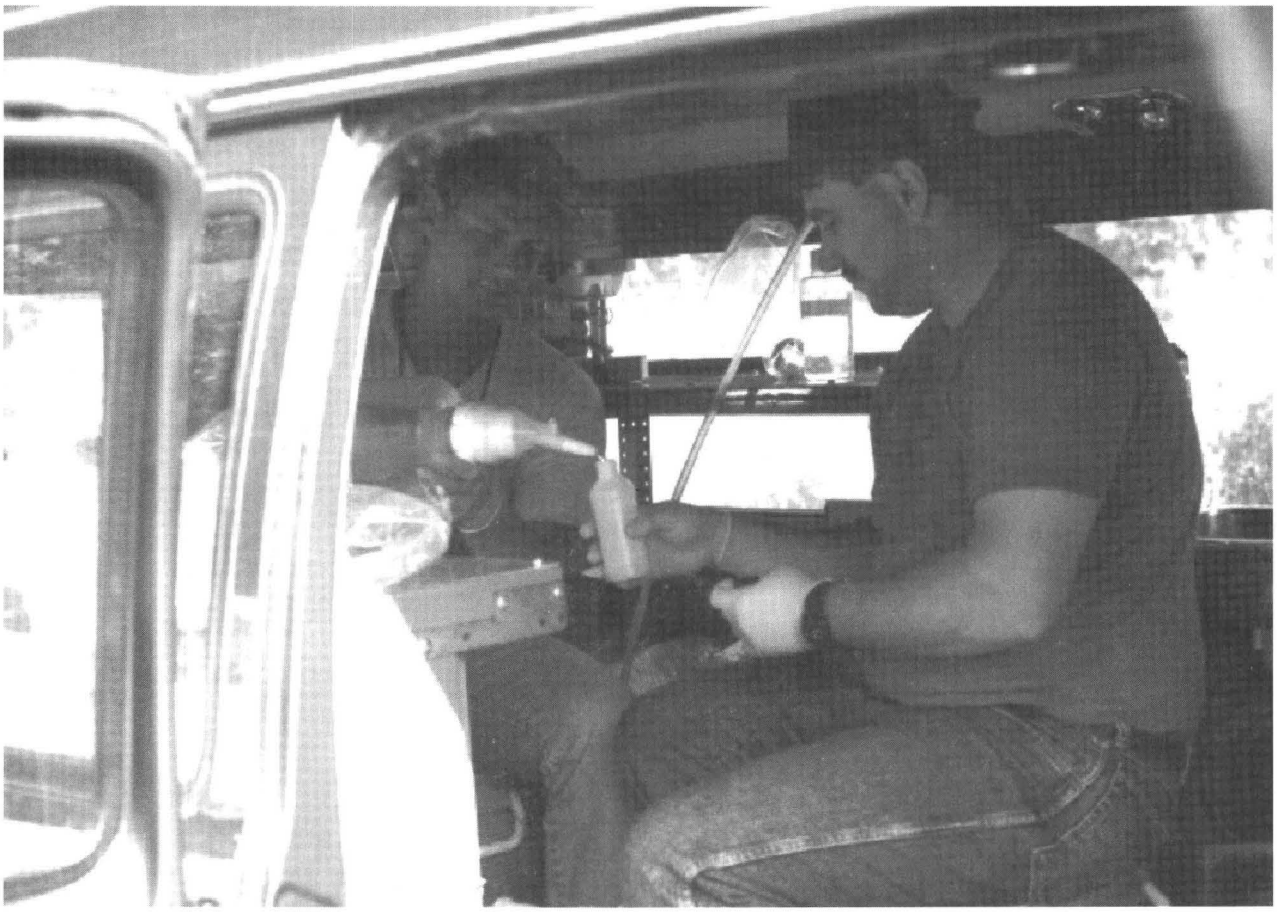
WATER-QUALITY RECORDS

PERIOD OF RECORD.--November 1998 to September 1999.

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)	OXYGEN, DIS-SOLVED (MG/L) (00300)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)
NOV									
23...	1500	60	107	7.9	2.6	7.6	.029	<.010	.71
DEC									
10...	1220	60	97	7.5	.1	5.0	.025	<.010	.68
JAN									
14...	1545	11	358	7.7	.6	12.6	.069	.014	.91
FEB									
24...	1250	10	206	7.3	-.1	--	.129	<.010	.81
MAR									
12...	1440	12	192	6.8	-.1	12.7	.096	<.010	.64
29...	1610	300	77	7.0	1.6	13.5	.108	<.010	.83
APR									
07...	0950	564	40	6.4	2.6	12.9	.030	<.010	.87
29...	1300	59	62	7.9	14.7	10.9	.031	<.010	.82
MAY									
12...	1300	174	52	7.4	11.9	10.9	<.020	<.010	1.1
JUN									
10...	1630	104	62	7.8	22.4	7.7	<.020	<.010	1.2
24...	1040	178	56	7.1	20.0	8.7	<.020	<.010	1.2
JUL									
09...	1010	1010	62	7.4	19.1	8.8	.021	<.010	1.6
26...	1200	397	52	7.0	23.1	8.1	<.020	<.010	1.4
26...	1630	572	--	--	--	--	--	--	--
AUG									
11...	1145	120	69	7.4	19.3	9.0	.038	<.010	1.3
SEP									
08...	1315	101	78	7.5	19.8	9.2	<.020	<.010	1.1

DATE	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
NOV								
23...	.72	.189	E.030	<0.05	<.010	3.5	15	62
DEC								
10...	.80	.148	<.050	<0.05	.012	2.9	1	67
JAN								
14...	.95	2.70	.025	.019	.017	12	5	84
FEB								
24...	.79	.209	.029	.021	.015	8.4	2	70
MAR								
12...	.63	.241	.027	.020	.018	8.1	3	59
29...	1.6	.383	.124	.023	.010	2.2	52	79
APR								
07...	.38	.224	.043	.021	<.010	1.3	11	61
29...	2.0	<.050	.020	.014	.017	2.4	7	44
MAY								
12...	2.5	<.050	.025	.014	<.010	1.4	6	75
JUN								
10...	3.1	.071	.047	.026	.018	1.4	7	91
24...	1.3	.067	.060	.036	.020	1.2	64	22
JUL								
09...	1.6	.104	.074	.044	<.010	1.4	--	--
26...	1.6	.107	.100	.042	<.010	.56	23	63
26...	--	--	.108	--	--	--	--	--
AUG								
11...	1.3	.113	.075	.037	.011	1.4	8	83
SEP								
08...	1.2	.128	.064	.038	.012	1.9	5	96



Water quality sample processing, 1998.

05335151 LOWER TAMARACK RIVER NEAR MARKVILLE, MN

LOCATION.--Lat 46°04'49", long 92°23'37", in SE¼NW¼ sec. 32, T. 42 N., R. 16 W., Pine County, Hydrologic Unit 07030001, at township road 3 miles southeast of Markville.

DRAINAGE AREA.-- 188 mi^2.

PERIOD OF RECORD.--October 1998 to November 1999.

GAGE.--Water-stage recorder.

REMARKS.--Records good except those for estimated daily discharges, which are poor.

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	e31	e31	e70	e37	e18	e19	413	93	50	178	1270	120
2	e29	e30	e68	e30	e18	e19	367	85	50	177	882	103
3	e28	e30	65	e26	e17	e19	333	77	49	165	641	96
4	e28	e29	62	e22	e17	e18	456	72	45	179	930	89
5	e28	e28	79	e20	e17	e17	740	87	69	171	919	115
6	e29	e28	138	e19	e17	e16	888	138	240	216	634	136
7	e31	e28	135	e17	e17	e15	994	283	292	225	437	118
8	e33	e28	117	e16	e17	e15	981	425	301	197	327	186
9	e34	e29	112	e15	e17	e15	823	389	248	217	273	287
10	e33	e65	110	e14	e18	e15	642	316	200	188	282	264
11	e32	e84	89	e13	e19	e15	553	270	198	153	265	209
12	e30	e80	85	e14	e20	e15	538	307	257	129	259	191
13	e29	e76	81	e15	e20	e16	483	319	232	111	518	209
14	e29	e74	71	e16	e19	e17	416	284	176	97	589	186
15	e29	e72	73	e17	e20	e18	373	245	132	87	435	164
16	e31	e70	59	e18	e19	e20	406	219	102	83	326	139
17	e50	e70	59	e19	e19	e24	401	214	85	105	260	122
18	e56	e68	57	e19	e19	e27	359	210	69	99	239	109
19	e52	e74	e56	e19	e19	e32	322	183	58	112	240	103
20	e47	e84	e54	e19	e19	38	286	173	52	115	210	112
21	e44	e76	e50	e19	e19	42	257	176	45	93	186	99
22	e41	e76	e48	e20	e18	48	235	158	104	81	175	89
23	e38	e80	e47	e19	e18	52	209	144	267	72	232	81
24	e36	e100	e47	e18	e18	59	186	139	497	118	490	74
25	e34	e92	e45	e18	e18	65	168	123	436	129	449	69
26	e32	e88	e43	e18	e18	71	150	106	336	256	310	78
27	e32	e82	e40	e17	e18	88	135	93	255	437	248	115
28	e32	e80	e41	e18	e19	207	123	82	211	381	219	111
29	e32	e76	e42	e18	---	403	113	72	219	281	192	95
30	e32	e74	e44	e18	---	470	101	63	197	233	163	85
31	e32	---	e42	e18	---	457	---	54	---	742	141	---
TOTAL	1074	1902	2129	586	512	2352	12451	5599	5472	5827	12741	3954
MEAN	34.6	63.4	68.7	18.9	18.3	75.9	415	181	182	188	411	132
MAX	56	100	138	37	20	470	994	425	497	742	1270	287
MIN	28	28	40	13	17	15	101	54	45	72	141	69
AC-FT	2130	3770	4220	1160	1020	4670	24700	11110	10850	11560	25270	7840
CFSM	.18	.34	.37	.10	.10	.40	2.21	.96	.97	1.00	2.19	.70
IN.	.21	.38	.42	.12	.10	.47	2.46	1.11	1.08	1.15	2.52	.78

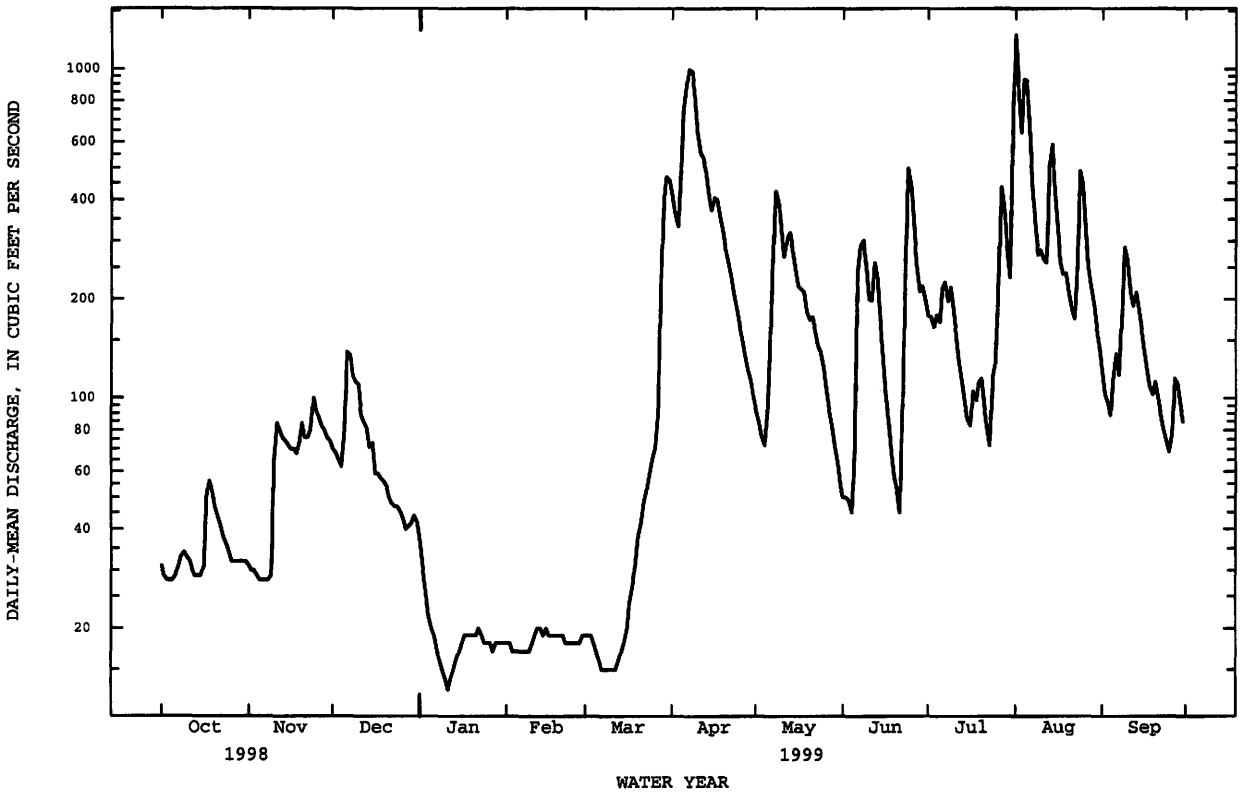
e Estimated

05335151 LOWER TAMARACK RIVER NEAR MARKVILLE, MN--Continued

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

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	34.6	63.4	68.7	18.9	18.3	75.9	415	181	182	188	411	132
MAX	34.6	63.4	68.7	18.9	18.3	75.9	415	181	182	188	411	132
(WY)	1999	1999	1999	1999	1999	1999	1999	1999	1999	1999	1999	1999
MIN	34.6	63.4	68.7	18.9	18.3	75.9	415	181	182	188	411	132
(WY)	1999	1999	1999	1999	1999	1999	1999	1999	1999	1999	1999	1999

SUMMARY STATISTICS	FOR 1999 WATER YEAR	
ANNUAL TOTAL	54599	
ANNUAL MEAN	150	
HIGHEST DAILY MEAN	1270	Aug 1
LOWEST DAILY MEAN	13	Jan 11
ANNUAL SEVEN-DAY MINIMUM	15	Jan 8
INSTANTANEOUS PEAK FLOW	1340	Aug 1
INSTANTANEOUS PEAK STAGE	10.45	Aug 1
ANNUAL RUNOFF (AC-FT)	108300	
ANNUAL RUNOFF (CFSM)	.80	
ANNUAL RUNOFF (INCHES)	10.80	
10 PERCENT EXCEEDS	376	
50 PERCENT EXCEEDS	81	
90 PERCENT EXCEEDS	18	



05335151 LOWER TAMARACK RIVER NEAR MARKVILLE, MN--Continued
(National Water Quality Assessment Program)

WATER-QUALITY RECORDS

PERIOD OF RECORD.--November 1998 to September 1999.

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

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	DIS-CHARGE, IN CUBIC FEET PER SECOND (00060)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	OXYGEN, DIS-SOLVED (MG/L) (00300)	ALKA-LINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)
NOV										
23...	1550	80	--	121	7.7	2.3	5.6	--	.028	<.010
DEC										
10...	1430	114	--	--	--	--	--	--	.028	<.010
JAN										
14...	1645	16	--	192	7.6	.1	12.8	--	.112	.013
FEB										
24...	1030	18	--	231	7.2	-.1	--	--	.113	<.010
MAR										
12...	1630	15	--	232	7.4	.9	12.9	10	.067	<.010
29...	1210	380	380	66	7.0	1.8	12.9	--	.106	<.010
APR										
07...	1120	994	--	40	6.3	3.3	11.8	--	.029	<.010
29...	0950	114	--	69	7.3	11.9	10.1	--	.032	<.010
MAY										
12...	1120	308	--	55	7.3	11.5	9.8	--	.028	<.010
JUN										
10...	1420	196	--	67	7.2	21.8	7.0	--	.044	<.010
24...	0930	527	--	60	6.9	20.0	7.1	--	.038	<.010
JUL										
09...	1130	221	--	77	7.2	19.7	7.4	--	.027	<.010
26...	1300	258	--	78	6.9	25.5	6.5	--	.049	<.010
AUG										
11...	0950	271	--	72	7.3	18.8	7.4	--	.053	<.010
SEP										
08...	1450	224	--	98	7.3	19.3	8.3	--	<.020	<.010

DATE	NITRO-GEN, AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
NOV									
23...	.63	.70	.146	E.040	<0.05	.014	2.7	3	100
DEC									
10...	.71	.83	.094	<.050	<0.05	.014	1.7	2	67
JAN									
14...	.67	.71	.101	.032	.023	.021	4.8	3	82
FEB									
24...	.48	.51	.168	.037	.021	.015	5.9	2	75
MAR									
12...	.41	.40	.193	.034	.018	.020	6.6	3	95
29...	.81	1.1	.485	.090	.029	.017	1.2	18	92
APR									
07...	.84	.88	.224	.055	.026	.010	.64	16	80
29...	.78	2.2	<.050	.028	.016	.017	1.3	5	89
MAY									
12...	1.0	2.3	<.050	.034	.018	<.010	.52	5	89
JUN									
10...	1.2	2.1	.051	.051	.029	.018	.51	7	78
24...	1.0	1.2	.055	.082	.038	.026	.92	20	87
JUL									
09...	1.3	1.5	.082	.081	.051	.015	.63	--	--
26...	1.1	1.4	.119	.092	.034	.010	<.10	10	98
AUG									
11...	1.2	1.3	.054	.079	.037	.014	.68	11	88
SEP									
08...	1.1	1.4	.086	.093	.036	.018	1.2	16	89

3-wheel base bridge measuring gear.

05336700 KETTLE RIVER BELOW SANDSTONE, MN

LOCATION.--Lat 46°06'20", long 92°51'50", in NW¼SW¼ sec. 22, T.42 N., R.20 W., Pine County, Hydrologic Unit 07030003, on Sandstone Federal Correctional Institution property, on left bank, about 1.8 mi south of Sandstone.

DRAINAGE AREA.--868 mi^2.

PERIOD OF RECORD.--October 1967 to current year.

GAGE.--Water-stage recorder and crest-stage gage. Datum of gage is 931.50 ft above sea level. (Minnesota Department of Transportation bench mark).

REMARKS.--Records good except those for estimated daily discharge, which are fair.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in April 1965 reached a stage of 12.96 ft, from flood marks, discharge, 13,400 ft^3/s.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 3,200 ft^3/s (revised) and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Apr 8	2230	*3,950	*7.90	No other peak greater than base discharge.			

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	103	207	527	e185	e148	e144	2050	551	347	542	1430	956
2	99	199	501	e186	e149	e148	1930	503	334	500	1290	816
3	98	192	479	e190	e149	e155	1750	466	318	547	1440	714
4	96	187	456	e190	e150	e161	1930	434	290	611	1830	681
5	102	182	503	e188	e150	e168	2950	436	452	623	1690	676
6	114	178	800	e186	e150	e165	3080	524	821	685	1470	645
7	126	175	839	e183	e150	e159	3200	752	1050	638	1280	602
8	128	174	737	e178	e151	e153	3780	1140	1230	604	1110	663
9	125	171	675	e172	e152	e170	3740	1190	1050	646	995	711
10	127	235	651	e167	e154	e168	3330	1120	908	826	943	656
11	124	395	554	e164	e157	e165	2960	1420	773	877	894	600
12	122	484	513	e160	e160	e158	2710	2090	660	863	856	608
13	117	452	472	e157	e165	152	2430	2420	571	823	1500	723
14	116	476	421	e153	e167	148	2130	2370	489	758	2110	721
15	118	455	416	e150	e160	149	1990	2080	430	659	1910	666
16	133	451	361	e150	e159	159	2100	1820	371	688	1680	591
17	226	435	331	e152	e155	185	2120	1620	323	894	1550	535
18	285	436	e310	e151	e153	209	1920	1440	285	851	1410	491
19	292	489	e280	e150	e150	244	1730	1260	260	788	1800	465
20	269	566	e265	e150	e148	299	1570	1110	247	701	1800	476
21	258	483	e250	e150	e146	311	1440	1000	241	617	1530	462
22	233	554	e240	e150	e143	317	1320	907	279	561	1350	432
23	217	556	e230	e150	e141	332	1190	849	432	523	1480	405
24	211	656	e220	e150	e139	349	1070	824	660	563	2700	380
25	208	692	e211	e148	e139	361	971	752	695	517	2930	361
26	208	675	e203	e145	e139	365	878	671	696	904	2450	433
27	203	631	e200	e149	e140	412	795	591	646	1360	2000	1210
28	197	593	e198	e149	e140	966	725	527	582	1310	1680	1220
29	198	562	e197	e148	---	2100	657	469	530	1220	1420	1020
30	202	540	e190	e148	---	2280	601	417	479	1270	1230	856
31	201	---	e188	e148	---	2170	---	376	---	1490	1070	---
TOTAL	5256	12481	12418	4997	4204	13422	59047	32129	16449	24459	48828	19775
MEAN	170	416	401	161	150	433	1968	1036	548	789	1575	659
MAX	292	692	839	190	167	2280	3780	2420	1230	1490	2930	1220
MIN	96	171	188	145	139	144	601	376	241	500	856	361
AC-FT	10430	24760	24630	9910	8340	26620	117100	63730	32630	48510	96850	39220
CFSM	.20	.48	.46	.19	.17	.50	2.28	1.20	.64	.91	1.83	.76
IN.	.23	.54	.54	.22	.18	.58	2.55	1.38	.71	1.05	2.10	.85

e Estimated

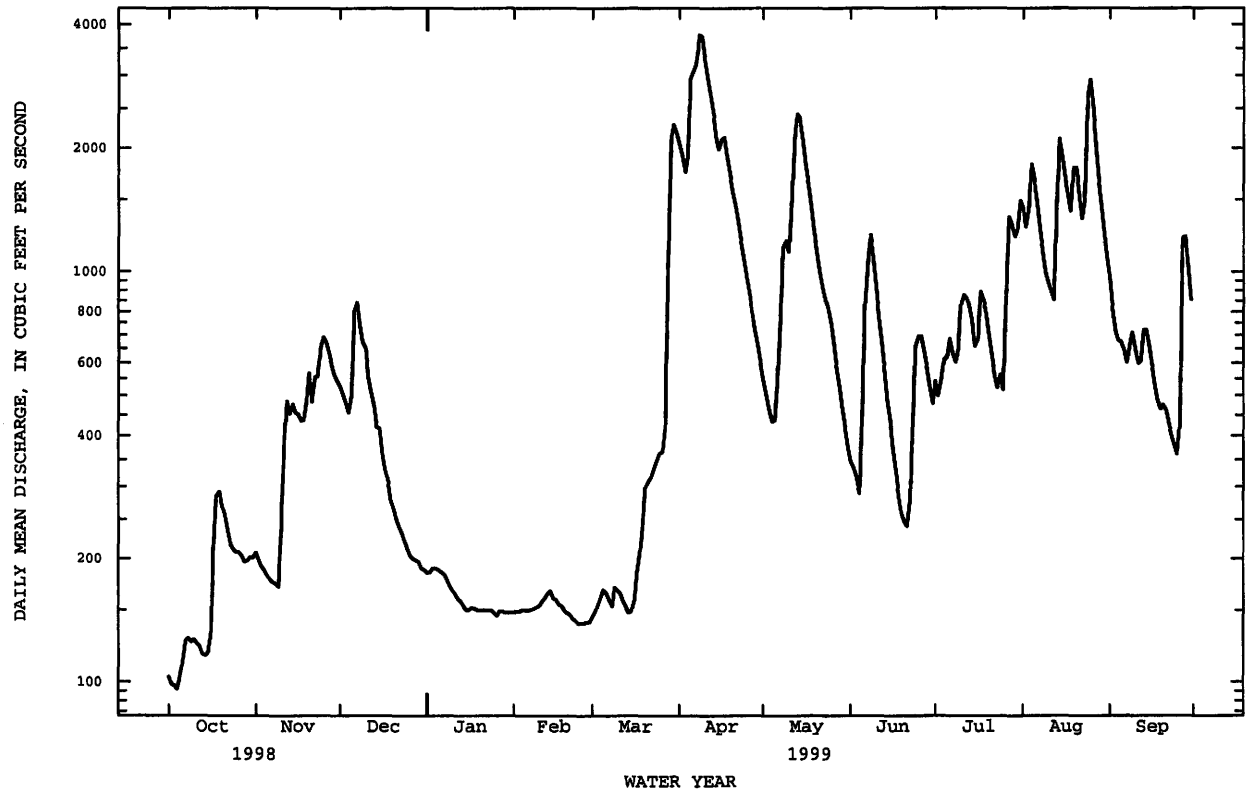
05336700 KETTLE RIVER BELOW SANDSTONE, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1968 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	725	595	288	185	185	539	2363	1224	870	678	425	548
MAX	2652	2414	652	411	447	1742	4653	3168	2799	2869	2094	3065
(WY)	1969	1972	1984	1984	1998	1973	1969	1986	1993	1972	1972	1986
MIN	80.6	85.8	98.3	77.3	98.5	141	435	222	131	110	86.4	71.3
(WY)	1977	1977	1977	1971	1977	1980	1977	1980	1988	1988	1976	1976

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1968 - 1999	
ANNUAL TOTAL	173177		253465			
ANNUAL MEAN	474		694		719	
HIGHEST ANNUAL MEAN					1390	1972
LOWEST ANNUAL MEAN					254	1977
HIGHEST DAILY MEAN	2850	Apr 4	3780	Apr 8	16400	Jul 23 1972
LOWEST DAILY MEAN	78	Sep 22	96	Oct 4	43	Nov 12 1976
ANNUAL SEVEN-DAY MINIMUM	82	Sep 19	105	Oct 1	62	Jan 14 1971
INSTANTANEOUS PEAK FLOW			3950	Apr 8	17200	Jul 23 1972
INSTANTANEOUS PEAK STAGE			7.90	Apr 8	15.38	Jul 23 1972
INSTANTANEOUS LOW FLOW			92	Oct 4	25a	Nov 11 1977
ANNUAL RUNOFF (AC-FT)	343500		502700		520600	
ANNUAL RUNOFF (CFSM)	.55		.80		.83	
ANNUAL RUNOFF (INCHES)	7.46		10.93		11.31	
10 PERCENT EXCEEDS	1150		1710		1760	
50 PERCENT EXCEEDS	237		479		297	
90 PERCENT EXCEEDS	102		149		130	

a Result of freezeup.



05337400 KNIFE RIVER NEAR MORA, MN

LOCATION.--Lat 45°55'12", long 93°18'26", in SW¼SW¼ sec. 26, T.40 N., R.24 W., Kanabec County, Hydrologic Unit 07030004, on left bank 400 ft upstream from bridge on County Highway 77, 1.1 mi upstream from mouth and 2.5 mi north of Mora.

DRAINAGE AREA.--102 mi^2.

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1969-74; July 1974 to current year.

GAGE.--Water-stage recorder. Datum of gage is 991.20 ft above sea level (Kanabec County bench mark).

REMARKS.--Records good except those for periods of estimated daily discharges, which are poor.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of July 26, 1972, reached a stage of 14.0 ft, from information by local resident (discharge not determined). Result of dam failure and backwater from collapsed bridge.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 250 ft^3/s (revised) and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Apr 8	1900	251	3.47	May 13	2000	*1,270	*5.59

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	1.7	8.1	33	e7.3	e6.4	9.1	161	36	36	43	71	28
2	1.5	9.2	32	e6.8	e6.4	9.6	149	32	32	39	57	27
3	1.4	8.0	31	e6.7	e6.5	e9.7	141	28	26	47	53	26
4	1.4	6.2	32	e6.3	e6.1	9.8	138	26	24	113	45	32
5	1.7	5.4	42	e6.2	e6.3	e10	149	39	40	170	36	29
6	1.8	5.2	45	e6.0	e6.4	10	174	48	52	171	32	26
7	1.5	4.5	47	e5.9	e6.6	e11	199	72	75	144	30	23
8	1.6	4.7	47	e5.7	e6.8	e11	226	105	103	131	27	23
9	1.7	5.0	47	e5.5	e6.9	e12	219	123	114	119	26	21
10	1.7	23	45	e5.7	e7.0	e12	185	152	118	109	28	20
11	1.9	24	42	e5.7	e7.0	e12	177	281	112	92	25	19
12	1.9	26	39	e5.7	e6.8	e13	157	568	93	76	65	20
13	1.9	26	36	e5.6	e6.6	e13	144	1080	79	66	136	17
14	1.9	27	33	e5.6	e6.8	13	139	1060	67	59	159	16
15	2.0	26	30	e5.5	e7.0	13	138	738	53	48	139	16
16	3.1	28	27	e5.6	e7.2	17	138	531	49	53	115	15
17	5.6	26	26	e5.8	e7.3	19	125	399	40	47	96	14
18	7.0	31	e20	e5.8	e7.3	21	117	309	34	40	91	14
19	7.5	36	e13	e5.9	e7.3	24	117	238	32	34	80	16
20	7.4	38	e9.6	e5.9	e7.4	27	110	193	30	29	67	15
21	7.6	41	e8.0	e6.0	e7.4	30	107	166	28	26	58	12
22	6.5	38	e7.4	e6.0	e7.4	33	106	138	37	22	51	11
23	6.5	40	e7.8	e6.0	7.6	34	83	120	42	24	59	12
24	6.6	41	e8.4	e5.9	7.7	33	70	103	35	21	57	10
25	8.2	40	e9.0	e5.8	7.8	33	65	91	28	25	50	9.9
26	8.3	40	e9.6	e5.7	8.0	33	63	74	31	57	46	15
27	8.3	39	e10	e5.7	8.2	34	60	66	47	48	45	16
28	7.7	38	e9.8	e5.8	8.7	70	53	55	49	42	39	16
29	8.3	36	e9.4	e5.9	---	116	44	47	45	41	35	14
30	8.2	35	e8.4	e6.0	---	151	40	41	42	61	31	12
31	9.0	---	e7.8	e6.3	---	165	---	40	---	83	29	---
TOTAL	141.4	755.3	772.2	184.3	198.9	1008.2	3794	6999	1593	2080	1878	544.9
MEAN	4.56	25.2	24.9	5.95	7.10	32.5	126	226	53.1	67.1	60.6	18.2
MAX	9.0	41	47	7.3	8.7	165	226	1080	118	171	159	32
MIN	1.4	4.5	7.4	5.5	6.1	9.1	40	26	24	21	25	9.9
AC-FT	280	1500	1530	366	395	2000	7530	13880	3160	4130	3730	1080
CFSM	.04	.25	.24	.06	.07	.32	1.24	2.21	.52	.66	.59	.18
IN.	.05	.28	.28	.07	.07	.37	1.38	2.55	.58	.76	.68	.20

e Estimated

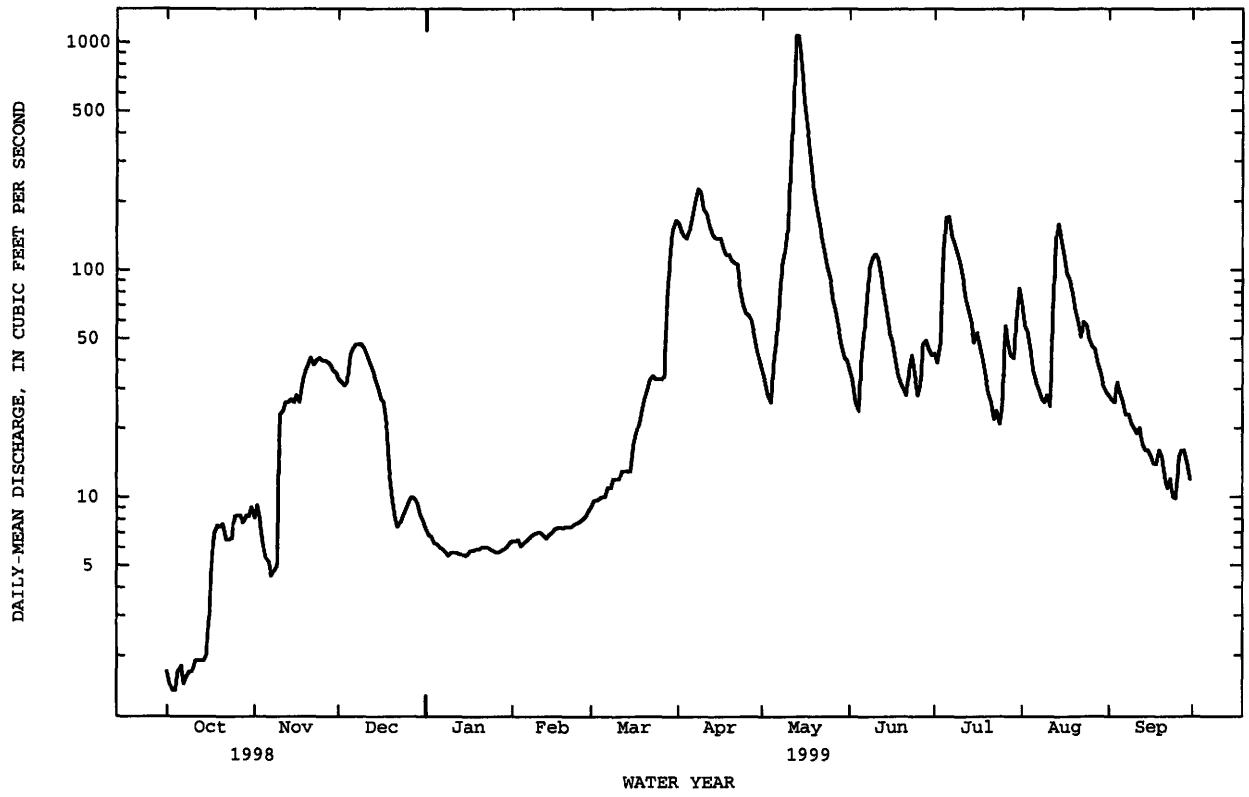
05337400 KNIFE RIVER NEAR MORA, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1974 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	48.2	41.0	25.1	13.1	14.1	67.9	228	106	58.1	52.7	30.8	35.0
MAX	242	206	109	28.8	48.9	238	472	338	233	171	218	257
(WY)	1985	1978	1978	1984	1984	1983	1986	1986	1984	1975	1995	1986
MIN	1.84	1.38	1.17	1.14	1.16	14.3	30.5	11.4	3.06	.98	1.86	1.82
(WY)	1977	1990	1990	1977	1990	1975	1977	1998	1988	1988	1976	1998

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1974 - 1999	
ANNUAL TOTAL	9538.9		19949.2			
ANNUAL MEAN	26.1		54.7		60.2	
HIGHEST ANNUAL MEAN					135	1986
LOWEST ANNUAL MEAN					16.8	1988
HIGHEST DAILY MEAN	193	Apr 4	1080	May 13	1790	Apr 6 1997
LOWEST DAILY MEAN	1.1	Aug 6	1.4	Oct 3	.76	Jul 7 1988
ANNUAL SEVEN-DAY MINIMUM	1.5	Jul 31	1.6	Oct 2	.86	Jul 23 1988
INSTANTANEOUS PEAK FLOW			1270	May 13	1870	Apr 6 1997
INSTANTANEOUS PEAK STAGE			5.59	May 13	6.69[a]	Nov 24 1977
INSTANTANEOUS LOW FLOW			1.2	Oct 2	.74	Jul 6 1988
ANNUAL RUNOFF (AC-FT)	18920		39570		43620	
ANNUAL RUNOFF (CFSM)	.26		.54		.59	
ANNUAL RUNOFF (INCHES)	3.48		7.28		8.02	
10 PERCENT EXCEEDS	71		137		143	
50 PERCENT EXCEEDS	9.8		28		21	
90 PERCENT EXCEEDS	1.8		5.8		4.9	

a From floodmarks, backwater from ice.



05338500 SNAKE RIVER NEAR PINE CITY, MN

LOCATION.--Lat 45°50'30", long 92°56'00", in SE¼NW¼ sec. 26, T. 39 N., R. 21 W., Pine County, Hydrologic Unit 07030004, on left bank at site of former power plant and dam, 0.5 mi downstream from Cross Lake and 1.5 mi northeast of Pine City.

DRAINAGE AREA.--974 mi^2.

PERIOD OF RECORD.--June 1913 to September 1917, July 1951 to Sept. 1981, Oct. 1992 to current year.

GAGE.--Water-stage recorder. Datum of gage is 919.00 ft above sea level. June 25, 1913 to Sept. 30, 1917, nonrecording gage at site 500 ft downstream at different datum. July 1 to Oct. 28, 1951, nonrecording gage at present site and datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair.

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	81	116	328	140	111	126	1160	496	508	520	445	529
2	65	106	322	134	115	139	1240	447	473	496	489	491
3	57	114	315	129	117	144	1190	392	422	508	520	454
4	48	118	290	130	e116	148	1300	354	383	531	508	440
5	61	113	331	131	115	152	1270	369	413	571	491	438
6	98	114	338	127	116	148	1430	418	426	626	485	413
7	97	108	345	e120	114	140	1540	520	471	629	480	390
8	81	105	398	e118	114	144	1600	650	512	640	451	395
9	76	97	411	e114	115	169	1670	828	562	648	433	354
10	75	173	407	e114	116	153	1710	996	604	630	424	340
11	73	239	387	e117	e116	147	1800	1200	617	620	382	316
12	98	217	366	123	e116	145	1770	1430	608	603	394	330
13	73	244	348	122	e119	138	1710	1830	574	568	486	310
14	58	284	333	119	124	137	1630	2350	520	529	598	280
15	62	282	321	119	124	137	1560	3050	468	486	770	266
16	84	284	298	110	130	142	1480	3810	429	456	937	259
17	138	280	260	102	129	169	1400	4320	389	420	958	255
18	153	272	242	112	129	186	1340	4450	336	380	939	244
19	147	361	236	113	126	219	1310	4210	299	355	923	246
20	133	332	212	107	122	270	1240	3820	275	332	868	222
21	135	329	194	106	124	313	1160	3340	251	318	812	207
22	137	359	180	107	120	345	1070	2850	417	297	762	198
23	135	385	175	106	118	381	1010	2410	513	283	759	183
24	133	354	167	109	119	393	942	2010	580	264	701	172
25	130	391	158	114	119	404	861	1670	593	257	716	165
26	129	379	149	110	118	398	775	1400	577	345	803	187
27	128	379	144	119	121	379	701	1170	585	333	842	175
28	118	372	137	114	126	488	635	954	574	358	790	176
29	113	365	145	111	---	599	590	791	566	386	694	177
30	133	365	151	111	---	812	547	674	543	390	627	202
31	119	---	138	115	---	1060	---	593	---	421	577	---
TOTAL	3168	7637	8226	3623	3349	8725	37641	53802	14488	14200	20064	8814
MEAN	102	255	265	117	120	281	1255	1736	483	458	647	294
MAX	153	391	411	140	130	1060	1800	4450	617	648	958	529
MIN	48	97	137	102	111	126	547	354	251	257	382	165
AC-FT	6280	15150	16320	7190	6640	17310	74660	106700	28740	28170	39800	17480
CFSM	.11	.27	.28	.12	.12	.29	1.31	1.81	.50	.48	.68	.31
IN.	.12	.30	.32	.14	.13	.34	1.46	2.09	.56	.55	.78	.34

e Estimated

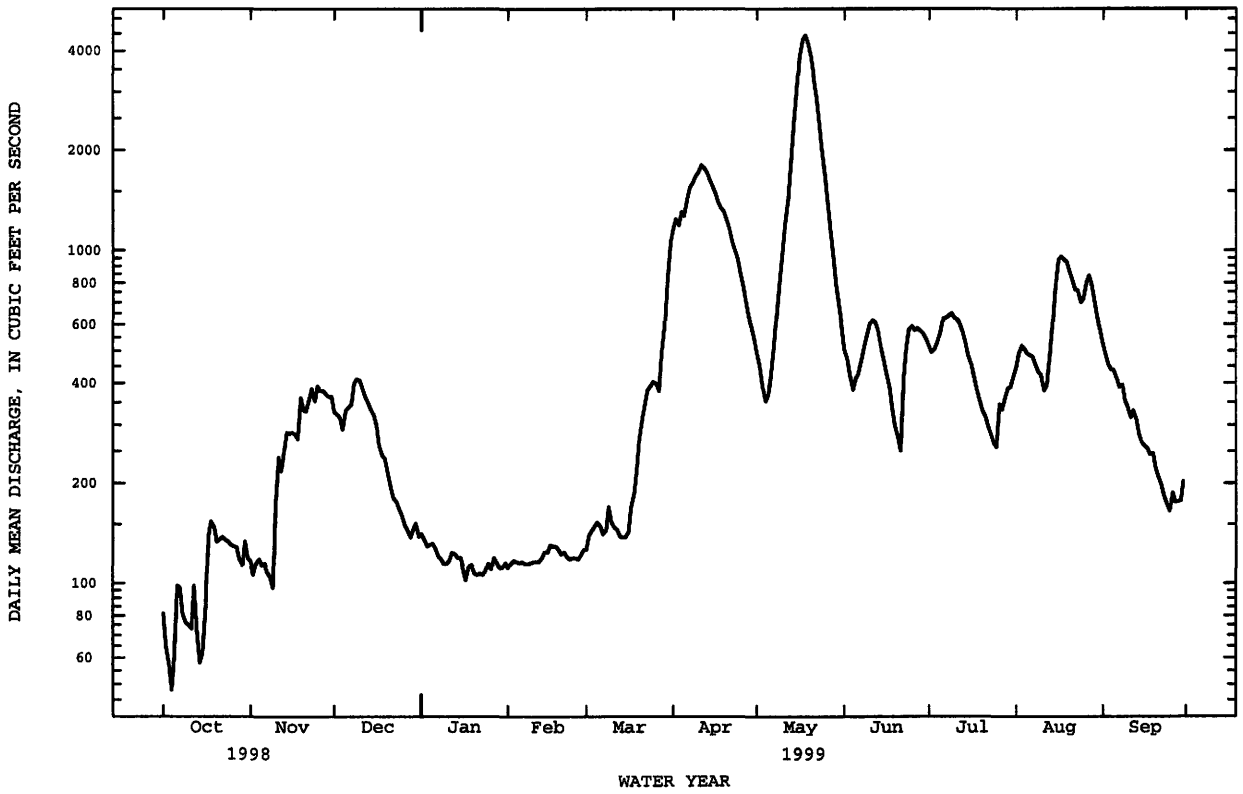
05338500 SNAKE RIVER NEAR PINE CITY, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1913 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	404	410	216	132	132	471	2050	1149	798	703	334	306
MAX	3130	2310	837	343	549	2658	4975	2726	2775	3400	2018	1201
(WY)	1969	1972	1978	1966	1966	1966	1965	1979	1967	1952	1972	1951
MIN	47.1	59.9	36.1	29.3	33.4	61.5	172	203	167	100	34.9	37.8
(WY)	1977	1977	1977	1977	1977	1965	1959	1998	1997	1961	1976	1976

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1913 - 1999	
ANNUAL TOTAL	112726		183737			
ANNUAL MEAN	309		503		588[a]	
HIGHEST ANNUAL MEAN					1223	1972
LOWEST ANNUAL MEAN					177	1959
HIGHEST DAILY MEAN	1890	Apr 7	4450	May 18	14200	Jul 27 1972
LOWEST DAILY MEAN	37	Sep 22	48	Oct 4	26	Aug 29 1976
ANNUAL SEVEN-DAY MINIMUM	42	Sep 18	72	Oct 1	28	Jan 21 1977
INSTANTANEOUS PEAK FLOW			4490	May 18	14300	Jul 27 1972
INSTANTANEOUS PEAK STAGE			6.71	May 18	10.38	Jul 27 1972
INSTANTANEOUS LOW FLOW			43	Oct 4,5	5.5[b]	Oct 1 1964
ANNUAL RUNOFF (AC-FT)	223600		364400		425800	
ANNUAL RUNOFF (CFSM)	.32		.53		.61	
ANNUAL RUNOFF (INCHES)	4.38		7.13		8.34	
10 PERCENT EXCEEDS	684		1160		1450	
50 PERCENT EXCEEDS	174		333		223	
90 PERCENT EXCEEDS	63		114		76	

a Median of annual mean discharges is 529 ft^3/s.
b Result of dam rehabilitation.



05340500 ST. CROIX RIVER AT ST. CROIX FALLS, WI

LOCATION.--Lat 45°24'25", long 92°38'49", in SW¼NW¼ sec. 30, T.34 N., R.18 W., Polk County, Hydrologic Unit 07030005, St. Croix National Scenic Riverway, on left bank, 1,500 ft downstream from power plant of Northern States Power Co., in St. Croix Falls, and at mile 52.2.

DRAINAGE AREA.--6,240 mi^2.

PERIOD OF RECORD.--January 1902 to current year. Prior to January 1910, monthly discharge only, published in WSP 1308. Prior to October 1939, published as "near St. Croix Falls."

REVISED RECORDS.--WSP 1115: 1929. WDR WI-82-1: Drainage area.

GAGE.--Water-stage recorder and crest-stage gage. Datum of gage is 689.94 ft above sea level. Prior to July 1905, gage heights and discharge measurements were used by Loweth and Wolff, consulting engineers of St. Paul, Minn., to determine the flow. July 1905 to February 1940, records were computed from power generation at the St. Croix Falls power plant. February 1940 to Sept. 30, 1979, water- stage recorder at site 300 ft downstream at same datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Diurnal fluctuation caused by St. Croix Falls Powerplant 1,500 ft upstream. Gage-height telemeter and 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	2140	2430	3840	e2100	2340	2510	8360	4190	3620	4300	7500	4930
2	2030	2570	3520	e2100	2260	2320	8500	3680	3600	4070	8150	4430
3	1980	2450	3420	2170	2310	2360	8550	3520	3460	4250	8840	4210
4	2060	2520	3560	e2100	2330	2530	8170	3430	3530	4850	8530	3760
5	2010	2560	3750	e2100	2430	2490	8880	3640	3380	4660	8580	3870
6	2050	2540	3660	e2100	2410	2390	11400	3870	3790	4870	8810	3730
7	2150	2550	4490	e2100	2420	2460	12700	4450	4450	5050	8060	3640
8	2320	2420	4690	e2300	2510	2340	13200	5730	4750	5150	7080	4100
9	2120	2420	4220	e2300	2360	2130	14300	6380	5610	5310	6320	4520
10	2110	2490	4320	e2000	2310	2110	14000	6960	5430	5240	6180	5020
11	2050	3490	3870	e1900	e2500	2400	13000	7120	5450	5450	5680	4970
12	2050	3850	4040	e2000	e2400	2320	11800	8070	5550	5510	5120	4710
13	2020	4300	3890	2020	e2400	2450	11100	9750	5720	5470	5370	4290
14	2040	3880	3630	2280	2640	2370	10600	10500	5700	5080	7130	4080
15	1940	3720	3360	2070	2510	2480	9830	11000	5280	4480	8490	4560
16	2170	3720	3380	2110	2460	2200	9590	11200	4700	4380	8510	4480
17	2500	3780	3090	2180	2440	2930	9470	11600	3900	4030	7530	4210
18	2750	3620	2990	2180	2580	3020	9440	11200	3870	4180	7240	4010
19	3450	3980	2290	2180	2690	3560	8830	10700	3530	3940	7070	3820
20	3360	4400	1670	2150	2680	3430	8040	10100	3380	3840	6950	3390
21	3210	4110	1290	2150	2250	3730	7460	9170	2970	3820	6900	3280
22	3050	4230	1440	2320	2550	3610	7010	8170	2770	3610	6470	3590
23	2870	4200	1680	2190	2200	3610	6810	7790	4800	3300	6610	3370
24	3040	4330	2070	2310	2190	3790	6450	7180	5860	3270	6240	3230
25	2920	4440	2240	2270	2260	3720	6170	6670	6500	3160	7240	3190
26	2680	4320	2520	2380	2300	3480	5390	6390	6260	3940	8170	2940
27	2630	4190	2510	2170	2180	3540	5040	6060	5710	4870	7670	3080
28	2620	4030	2440	2320	2240	4360	4700	5270	5390	6670	7060	3810
29	2680	3900	2560	2230	---	5640	4570	4700	5110	9320	6490	4320
30	2670	3950	2390	2410	---	7370	4470	4070	4410	9700	6080	4030
31	2620	---	2230	2340	---	8460	---	3990	---	8080	5320	---
TOTAL	76290	105390	95050	67530	67150	102110	267830	216550	138480	153850	221390	119570
MEAN	2461	3513	3066	2178	2398	3294	8928	6985	4616	4963	7142	3986
MAX	3450	4440	4690	2410	2690	8460	14300	11600	6500	9700	8840	5020
MIN	1940	2420	1290	1900	2180	2110	4470	3430	2770	3160	5120	2940
AC-FT	151300	209000	188500	133900	133200	202500	531200	429500	274700	305200	439100	237200
CFSM	.39	.56	.49	.35	.38	.53	1.43	1.12	.74	.80	1.14	.64
IN.	.45	.63	.57	.40	.40	.61	1.60	1.29	.83	.92	1.32	.71

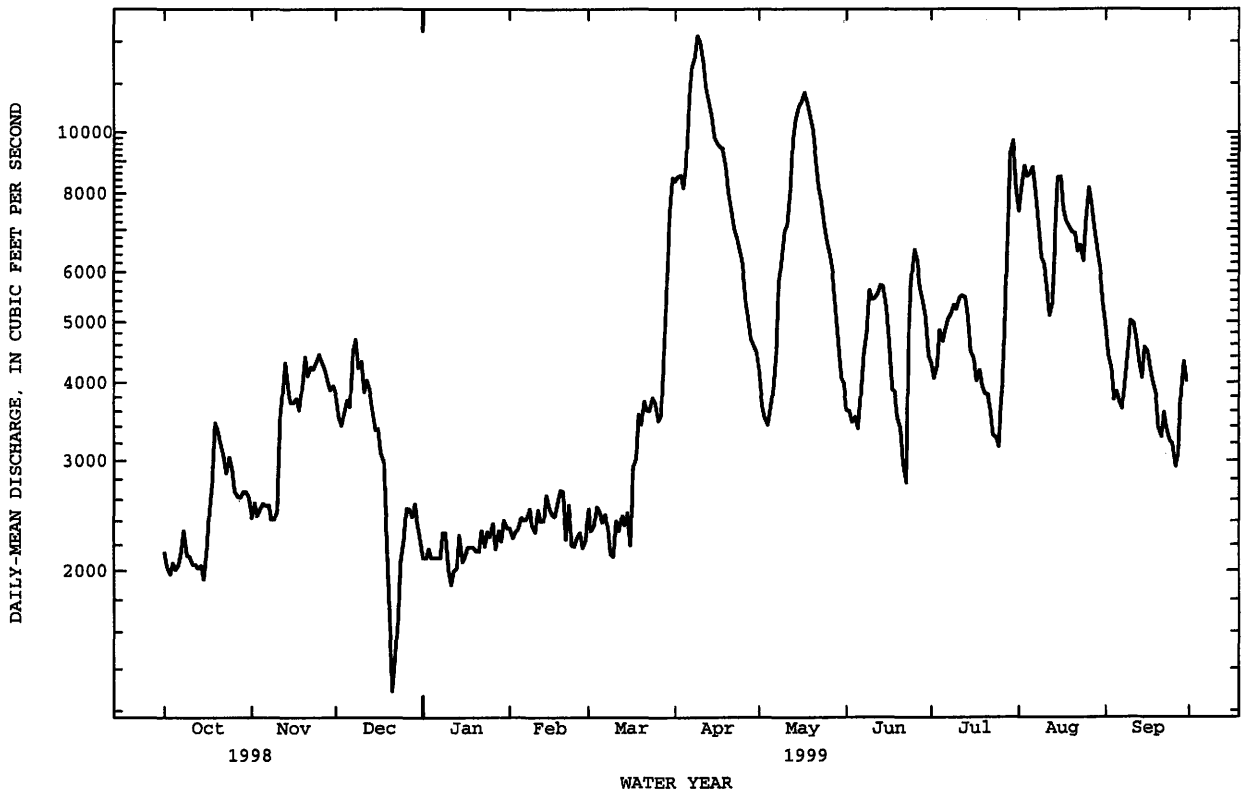
e Estimated

05340500 ST. CROIX RIVER AT ST. CROIX FALLS, WI--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1902 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	3693	3486	2554	2156	2134	4250	10320	7405	5647	4137	2901	3388
MAX	14270	11910	5821	4279	6021	14420	22320	21840	19510	17260	9777	14590
(WY)	1969	1972	1984	1984	1984	1945	1952	1950	1944	1952	1955	1941
MIN	1380	1342	1287	1157	1257	1538	2212	2430	1481	1014	839	1152
(WY)	1933	1911	1911	1911	1913	1912	1902	1934	1934	1934	1934	1933

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1902 - 1999	
ANNUAL TOTAL	1367540		1631190			
ANNUAL MEAN	3747		4469		4348	
HIGHEST ANNUAL MEAN					8569	1986
LOWEST ANNUAL MEAN					1754	1934
HIGHEST DAILY MEAN	17600	Apr 4	14300	Apr 9	53900	May 8 1950
LOWEST DAILY MEAN	1290	Dec 21	1290	Dec 21	75	Jul 17 1910
ANNUAL SEVEN-DAY MINIMUM	1550	Sep 13	1810	Dec 19	754	Jul 29 1934
INSTANTANEOUS PEAK FLOW			14800	Apr 9	54900	May 8 1950
INSTANTANEOUS PEAK STAGE			7.99	Apr 9	25.19	May 8 1950
ANNUAL RUNOFF (AC-FT)	2713000		3235000		3150000	
ANNUAL RUNOFF (CFSM)	.60		.72		.70	
ANNUAL RUNOFF (INCHES)	8.15		9.72		9.47	
10 PERCENT EXCEEDS	6310		8250		9070	
50 PERCENT EXCEEDS	2840		3790		2790	
90 PERCENT EXCEEDS	1780		2170		1570	



05344500 MISSISSIPPI RIVER AT PRESCOTT, WI

LOCATION.--Lat 44°44'45", long 92°48'00", in sec. 9, T.26 N., R.20 W., Pierce County, Hydrologic Unit 07040001,on left bank at Prescott, 200 ft downstream from St. Croix River, 300 ft south of Chicago, Burlington & Quincy Railroad bridge, 800 ft south of bridge on U.S. Highway 10, and at mile 811.4 upstream from Ohio River.

DRAINAGE AREA.--44,800 mi^2 (approximately).

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

REVISED RECORDS.--WSP 1508: 1941. WRD MN-74: 1973.

GAGE.--Water-stage recorder. Datum of gage is 649.50 ft above sea level. Prior to Aug. 2, 1932, nonrecording gage at railroad bridge 300 ft upstream at following datums: June 3, 1928 to Sept. 30, 1929, 19.27 ft higher; Oct. 1, 1929 to Sept. 30, 1930, 17.68 ft higher; Oct. 1, 1930 to Aug. 1, 1932, 19.28 ft higher. Aug. 2, 1932 to Oct. 30, 1938, water-stage recorder at present site at datum 19.28 ft higher; Nov. 1, 1938 to Sept. 7, 1971, water-stage recorder at present site at datum 50.00 ft lower.

REMARKS.--Records fair except those for estimated daily discharge, which are fair to poor. Some regulation by reservoirs, navigation dams, and power plants at low and medium stages. Discharges below a stage of 26.7 ft. are computed by routing flows from the Mississippi River at St. Paul (05331000) and St. Croix River at St. Croix Falls, WI (05340500).

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	6940	19100	18600	e11700	e10800	e12800	25700	35200	44500	28100	29300	19800
2	6560	19100	19000	e11500	e10900	e13000	26100	33500	40700	27500	26700	19200
3	6700	19300	19200	e11500	e10900	e12800	26600	31200	38500	27300	24800	18800
4	6910	19300	19200	e11600	e10900	e13000	27200	29100	37400	28100	24500	18700
5	6530	18400	19500	e11400	e10900	e12900	27600	27700	36600	28900	24000	18700
6	6570	18100	19700	e11200	e10600	e13500	28700	27000	36300	30100	23400	18300
7	6950	17800	19500	e11100	e11300	e13600	30900	26300	35600	30500	23400	17800
8	7500	17600	19100	e10900	e11100	e13900	34300	26300	34200	29600	23200	18400
9	7380	17000	19200	e11000	e11200	e14000	38100	26200	33900	29700	22200	19000
10	7600	16600	19600	e10800	e11300	e13700	41000	27900	35400	29100	21400	19100
11	7140	16400	19600	e10400	e11100	13500	46500	31500	36200	28000	20600	19200
12	7780	17900	18800	e10100	e11400	13600	48300	35200	36800	27000	20300	20300
13	7660	18800	18400	e9980	e11200	e13700	49400	39000	37000	25900	20600	20800
14	8060	20400	18400	e10000	e11000	e14000	50300	44500	37200	25000	20000	19700
15	8130	20200	18500	e10100	e12400	e13600	51900	50900	37200	24000	20500	19300
16	7830	20300	18400	e9860	e12600	e13900	52100	56900	37400	23400	22000	19000
17	8490	19500	18300	e9910	e12000	13400	52400	63100	37200	22500	22900	18700
18	9640	19500	18200	e9990	e12600	e14200	53600	66500	37000	21800	22900	19000
19	16600	20000	18000	e10000	e13600	e15500	54300	68200	37000	21800	e23000	19100
20	19100	19800	16300	e10100	e14300	e18900	54600	70300	36800	21900	23100	18100
21	20000	19500	14200	e10100	e14600	20300	53700	72100	36100	22400	22500	17000
22	20100	19800	11700	e10100	e14000	21100	52300	70800	35400	22800	23400	16900
23	20600	19800	e9850	e10300	e13900	21900	50400	69400	34800	23800	25100	16800
24	20100	19500	e9140	e10100	e13700	22500	48500	67500	34200	25200	23600	16300
25	19800	19600	e10400	e10500	e13600	22300	46700	65300	32700	25500	22900	15800
26	19700	19800	e10900	e10500	e13300	21700	44400	62700	32000	29500	22900	15400
27	20000	20200	e11600	e10600	e13000	21000	41800	60500	31400	30700	23500	14600
28	19500	20400	e11700	e10600	e12800	21000	39700	58000	29700	29700	23100	14800
29	18500	20000	e12000	e10700	---	21400	37800	54800	28700	30100	21900	15200
30	19100	19500	e12200	e10600	---	22200	36200	51700	28400	30100	21100	16300
31	19500	---	e12100	e10900	---	24000	---	48400	---	31500	20600	---
TOTAL	386970	573200	501290	328140	341000	516900	1271100	1497700	1066300	831500	709400	540100
MEAN	12480	19110	16170	10590	12180	16670	42370	48310	35540	26820	22880	18000
MAX	20600	20400	19700	11700	14600	24000	54600	72100	44500	31500	29300	20800
MIN	6530	16400	9140	9860	10600	12800	25700	26200	28400	21800	20000	14600
AC-FT	767600	1137000	994300	650900	676400	1025000	2521000	2971000	2115000	1649000	1407000	1071000
CFSM	.28	.43	.36	.24	.27	.37	.95	1.08	.79	.60	.51	.40
IN.	.32	.48	.42	.27	.28	.43	1.06	1.24	.89	.69	.59	.45

e Estimated

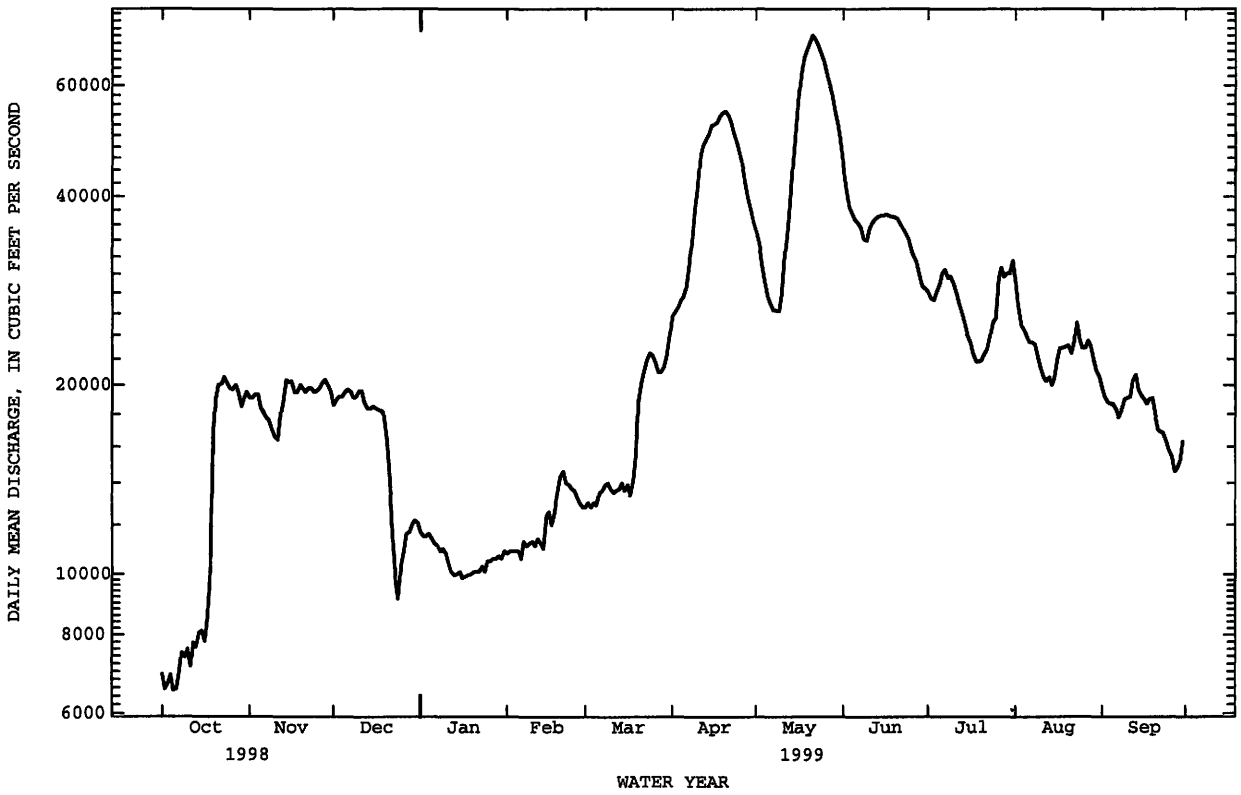
05344500 MISSISSIPPI RIVER AT PRESCOTT, WI--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1928 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	13540	13380	10070	8335	8255	17410	41520	32250	25860	20630	13530	12910
MAX	49740	40360	21460	16060	21390	55010	117600	90100	69890	87420	48350	45950
(WY)	1987	1972	1983	1983	1966	1983	1965	1986	1993	1993	1993	1986
MIN	3526	3874	3379	3153	3519	4369	7215	6304	4185	3197	2366	3002
(WY)	1933	1977	1934	1935	1934	1934	1931	1931	1934	1934	1934	1976

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1928 - 1999	
ANNUAL TOTAL	7440120		8563600			
ANNUAL MEAN	20380		23460		18180[a]	
HIGHEST ANNUAL MEAN					38540	1986
LOWEST ANNUAL MEAN					4367	1934
HIGHEST DAILY MEAN	70000	Apr 7	72100	May 21	226000	Apr 18 1965
LOWEST DAILY MEAN	6220	Sep 20	6530	Oct 5	1380	Jul 13 1940
ANNUAL SEVEN-DAY MINIMUM	6660	Sep 19	6740	Oct 1	2190	Aug 11 1936
INSTANTANEOUS PEAK FLOW			72500	May 21	228000	Apr 18 1965
INSTANTANEOUS PEAK STAGE			33.57	May 21	43.11	Apr 18 1965
ANNUAL RUNOFF (AC-FT)	14760000		16990000		13170000	
ANNUAL RUNOFF (CFSM)	.45		.52		.41	
ANNUAL RUNOFF (INCHES)	6.18		7.11		5.51	
10 PERCENT EXCEEDS	39700		41300		39400	
50 PERCENT EXCEEDS	19100		19800		11900	
90 PERCENT EXCEEDS	8020		10500		5120	

a Median of annual mean discharges is 18,500 ft^3/s.



05344850 STURGEON LAKE, WEST SIDE, AT PRAIRIE ISLAND, MN

LOCATION.--Lat 44°38'18", long 92°38'38", in NE¼NE¼SW¼ sec. 32, T. 114 N., R. 15 W., Goodhue County, Hydrologic Unit 07040001, on west bank of Sturgeon Lake, 0.7 miles above lake outlet to Mississippi River and 7 miles northwest of Red Wing.

PERIOD OF RECORD.--July 1998 to current year.

GAGE.--Water-stage recorder.Datum of gege is 662.67 ft above sea leve.

REMARKS.--Water level affected by U.S. Army Corp of Engineers Lock and Dam 3 on the Mississippi River above Red Wing.

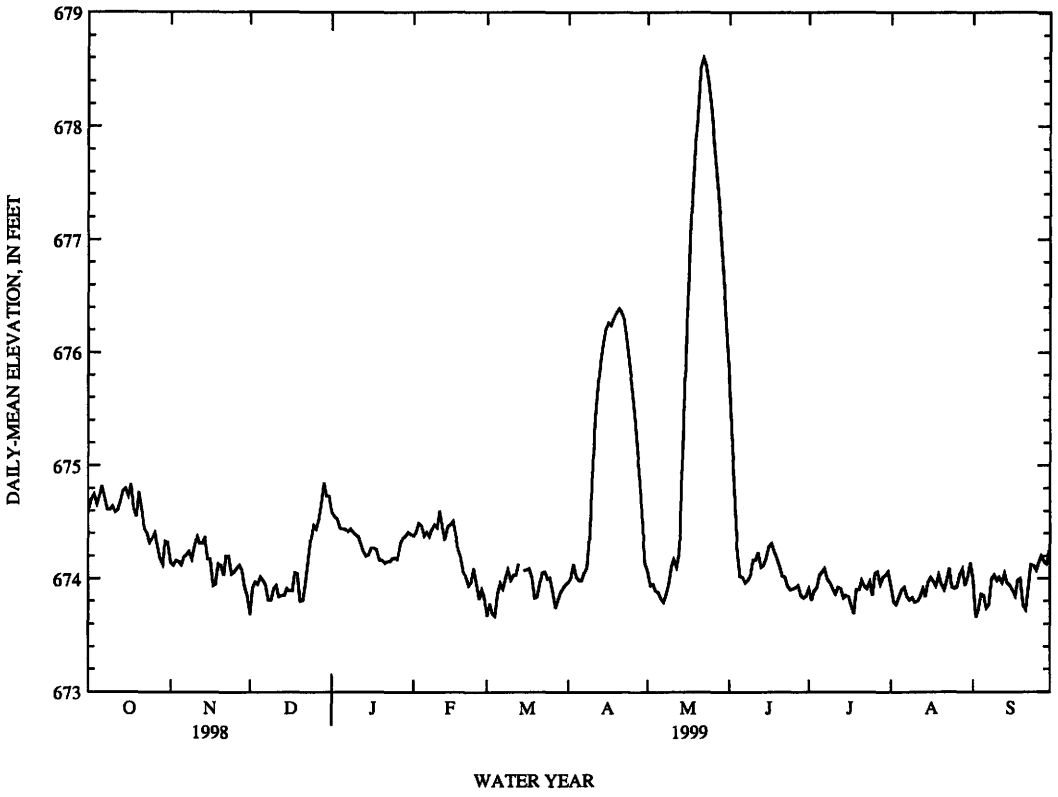
EXTREMES FOR PERIOD OF RECORD.--Maximum elevation, 678.61 ft., May 22, 1999; maximum daily, 678.60 ft. May 22, 1999; minimum elevation, 673.57 ft, Dec. 1, 1999; minimum daily, 673.66 ft., Sept. 2, 1999.

EXTREMES FOR CURRENT YEAR.--Maximum elevation, 678.61 ft., May 22; maximum daily, 678.60 ft. May 22; minimum elevation, 673.57 ft, Dec. 1; minimum daily, 673.66 ft., Sept. 2.

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	674.62	674.14	673.68	674.59	674.38	673.67	673.97	674.07	675.74	673.91	673.93	674.00
2	674.71	674.12	673.92	674.55	674.41	673.78	674.01	673.94	675.23	673.81	673.79	673.66
3	674.75	674.16	673.97	674.53	674.49	673.69	674.13	673.95	674.71	673.89	673.77	673.72
4	674.66	674.15	673.95	674.45	674.47	673.67	674.01	673.89	674.27	673.92	673.83	673.86
5	674.73	674.12	674.01	674.44	674.38	673.86	673.98	673.88	674.02	674.03	673.90	673.85
6	674.82	674.19	673.98	674.44	674.41	673.96	673.98	673.82	674.01	674.06	673.92	673.74
7	674.73	674.21	673.94	674.42	674.37	673.91	674.05	673.79	673.96	674.09	673.84	673.77
8	674.61	674.24	673.81	674.44	674.44	674.00	674.10	673.86	673.98	673.99	673.81	674.00
9	674.61	674.17	673.81	674.41	674.48	674.08	674.37	673.95	674.03	673.96	673.83	674.03
10	674.64	674.27	673.91	674.39	674.45	673.99	674.84	674.11	674.16	673.91	673.79	673.98
11	674.59	674.37	673.94	674.37	674.60	674.03	675.38	674.17	674.16	673.86	673.80	674.01
12	674.61	674.31	673.84	674.31	674.44	674.03	675.68	674.10	674.23	673.92	673.84	673.96
13	674.69	674.31	673.85	674.24	674.34	674.13	675.91	674.22	674.10	673.91	673.91	674.04
14	674.78	674.37	673.85	674.20	674.46	---	676.07	674.91	674.12	673.83	673.84	673.96
15	674.80	674.17	673.91	674.21	674.48	674.07	676.20	675.65	674.18	673.85	673.97	673.94
16	674.73	674.17	673.89	674.27	674.51	674.08	676.26	676.32	674.28	673.84	674.01	673.89
17	674.84	673.94	673.89	674.27	674.40	674.09	676.24	677.01	674.31	673.76	673.97	673.84
18	674.62	673.95	674.05	674.26	674.26	674.01	676.30	677.50	674.24	673.69	673.93	673.98
19	674.55	674.13	674.04	674.16	674.19	673.83	676.35	677.83	674.18	673.90	674.03	674.00
20	674.77	674.12	673.80	674.16	674.05	673.84	676.39	678.17	674.11	673.90	673.95	673.76
21	674.62	674.03	673.81	674.14	674.02	673.95	676.36	678.52	674.02	673.98	673.90	673.72
22	674.44	674.20	673.96	674.15	673.94	674.05	676.30	678.60	674.01	673.93	673.97	673.91
23	674.40	674.20	674.14	674.15	673.97	674.06	676.12	678.54	673.93	673.91	674.09	674.12
24	674.32	674.04	674.33	674.18	674.09	674.00	675.89	678.38	673.90	673.97	673.92	674.11
25	674.36	674.06	674.47	674.18	673.96	674.01	675.69	678.17	673.91	673.85	673.91	674.07
26	674.41	674.09	674.44	674.17	673.82	673.88	675.46	677.90	673.92	674.04	673.93	674.14
27	674.30	674.12	674.52	674.30	673.90	673.74	675.17	677.62	673.94	674.06	674.04	674.20
28	674.17	674.07	674.66	674.36	673.83	673.81	674.85	677.31	673.85	673.95	674.09	674.15
29	674.12	673.92	674.85	674.38	---	673.88	674.50	676.95	673.83	674.01	673.94	674.13
30	674.33	673.85	674.73	674.41	---	673.92	674.13	676.58	673.85	674.03	674.01	674.25
31	674.32	---	674.73	674.39	---	673.95	---	676.18	---	674.06	674.14	---
MEAN	674.57	674.14	674.09	674.32	674.27	---	675.22	675.93	674.17	673.93	673.92	673.96
MAX	674.84	674.37	674.85	674.59	674.60	---	676.39	678.60	675.74	674.09	674.14	674.25
MIN	674.12	673.85	673.68	674.14	673.82	---	673.97	673.79	673.83	673.69	673.77	673.66

05344850 STURGEON LAKE, WEST SIDE, AT PRAIRIE ISLAND, MN--Continued



05345000 VERMILLION RIVER NEAR EMPIRE, MN

LOCATION.--Lat 44°40'00", long 93°03'17", in SW¼NW¼ sec. 24, T.114 N., R.19 W., Dakota County, Hydrologic Unit 07040001, on right bank and just downstream from County Road 79, 2 mi west of Empire and 4 mi northeast of Farmington.

DRAINAGE AREA.--129 mi^2.

PERIOD OF RECORD.--May 1942 to June 1945 (no record during July, August, and September 1944), September 1969 to September 1973 (discharge measurements only), October 1973 to current year. Prior to October 1975 published as "near Empire City".

GAGE.--Water-stage recorder. Datum of gage is 851.99 ft above sea level (levels by U.S. Army Corps of Engineers). April 12, 1942 to June 30, 1944, and October 1, 1944 to July 7, 1945, nonrecording gage at same site and present datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair to poor. Some regulation at low-flow by wastewater plant upstream.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in April 1965, reached a stage of 7.5 ft, from information by local resident, discharge 6,200 ft^3/s, from rating extended above 2,100 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	82	83	63	42	42	78	117	106	119	96	102	61
2	81	81	63	43	42	93	111	100	116	97	87	58
3	78	77	62	43	42	84	106	95	109	146	77	55
4	73	74	61	e41	40	80	127	92	102	463	71	54
5	75	72	71	e40	41	73	133	100	99	333	65	59
6	78	70	70	39	41	69	232	102	101	176	58	56
7	76	69	65	e34	42	65	282	99	114	e145	56	54
8	72	72	62	35	44	65	225	98	103	e138	53	88
9	71	74	60	e34	45	62	254	93	93	e142	72	78
10	69	121	59	e34	48	62	333	87	106	e125	109	67
11	67	167	59	35	72	59	369	105	147	e110	84	63
12	69	128	60	34	68	60	518	194	251	e100	72	75
13	67	112	59	e34	65	60	369	446	202	e97	119	92
14	70	107	60	34	59	61	293	506	143	e94	136	76
15	71	99	59	36	66	63	257	329	126	e91	99	68
16	83	93	60	38	87	72	260	268	115	e90	85	61
17	162	87	58	38	77	137	260	265	105	e92	72	62
18	257	85	59	40	70	310	226	307	96	e85	67	61
19	152	94	56	38	65	263	201	263	93	e67	68	61
20	119	84	52	39	61	203	187	225	93	e66	62	60
21	106	78	51	39	58	195	184	296	88	e83	57	58
22	98	81	47	39	57	173	180	338	84	e75	83	57
23	93	79	47	39	54	156	201	283	105	66	122	57
24	90	76	47	39	54	132	179	262	112	63	118	55
25	90	76	45	39	53	120	161	225	94	57	102	53
26	87	73	45	39	54	112	139	193	85	134	90	57
27	86	71	48	40	63	111	131	169	82	274	83	56
28	85	71	49	39	75	142	125	142	83	190	77	51
29	91	68	45	39	---	150	117	130	83	127	70	50
30	92	66	43	39	---	129	111	119	81	117	66	50
31	86	---	44	40	---	124	---	118	---	112	63	---
TOTAL	2876	2588	1729	1182	1585	3563	6388	6155	3330	4051	2545	1853
MEAN	92.8	86.3	55.8	38.1	56.6	115	213	199	111	131	82.1	61.8
MAX	257	167	71	43	87	310	518	506	251	463	136	92
MIN	67	66	43	34	40	59	106	87	81	57	53	50
AC-FT	5700	5130	3430	2340	3140	7070	12670	12210	6610	8040	5050	3680
CFSM	.72	.67	.43	.30	.44	.89	1.65	1.54	.86	1.01	.64	.48
IN.	.83	.75	.50	.34	.46	1.03	1.84	1.77	.96	1.17	.73	.53

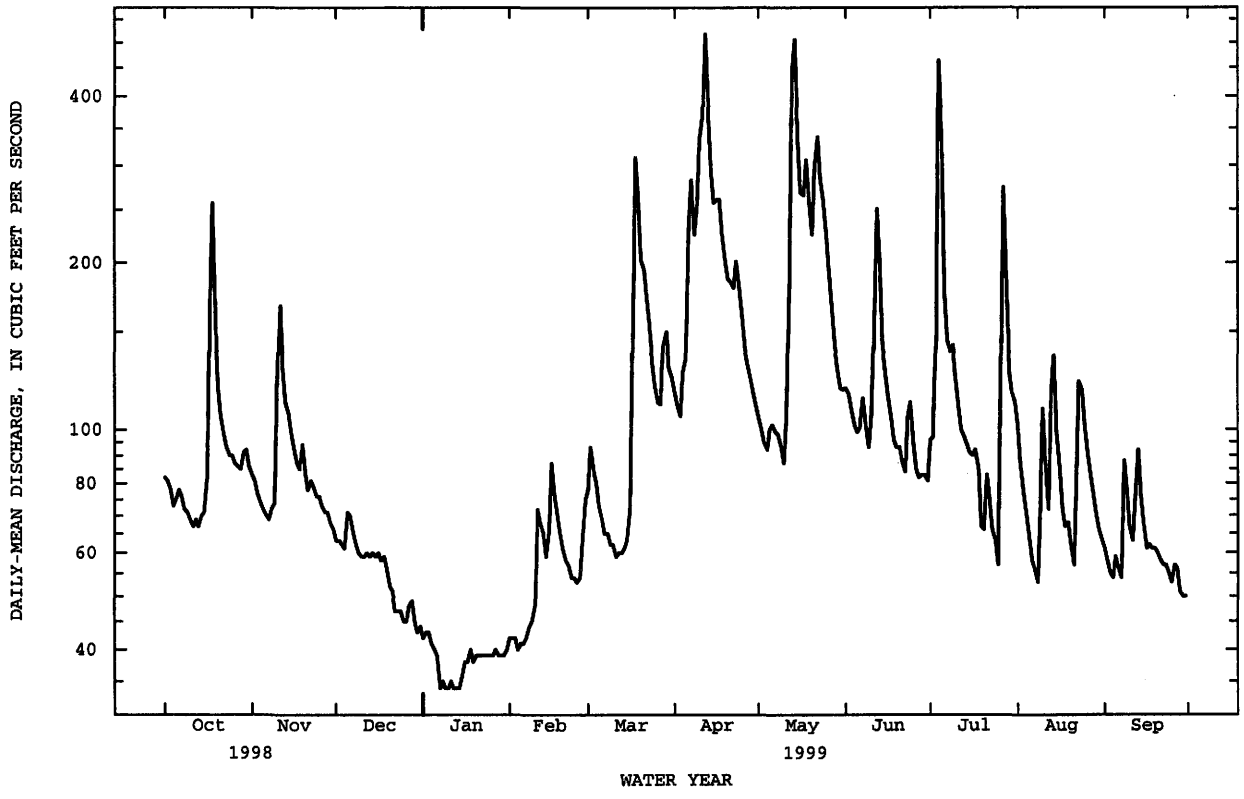
e Estimated

05345000 VERMILLION RIVER NEAR EMPIRE, MN--Continued

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

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	56.6	51.3	40.2	31.8	37.1	103	111	93.5	92.2	73.8	59.7	72.2
MAX	160	133	79.5	58.6	89.8	199	281	223	290	258	234	313
(WY)	1995	1993	1993	1998	1998	1983	1998	1986	1993	1997	1997	1992
MIN	14.9	15.6	12.4	11.0	13.1	25.4	35.2	29.3	23.0	16.0	14.3	14.6
(WY)	1977	1977	1977	1977	1977	1975	1977	1977	1988	1988	1976	1976

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1942 - 1999	
ANNUAL TOTAL	52634		37845			
ANNUAL MEAN	144		104		68.7	
HIGHEST ANNUAL MEAN					147	1998
LOWEST ANNUAL MEAN					23.6	1977
HIGHEST DAILY MEAN	1510	Jun 28	518	Apr 12	3000	Sep 16 1992
LOWEST DAILY MEAN	43	Dec 30	34	Jan 7	8.4	Jan 15 1975
ANNUAL SEVEN-DAY MINIMUM	46	Dec 25	34	Jan 7	9.0	Jan 13 1975
INSTANTANEOUS PEAK FLOW			691	Jul 4	6570	Sep 16 1992
INSTANTANEOUS PEAK STAGE			6.55	Jul 4	10.00	Sep 16 1992
INSTANTANEOUS LOW FLOW			22	Jan 11	6.8	Aug 15 1992
ANNUAL RUNOFF (AC-FT)	104400		75070		49780	
ANNUAL RUNOFF (CFSM)	1.12		.80		.53	
ANNUAL RUNOFF (INCHES)	15.18		10.91		7.24	
10 PERCENT EXCEEDS	230		201		133	
50 PERCENT EXCEEDS	102		80		44	
90 PERCENT EXCEEDS	57		43		20	



05346050 CLEAR LAKE, EAST SIDE, AT PRAIRIE ISLAND, MN

LOCATION.--Lat 43°38'11", long 92°58'26", in NE¼SE¼ sec. 15, T. 102 N., R. 18 W., Goodhue County, on east bank of Clear Lake and 0.9 miles above lake output to Vermillion River.

PERIOD OF RECORD.--July 1998 to current year.

GAGE.--Water-stage recorder. Datum of gage is 660.23 ft above sea level.

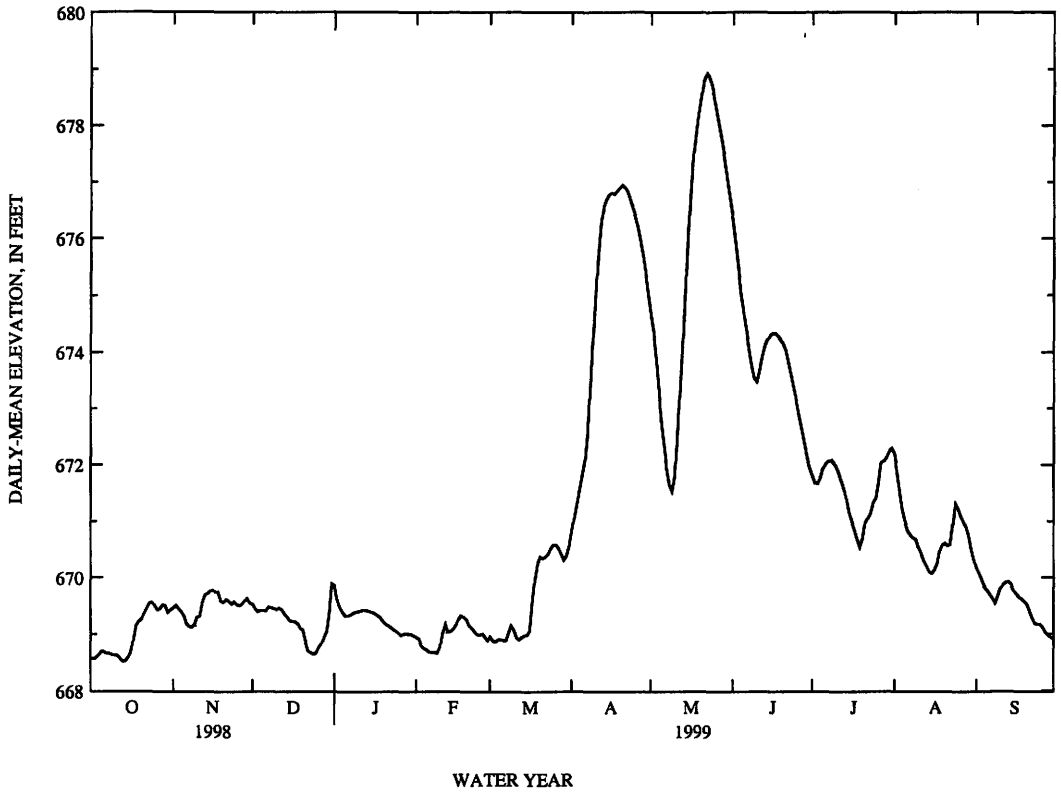
REMARKS.--Records fair. Water level affected by U.S. Army Corp of Engineers Lock and Dam 3 on the Mississippi River.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 678.96 ft., May 22, 1999; maximum daily, 678.93 ft. May 22, 1999; minimum gage height, 668.51 ft, Oct. 13, 1998; minimum daily, 668.52 ft., Oct. 13, 1998.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 678.96 ft., May 22; maximum daily, 678.93 ft. May 22; minimum gage height, 668.51 ft, Oct. 13; minimum daily, 668.52 ft., Oct. 13.

ELEVATION, 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	668.57	669.47	669.53	669.86	668.95	668.96	670.83	674.65	676.33	671.81	672.19	670.16
2	668.57	669.51	669.45	669.61	668.92	668.88	671.05	674.31	675.93	671.68	671.85	670.07
3	668.59	669.45	669.40	669.47	668.80	668.87	671.28	673.86	675.51	671.67	671.49	669.95
4	668.64	669.40	669.42	669.38	668.75	668.91	671.54	673.28	675.06	671.78	671.19	669.83
5	668.71	669.32	669.42	669.32	668.73	668.91	671.79	672.75	674.69	671.94	670.98	669.77
6	668.69	669.18	669.41	669.32	668.69	668.89	672.06	672.29	674.38	672.01	670.82	669.71
7	668.66	669.13	669.48	669.34	668.68	668.89	672.53	671.91	674.09	672.07	670.76	669.64
8	668.66	669.12	669.47	669.37	668.68	669.03	673.33	671.64	673.79	672.09	670.71	669.55
9	668.64	669.17	669.45	669.39	668.67	669.15	674.25	671.53	673.54	672.03	670.68	669.66
10	668.63	669.30	669.44	669.40	668.78	669.07	674.98	671.81	673.48	671.97	670.55	669.80
11	668.63	669.32	669.47	669.41	669.01	668.94	675.70	672.43	673.67	671.85	670.44	669.88
12	668.57	669.55	669.44	669.43	669.17	668.90	676.26	673.31	673.90	671.69	670.30	669.92
13	668.52	669.69	669.36	669.42	669.04	668.95	676.57	674.16	674.11	671.55	670.20	669.93
14	668.53	669.71	669.31	669.41	669.05	668.98	676.70	675.05	674.23	671.37	670.11	669.89
15	668.59	669.76	669.24	669.39	669.09	668.99	676.78	676.03	674.30	671.14	670.08	669.78
16	668.69	669.77	669.23	669.37	669.17	669.07	676.81	676.86	674.34	670.98	670.13	669.72
17	668.90	669.74	669.22	669.34	669.26	669.54	676.79	677.51	674.33	670.84	670.26	669.66
18	669.16	669.75	669.19	669.31	669.33	669.98	676.84	677.94	674.28	670.68	670.47	669.63
19	669.23	669.58	669.10	669.24	669.31	670.26	676.89	678.22	674.22	670.54	670.58	669.59
20	669.27	669.56	669.08	669.19	669.26	670.37	676.95	678.52	674.16	670.71	670.61	669.53
21	669.37	669.61	668.87	669.16	669.16	670.35	676.91	678.82	674.03	671.00	670.57	669.42
22	669.46	669.58	668.71	669.13	669.11	670.38	676.84	678.93	673.80	671.07	670.59	669.29
23	669.55	669.53	668.68	669.09	669.05	670.42	676.69	678.87	673.58	671.15	670.95	669.19
24	669.56	669.57	668.65	669.06	669.00	670.52	676.53	678.71	673.36	671.35	671.31	669.17
25	669.51	669.52	668.67	669.03	668.99	670.58	676.38	678.47	673.11	671.42	671.22	669.17
26	669.43	669.50	668.77	668.98	669.01	670.58	676.20	678.20	672.85	671.69	671.08	669.12
27	669.45	669.54	668.84	669.00	668.95	670.52	675.96	677.93	672.63	672.05	670.97	669.04
28	669.52	669.59	668.94	669.01	668.89	670.43	675.67	677.66	672.39	672.08	670.90	668.98
29	669.50	669.63	669.06	669.00	---	670.32	675.35	677.34	672.11	672.15	670.75	668.95
30	669.38	669.55	669.39	669.00	---	670.40	675.00	677.01	671.94	672.25	670.50	668.92
31	669.43	---	669.89	668.97	---	670.56	---	676.68	---	672.30	670.29	---
MEAN	668.99	669.50	669.21	669.27	668.98	669.63	675.05	675.70	673.94	671.58	670.76	669.56
MAX	669.56	669.77	669.89	669.86	669.33	670.58	676.95	678.93	676.33	672.30	672.19	670.16
MIN	668.52	669.12	668.65	668.97	668.67	668.87	670.83	671.53	671.94	670.54	670.08	668.92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WATER YEAR

05353800 STRAIGHT RIVER NEAR FARIBAULT, MN

LOCATION.--Lat 44°15'29", long 93°13'51", in NW¼SE¼ sec. 9, T.109 N., R.20 W., Rice County, Hydrologic Unit 07040002, on right bank 15 ft downstream from highway bridge, 2.8 mi upstream from Falls Creek and 3.2 mi southeast of Faribault.

DRAINAGE AREA.--435 mi^2.

PERIOD OF RECORD.--October 1965 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,034.58 ft above sea level.

REMARKS.--Records good except those for estimated daily discharges, which are fair.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,500 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Apr 11	1400	2,270	7.96	Jun 12	1700	1,520	6.84
May 14	0500	2,590	8.38	Jul 22	1000	1,620	7.00
May 22	0400	*3,310	*9.20	Aug 22	1400	1,520	6.85

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	60	219	133	e69	e68	241	294	505	576	282	308	173
2	60	200	131	e69	e69	246	279	464	542	277	273	156
3	67	193	131	e68	e70	274	301	432	491	663	244	143
4	67	178	130	e67	e71	221	352	e440	483	765	223	132
5	80	164	134	e66	e71	193	434	473	481	608	206	149
6	86	155	127	e65	e72	155	1260	427	622	426	191	134
7	82	143	120	e65	e73	142	1420	405	981	336	178	139
8	78	138	116	e65	e86	135	1260	376	1070	339	166	392
9	75	137	113	e64	e100	156	1870	342	871	393	231	252
10	70	221	110	e63	121	176	1860	322	772	430	285	200
11	67	279	104	e63	426	203	2160	413	1150	321	319	169
12	67	286	111	e62	383	139	2120	1440	1470	275	248	151
13	66	266	109	e63	422	138	1900	2550	1400	249	220	140
14	65	280	104	e64	459	151	1590	2580	1110	244	200	129
15	90	255	105	e65	547	240	1340	2300	824	228	180	125
16	96	238	105	e65	744	549	1180	1870	689	212	167	120
17	218	219	101	e65	664	801	1030	1900	599	279	156	115
18	355	204	102	e65	561	683	921	2070	534	435	182	108
19	300	199	e98	e63	384	508	814	2070	500	916	357	104
20	240	178	e80	e64	306	391	731	2050	470	1320	333	101
21	203	162	e70	e64	292	351	666	3050	434	1460	277	97
22	178	184	e74	e65	269	313	920	3140	400	1600	944	95
23	162	169	e76	e65	234	280	1380	2480	448	1420	964	93
24	149	164	e78	e65	209	258	1410	1960	447	1150	795	90
25	139	162	e80	e65	208	236	1270	1580	413	922	559	90
26	131	151	e82	e65	209	220	1050	1310	367	709	408	87
27	179	140	e82	e66	218	216	844	1070	348	524	320	85
28	227	139	e82	e67	221	293	718	894	340	669	266	86
29	315	139	e78	e67	---	317	619	767	317	533	232	83
30	280	139	e74	e67	---	310	552	675	295	425	207	81
31	245	---	e72	e68	---	296	---	615	---	345	189	---
TOTAL	4497	5701	3112	2024	7557	8832	32545	40970	19444	18755	9828	4019
MEAN	145	190	100	65.3	270	285	1085	1322	648	605	317	134
MAX	355	286	134	69	744	801	2160	3140	1470	1600	964	392
MIN	60	137	70	62	68	135	279	322	295	212	156	81
AC-FT	8920	11310	6170	4010	14990	17520	64550	81260	38570	37200	19490	7970
CFSM	.33	.43	.23	.15	.61	.64	2.45	2.99	1.47	1.37	.72	.30
IN.	.38	.48	.26	.17	.64	.74	2.74	3.45	1.64	1.58	.83	.34

e Estimated

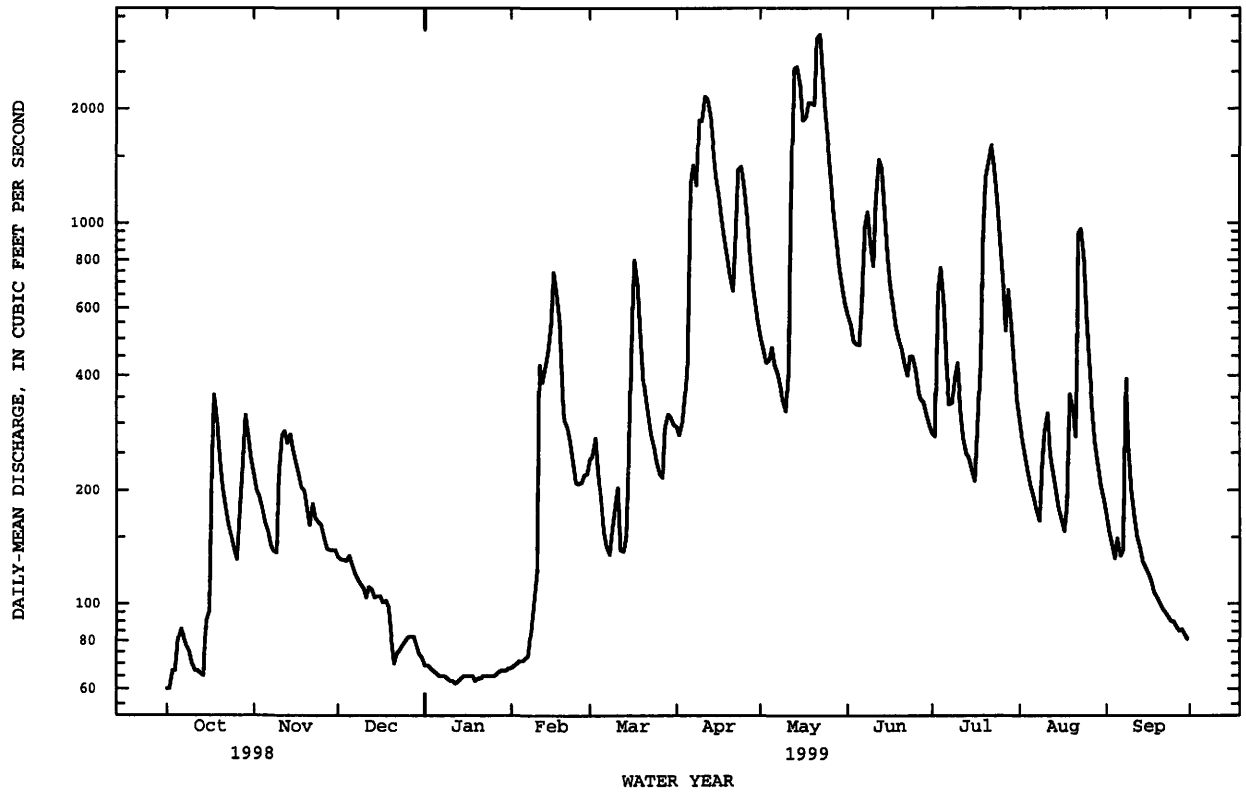
05353800 STRAIGHT RIVER NEAR FARIBAULT, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1966 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	225	198	122	70.0	119	534	639	453	373	313	235	176
MAX	831	595	336	167	837	1270	1912	1322	1399	1027	1136	645
(WY)	1969	1971	1983	1992	1984	1973	1993	1999	1993	1993	1979	1993
MIN	17.0	15.1	11.0	11.0	12.9	26.4	70.2	58.1	45.8	26.2	16.2	16.0
(WY)	1977	1977	1977	1977	1968	1968	1977	1976	1976	1988	1976	1976

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1966 - 1999	
ANNUAL TOTAL	104651		157284			
ANNUAL MEAN	287		431		289	
HIGHEST ANNUAL MEAN					754	1993
LOWEST ANNUAL MEAN					43.9	1977
HIGHEST DAILY MEAN	2740	Apr 1	3140	May 22	5410	May 2 1973
LOWEST DAILY MEAN	45	Jan 14	60	Oct 1, 2	11	Feb 18 1968
ANNUAL SEVEN-DAY MINIMUM	45	Jan 13	63	Jan 8	11	Feb 18 1968
INSTANTANEOUS PEAK FLOW			3310	May 22	6030	Jul 7 1990
INSTANTANEOUS PEAK STAGE			9.20	May 22	12.74[a]	Mar 5 1974
INSTANTANEOUS LOW FLOW			57	Oct 2	10	Mar 5 1974
ANNUAL RUNOFF (AC-FT)	207600		312000		209200	
ANNUAL RUNOFF (CFSM)	.65		.97		.65	
ANNUAL RUNOFF (INCHES)	8.81		13.24		8.88	
10 PERCENT EXCEEDS	594		1150		716	
50 PERCENT EXCEEDS	177		231		130	
90 PERCENT EXCEEDS	57		68		31	

a Backwater from ice.



05355200 CANNON RIVER AT WELCH, MN

LOCATION.--Lat 44°33'50", long 92°43'55", in NW¼SW¼ sec. 27, T. 113 N., R. 16 W., Goodhue County, on right bank 0.3 mile downstream from highway bridge at Welch and 1.8 miles upstream from Belle Creek.

DRAINAGE AREA.--1,340 mi^2.

PERIOD OF RECORD.--June 1909 to January 1914 (no winter records 1909-11), November 1930 to September 1971, October 1972 to September 1987 (annual maximum only), October 1991 to current year.

REVISED RECORDS.--WSP 1308: 1912(M). WSP 1508: 1933. WSP 1914: 1960.WRD MN-98: 1986 (M), 1997.

GAGE.--Water-stage recorder. Datum of gage is 699.16 ft above sea level. Prior to Nov. 11, 1930, nonrecording gage on highway bridge at site 0.3 mile upstream at datum 3.00 ft lower. Nov. 11, 1930 to Oct. 11, 1938, water-stage recorder at site 0.3 mile upstream at present datum.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage known, 17.1 ft, present datum, in April 1888, from floodmark at mill about 2,400 ft upstream.

REVISIONS.-- The maximum discharge for the water year 1986 has been revised to 18,900 ft^3/s, Sept. 22, 1986; gage height, 13.80 ft. Discharges above a stage of 5.00 ft have been revised from May 23, 1997 to Sept. 30, 1997. The maximum discharge for the 1997 water year has been revised to 8670 $ft^3/.s$, and the maximum stage has been revised to 10.33 ft, both occurring on July 26, 1997.

REMARKS.--Records good to fair except those for estimated daily discharges, which are fair to poor. Flow affected at lower stages by regulation from power plant upstream at Cannon Falls.

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	386	716	588	e355	e355	666	1070	1590	1800	942	807	776
2	356	718	574	e370	e370	710	1050	1490	1520	936	766	894
3	363	663	562	e365	e365	720	1020	1400	1490	1100	761	794
4	346	666	557	e355	e360	732	1060	1340	1590	1780	731	764
5	386	664	584	e340	e365	702	1070	1310	1100	1540	628	750
6	425	631	551	e325	e370	670	1340	1300	1420	1300	610	707
7	393	645	549	e320	e375	629	2010	1260	1540	1130	596	672
8	383	602	538	e320	e380	614	2430	1210	1680	1220	566	747
9	382	597	539	e320	e385	570	2890	1150	1660	1290	602	917
10	373	812	523	e325	e390	516	3790	1100	1570	1180	883	1000
11	360	829	502	e335	e435	637	4270	1080	2070	1040	795	973
12	368	840	502	e340	631	708	5010	1300	2480	998	745	883
13	351	1020	502	e345	671	608	4740	2700	2700	867	695	774
14	340	908	502	e350	697	594	4440	4680	2620	777	599	698
15	390	868	502	e355	717	604	4020	5090	2300	777	551	659
16	434	838	498	e365	819	792	3610	4700	2020	819	579	646
17	652	826	484	e375	819	1260	3270	4400	1750	810	536	644
18	924	790	485	e380	840	1370	2920	4250	1580	802	517	624
19	827	829	487	e385	834	1430	2670	4160	1510	950	625	578
20	897	755	406	e390	798	1390	2460	4210	1440	1430	712	576
21	778	710	375	e390	767	1330	2280	5070	1370	1860	738	568
22	699	729	e360	e385	748	1250	2200	5940	1310	1820	805	530
23	686	716	e355	e370	721	1190	2490	6500	1260	2060	2190	455
24	646	671	e370	e360	714	1140	2840	5610	1230	2030	1860	411
25	630	691	e400	e350	712	1090	2860	4330	1210	1530	1520	410
26	608	664	e420	e365	683	1040	2640	3550	1110	1520	1170	415
27	622	666	e405	e380	594	998	2360	2560	1030	1240	925	416
28	606	622	e390	e370	660	1020	2120	2390	1010	1100	863	417
29	659	645	e370	e365	---	1080	1920	2030	1030	1150	723	409
30	817	637	e355	e350	---	1090	1730	1910	956	1020	594	400
31	680	---	e350	e350	---	1100	---	1640	---	905	697	---
TOTAL	16767	21968	14585	11050	16575	28250	78580	91250	47356	37923	25389	19507
MEAN	541	732	470	356	592	911	2619	2944	1579	1223	819	650
MAX	924	1020	588	390	840	1430	5010	6500	2700	2060	2190	1000
MIN	340	597	350	320	355	516	1020	1080	956	777	517	400
AC-FT	33260	43570	28930	21920	32880	56030	155900	181000	93930	75220	50360	38690
CFSM	.40	.55	.35	.27	.44	.68	1.95	2.20	1.18	.91	.61	.49
IN.	.47	.61	.40	.31	.46	.78	2.18	2.53	1.31	1.05	.70	.54

e Estimated

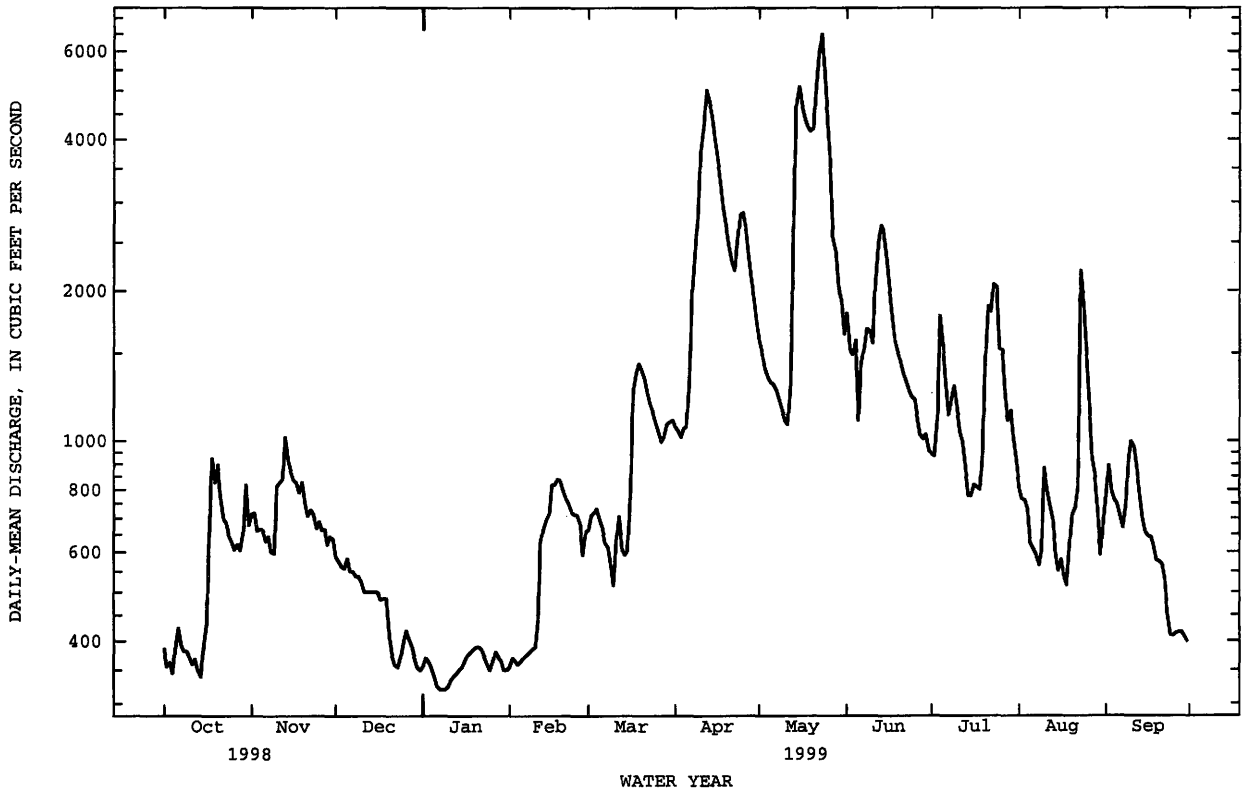
05355200 CANNON RIVER AT WELCH, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	382	375	290	239	304	998	1379	784	791	585	447	394
MAX	1806	1708	1105	662	1141	2627	8240	2966	4144	3343	2951	1823
(WY)	1969	1971	1992	1992	1966	1992	1965	1944	1993	1993	1993	1993
MIN	65.5	78.8	75.0	76.9	110	149	145	84.9	80.0	71.2	78.1	72.8
(WY)	1934	1934	1938	1938	1913	1911	1911	1934	1934	1934	1936	1933

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1909 - 1999	
ANNUAL TOTAL	431783		409200			
ANNUAL MEAN	1183		1121		604	
HIGHEST ANNUAL MEAN					2132	1993
LOWEST ANNUAL MEAN					137	1934
HIGHEST DAILY MEAN	15100	Jun 27	6500	May 23	28700	Apr 8 1965
LOWEST DAILY MEAN	233	Jan 10	320	Jan 7-9	19	Jan 2 1950
ANNUAL SEVEN-DAY MINIMUM	333	Sep 13	326	Jan 5	42	Aug 12 1936
INSTANTANEOUS PEAK FLOW			6920	May 23	36100	Apr 8 1965
INSTANTANEOUS PEAK STAGE			9.22	May 23	15.05	Jun 27 1998
INSTANTANEOUS LOW FLOW			272a	Dec 22	2.5	Jan 3 1950
ANNUAL RUNOFF (AC-FT)	856400		811600		437400	
ANNUAL RUNOFF (CFSM)	.88		.84		.45	
ANNUAL RUNOFF (INCHES)	11.99		11.36		6.12	
10 PERCENT EXCEEDS	2340		2370		1300	
50 PERCENT EXCEEDS	763		748		277	
90 PERCENT EXCEEDS	370		369		100	

a Result of freezeup.



05372995 SOUTH FORK ZUMBRO RIVER AT ROCHESTER, MN

LOCATION.--Lat 44°03'42", long 92°27'58", in NW¼NE¼ sec. 23, T.107 N., R.14 W., Olmsted County, Hydrologic Unit 07040004, on left bank 50 ft downstream from 37th Street bridge, 0.2 mi upstream from sewer plant, and 2.0 mi downstream from Silver Lake Dam.

DRAINAGE AREA.--303 mi^2.

PERIOD OF RECORD.--March 1981 to current year.

GAGE.--Water-stage recorder. Datum of gage is 950.00 ft above sea level.

REMARKS.--Records good. Slight regulation at times from Silver Lake.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of July 6, 1978, reached a stage of about 28.0 ft, on upstream side of bridge, discharge 30,500 ft^3/s. This is the highest known stage since at least 1908.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,300 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Apr 10	0700	1,750	7.04	May 21	1500	2,190	7.61
Apr 23	0700	1,340	6.18	Aug 18	1700	2,380	7.92
May 18	0900	*2,990	*8.86				

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	69	162	123	68	73	161	157	348	358	181	404	240
2	66	150	121	67	75	171	153	325	346	170	317	224
3	80	140	121	65	80	159	239	307	321	451	275	211
4	76	135	124	68	69	152	302	294	310	356	248	211
5	121	132	124	62	74	151	384	303	291	260	225	202
6	98	124	124	61	77	133	630	286	352	233	209	189
7	90	124	117	63	76	121	685	274	340	199	195	193
8	83	122	112	63	91	120	585	260	298	203	187	198
9	80	130	111	63	95	111	1160	245	282	186	331	178
10	76	197	111	63	103	128	1610	234	289	170	370	172
11	75	204	109	63	213	131	1180	293	293	161	279	166
12	70	190	107	63	215	119	1120	370	310	155	259	189
13	69	180	107	63	203	118	826	534	279	153	241	168
14	73	175	107	63	237	120	687	608	255	146	218	162
15	98	168	107	63	248	135	597	490	235	139	201	156
16	119	166	107	66	321	213	556	715	226	172	190	152
17	133	160	103	71	312	304	500	1790	215	201	182	149
18	119	154	101	72	254	280	438	2670	202	400	637	146
19	109	154	95	65	206	224	404	1470	195	1020	679	140
20	104	143	75	68	189	205	381	1160	191	721	396	136
21	97	137	77	71	173	200	359	1970	186	739	338	136
22	90	137	80	72	164	190	765	1440	182	583	562	134
23	89	137	78	73	167	178	1280	933	185	456	778	132
24	84	137	74	73	159	172	890	757	178	363	634	128
25	82	130	73	65	148	164	683	639	169	305	529	126
26	84	129	71	69	148	155	586	564	160	502	443	120
27	270	129	74	73	152	149	527	503	154	391	384	120
28	261	126	76	73	161	169	473	467	156	396	338	116
29	225	126	76	70	---	169	417	426	153	359	304	117
30	197	126	66	69	---	161	372	389	151	333	277	111
31	177	---	71	65	---	157	---	372	---	397	252	---
TOTAL	3464	4424	3022	2073	4483	5120	18946	21436	7262	10501	10882	4822
MEAN	112	147	97.5	66.9	160	165	632	691	242	339	351	161
MAX	270	204	124	73	321	304	1610	2670	358	1020	778	240
MIN	66	122	66	61	69	111	153	234	151	139	182	111
AC-FT	6870	8780	5990	4110	8890	10160	37580	42520	14400	20830	21580	9560
CFSM	.37	.49	.32	.22	.53	.55	2.08	2.28	.80	1.12	1.16	.53

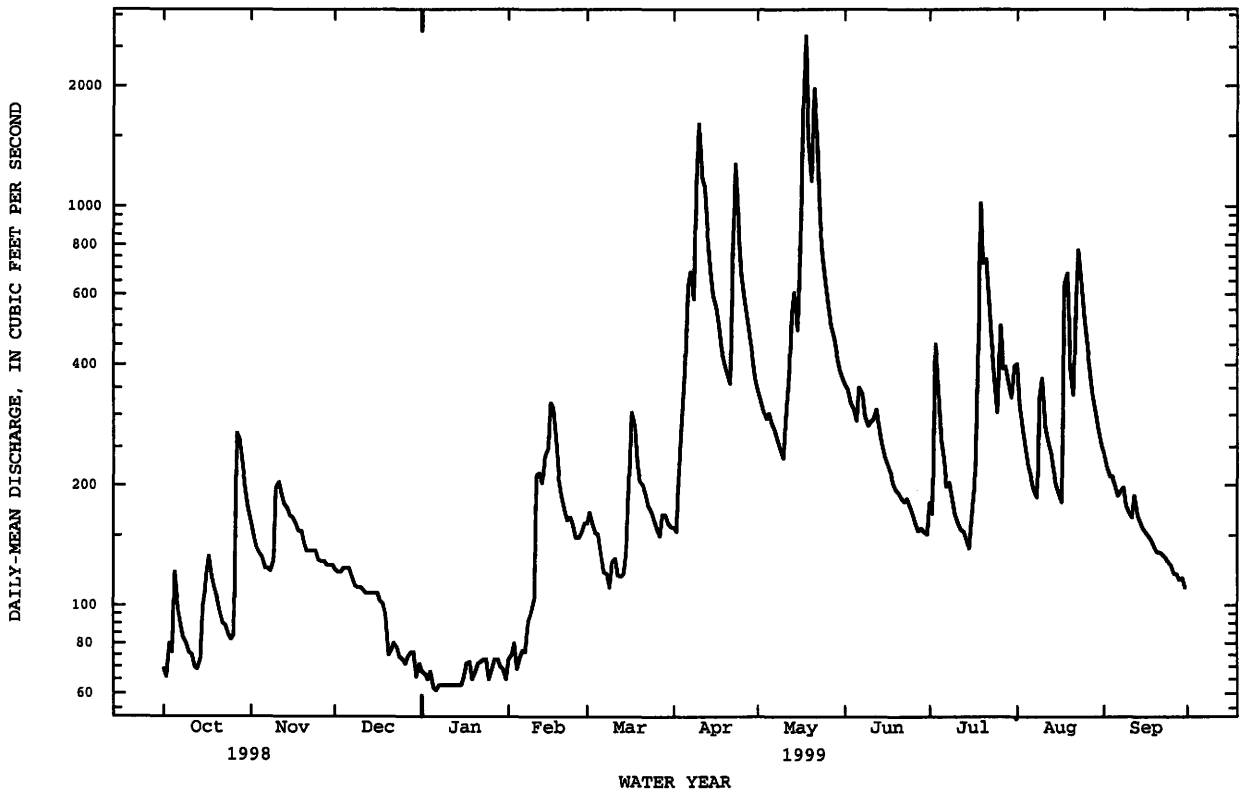
05372995 SOUTH FORK ZUMBRO RIVER AT ROCHESTER, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1981 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	158	148	120	77.5	131	390	418	320	239	238	174	176
MAX	824	338	358	167	454	760	1211	691	1014	663	501	1075
(WY)	1987	1992	1992	1983	1984	1983	1993	1999	1993	1993	1990	1986
MIN	20.0	24.5	21.0	22.5	23.8	165	106	88.3	49.0	23.2	24.6	31.5
(WY)	1990	1990	1990	1990	1990	1999	1981	1989	1989	1988	1988	1988

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1981 - 1999	
ANNUAL TOTAL	72482		96435			
ANNUAL MEAN	199		264		217	
HIGHEST ANNUAL MEAN					431	1993
LOWEST ANNUAL MEAN					87.3	1989
HIGHEST DAILY MEAN	1370	Apr 1	2670	May 18	7710	Sep 21 1986
LOWEST DAILY MEAN	35	Jan 13	61	Jan 6	12	Sep 12 1988
ANNUAL SEVEN-DAY MINIMUM	38	Jan 10	63	Jan 5	14	Sep 8 1988
INSTANTANEOUS PEAK FLOW			2990	May 18	10000	Sep 21 1986
INSTANTANEOUS PEAK STAGE			8.86	May 18	20.77	Sep 21 1986
INSTANTANEOUS LOW FLOW			52a	Feb 4	10a	Oct 23 1981
ANNUAL RUNOFF (AC-FT)	143800		191300		157300	
ANNUAL RUNOFF (CFSM)	.66		.87		.72	
10 PERCENT EXCEEDS	382		558		476	
50 PERCENT EXCEEDS	151		169		125	
90 PERCENT EXCEEDS	62		73		46	

a Due in part to regulation.



05376800 WHITEWATER RIVER NEAR BEAVER, MN

LOCATION.--Lat 44° 09'03", long 92° 00'17", in SW¼ SE¼ sec. 15, T. 108 N., R. 10 W., Winona County, Hydrologic Unit 07040003, on left bank at downstream side of bridge on County Road No. 30, 0.5 mi above mouth of Beaver Creek, and 4.7 mi north of Elba.

DRAINAGE AREA.--271 mi^2.

PERIOD OF RECORD.--May 1975 to September 1985, May 1991 to July 1993, October 1993 to current.

GAGE.--Water-stage recorder. Datum of gage is 692.01 ft above sea level. Prior to Oct. 1, 1976, at datum 2.00 ft higher.

REMARKS.--Records good except those for estimated daily discharges, which are fair.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum discharge since at least 1939, 19,200 ft^3/s, June 21, 1974, gage height, 13.00 ft, present datum, determined by contracted-opening measurement of flow.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 980 ft^3/s (revised) and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Aug 23	2215	*1,460	*5.52	Aug 24	1230	1,260	4.93

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	171	177	160	e105	120	149	168	271	256	180	341	261
2	163	173	158	e102	120	149	166	263	255	182	299	250
3	163	170	156	e100	121	147	190	256	243	325	282	240
4	162	166	155	e99	119	144	299	252	237	343	271	234
5	182	167	156	e98	117	144	334	258	239	234	258	242
6	196	164	156	e98	119	141	401	251	279	231	249	232
7	185	162	154	e99	118	136	397	245	267	208	247	224
8	165	162	153	e100	120	141	348	239	243	211	244	229
9	159	165	153	e103	124	141	480	228	232	263	249	220
10	164	202	152	e105	125	138	498	222	230	205	359	215
11	162	238	152	e110	e130	139	497	222	227	191	349	211
12	159	213	152	e113	e155	137	498	245	221	183	288	225
13	158	198	151	e120	168	136	430	258	214	192	281	222
14	158	196	151	e140	167	137	399	252	207	181	264	210
15	159	191	151	e155	160	144	373	235	202	174	250	204
16	163	188	151	e140	259	202	358	241	203	175	245	196
17	169	184	150	127	200	277	336	421	200	190	234	191
18	173	183	150	122	170	240	315	482	196	205	232	198
19	162	184	150	117	152	198	302	384	194	298	345	197
20	150	179	e125	119	150	189	294	359	193	257	299	184
21	150	175	e100	117	146	191	287	394	190	348	265	180
22	151	176	e95	121	144	179	342	381	188	286	268	183
23	154	176	e92	120	145	170	464	348	198	248	526	185
24	154	170	e96	119	144	165	380	330	192	232	943	181
25	155	169	e103	113	141	159	346	316	183	215	498	186
26	154	168	e110	125	143	157	331	299	178	605	392	186
27	203	166	e115	122	144	156	320	287	175	552	352	180
28	223	165	e117	118	149	168	313	280	177	380	327	173
29	202	167	e115	117	---	172	295	270	179	343	307	171
30	195	166	e112	116	---	166	281	259	176	312	287	173
31	184	---	e108	113	---	166	---	256	---	393	274	---
TOTAL	5248	5360	4199	3573	4070	5078	10442	9004	6374	8342	10025	6183
MEAN	169	179	135	115	145	164	348	290	212	269	323	206
MAX	223	238	160	155	259	277	498	482	279	605	943	261
MIN	150	162	92	98	117	136	166	222	175	174	232	171
AC-FT	10410	10630	8330	7090	8070	10070	20710	17860	12640	16550	19880	12260
CFSM	.62	.66	.50	.43	.54	.60	1.28	1.07	.78	.99	1.19	.76
IN.	.72	.74	.58	.49	.56	.70	1.43	1.24	.87	1.15	1.38	.85

e Estimated

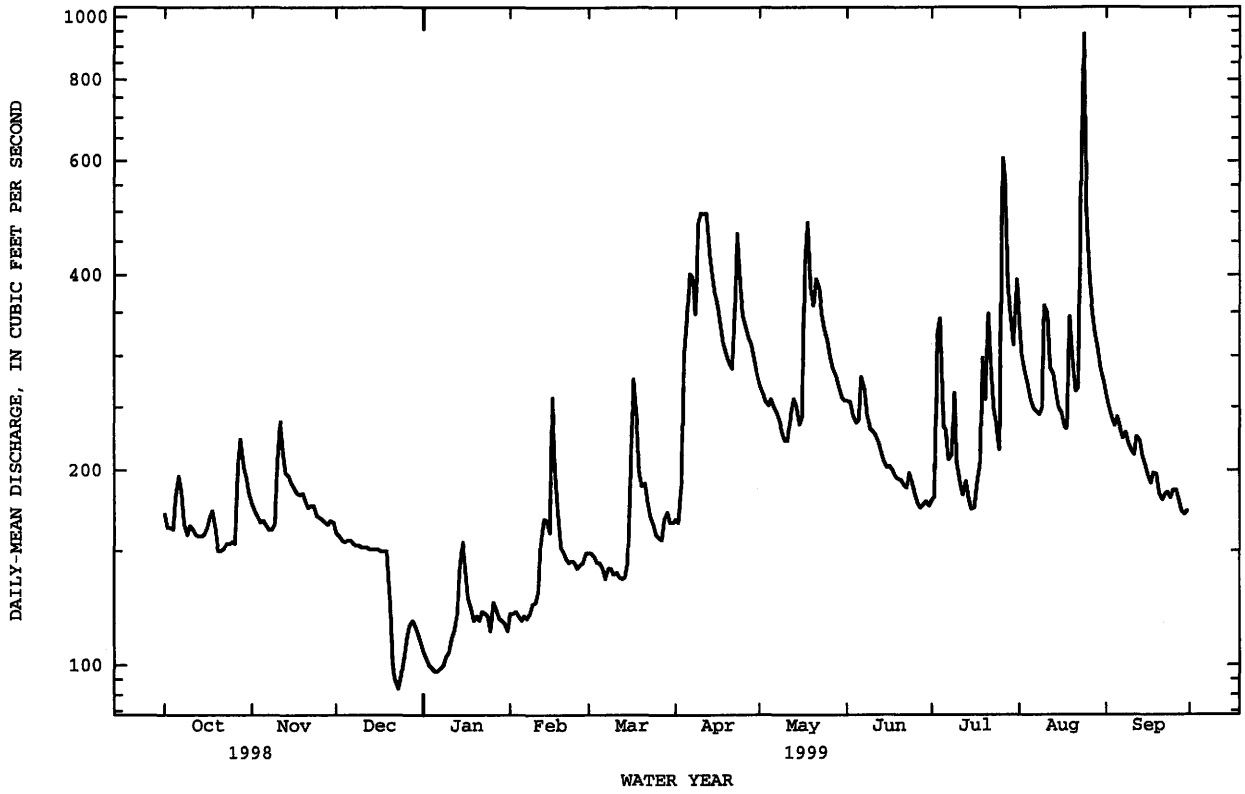
05376800 WHITEWATER RIVER NEAR BEAVER, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1975 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	143	155	138	124	151	267	212	185	179	223	166	148
MAX	223	288	235	188	236	512	348	290	260	973	323	230
(WY)	1994	1992	1992	1980	1985	1985	1999	1999	1998	1978	1999	1978
MIN	88.0	84.8	77.0	80.6	59.7	84.2	92.9	89.6	112	92.1	87.1	85.5
(WY)	1978	1978	1977	1978	1978	1978	1977	1977	1976	1977	1977	1977

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1975 - 1999	
ANNUAL TOTAL	73557		77898			
ANNUAL MEAN	202		213		172[a]	
HIGHEST ANNUAL MEAN					213	1999
LOWEST ANNUAL MEAN					103	1977
HIGHEST DAILY MEAN	1060	Aug 17	943	Aug 24	8760	Jul 6 1978
LOWEST DAILY MEAN	92	Dec 23	92	Dec 23	53	Feb 20 1978
ANNUAL SEVEN-DAY MINIMUM	102	Dec 21	99	Jan 2	53	Feb 20 1978
INSTANTANEOUS PEAK FLOW			1460	Aug 23		
INSTANTANEOUS PEAK STAGE			5.52	Aug 23	12.88	Jul 6 1978
INSTANTANEOUS LOW FLOW			92[b]	Dec 23	53	Feb 20 1978
ANNUAL RUNOFF (AC-FT)	145900		154500		124900	
ANNUAL RUNOFF (CFSM)	.74		.79		.64	
ANNUAL RUNOFF (INCHES)	10.10		10.69		8.65	
10 PERCENT EXCEEDS	307		342		246	
50 PERCENT EXCEEDS	166		184		147	
90 PERCENT EXCEEDS	118		120		96	

a Median of annual mean discharges is 180 ft^3/s.
b Result of freezeup.



05378500 MISSISSIPPI RIVER AT WINONA, MN

LOCATION.--Lat 44°03'21", long 91°38'16", in sec. 23, T.107 N., R.7 W., Winona County, Hydrologic Unit 07040003, on right bank at Winona pumping station in Winona, 9.5 mi upstream from Trempealeau River, and at mile 725.7 upstream from the Ohio River.

DRAINAGE AREA.--59,200 mi^2 (approximately).

PERIOD OF RECORD.--June 1928 to current year. Gage-height records collected in this vicinity since 1878 are contained in reports of Mississippi River Commission.

GAGE.--Water-stage recorder. Datum of gage is 639.64 ft above sea level. June 10,1928 to Apr. 15, 1931, nonrecording gage at site 800 ft upstream. Prior to Oct. 1, 1929, at datum 0.20 ft higher and Oct. 1, 1929 to Apr. 15, 1931, at datum 0.12 ft lower. Apr. 16, 1931 to Nov. 12, 1934, nonrecording gage at present site and datum. Since Mar. 31, 1937, auxiliary water-stage recorder 2.7 mi upstream at tailwater of navigation dam 5A.

REMARKS.-- Records good except those for estimated days, which are fair to poor. Some regulation by reservoirs, navigation dams, and power plants at low and medium stages. Daily discharges for some estimated days provided by the U.S. Army Corps of Engineers.

EXTREMES FOR PERIOD OF RECORD.--Minimum gage height, -3.38 ft, Aug. 31, 1934 (prior to dam construction in 1936); minimum gage height since 1938, after completion of dam, 1.95 ft, Jan. 27, 1944.

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	16000	27900	27900	e14300	e14800	24000	33000	57600	75500	38900	49100	30800
2	15100	27300	28800	e15000	e15200	22400	36100	55100	72100	37700	45500	32100
3	e12900	27100	27400	e16000	e15700	21000	41400	51600	68200	37800	43500	30800
4	e12000	27300	26000	e17000	e16200	21100	42800	46400	63700	38700	43900	30200
5	e10900	27100	26200	e17000	e16500	20700	45200	47500	60200	39300	41700	29700
6	e9900	27100	25900	e17000	e16600	20700	49600	46800	60700	41700	39700	27800
7	e12800	26400	26200	e17000	e16700	21200	50900	42000	58200	41200	38600	24400
8	e16400	22400	26300	e17000	e16800	21400	55500	42900	55900	39000	37700	26100
9	e16500	21200	26500	e17000	e17000	20600	62300	41400	52700	43900	38000	28100
10	e14600	22500	26400	e17000	e17400	22600	66300	43000	52600	43700	38100	28400
11	e14700	24000	26500	e17000	17800	23500	69800	51300	52200	40600	e35000	27600
12	e15500	26100	26000	e17000	19400	23200	73700	55400	51500	41700	33900	27400
13	e16200	27500	25700	e16700	21400	22200	74600	59600	51600	43500	32600	27700
14	e16000	29300	25600	e16600	22700	22100	74700	61000	52100	43300	32000	28000
15	e12600	29800	25300	e16500	23800	21200	75400	64900	52400	40200	31500	28300
16	e12700	29500	25400	e16400	23100	20600	76200	69300	52500	38400	30300	28600
17	e14700	28400	25100	e16500	23100	22500	75300	74600	52700	41100	30600	28200
18	22000	28400	23800	e16700	23400	26800	74100	78700	52600	40200	33700	27800
19	23500	28100	23400	e17000	23500	30900	73600	83800	52000	38500	35000	27100
20	23300	28600	23100	e17400	23600	33300	72700	91300	50100	35800	34700	26400
21	21700	28500	e17000	e17900	23400	33400	72300	99100	49600	e36000	34500	25600
22	24900	27500	e15000	e18000	22800	32900	73300	104000	48700	40900	35400	24200
23	28000	27700	e12000	e18100	21100	32900	73300	108000	48100	39600	36000	23600
24	27800	28300	e10300	e18000	20500	34700	72000	109000	48100	e40000	37700	23900
25	26700	27900	e10000	e17000	20700	36200	71600	107000	47100	e40000	39700	23300
26	26500	27500	e10300	e15000	21000	36400	70200	104000	43600	e40000	e40000	21900
27	26600	27000	e11400	e14300	21500	36000	67900	101000	43000	42600	41000	21200
28	26700	27300	e13000	e14400	23400	33700	66600	97100	42800	43800	41600	21200
29	27200	27600	e13600	e14400	---	32000	64500	90500	41500	46600	40200	21200
30	26800	27300	e14000	e14500	---	32400	61500	85500	40100	49600	35800	21000
31	27600	---	e14300	e14600	---	31800	---	80400	---	51100	32200	---
TOTAL	598800	812600	658400	508300	559100	834400	1916400	2249800	1592100	1275400	1159200	792600
MEAN	19320	27090	21240	16400	19970	26920	63880	72570	53070	41140	37390	26420
MAX	28000	29800	28800	18100	23800	36400	76200	109000	75500	51100	49100	32100
MIN	9900	21200	10000	14300	14800	20600	33000	41400	40100	35800	30300	21000
AC-FT	1188000	1612000	1306000	1008000	1109000	1655000	3801000	4462000	3158000	2530000	2299000	1572000
CFSM	.33	.46	.36	.28	.34	.45	1.08	1.23	.90	.69	.63	.45

e Estimated

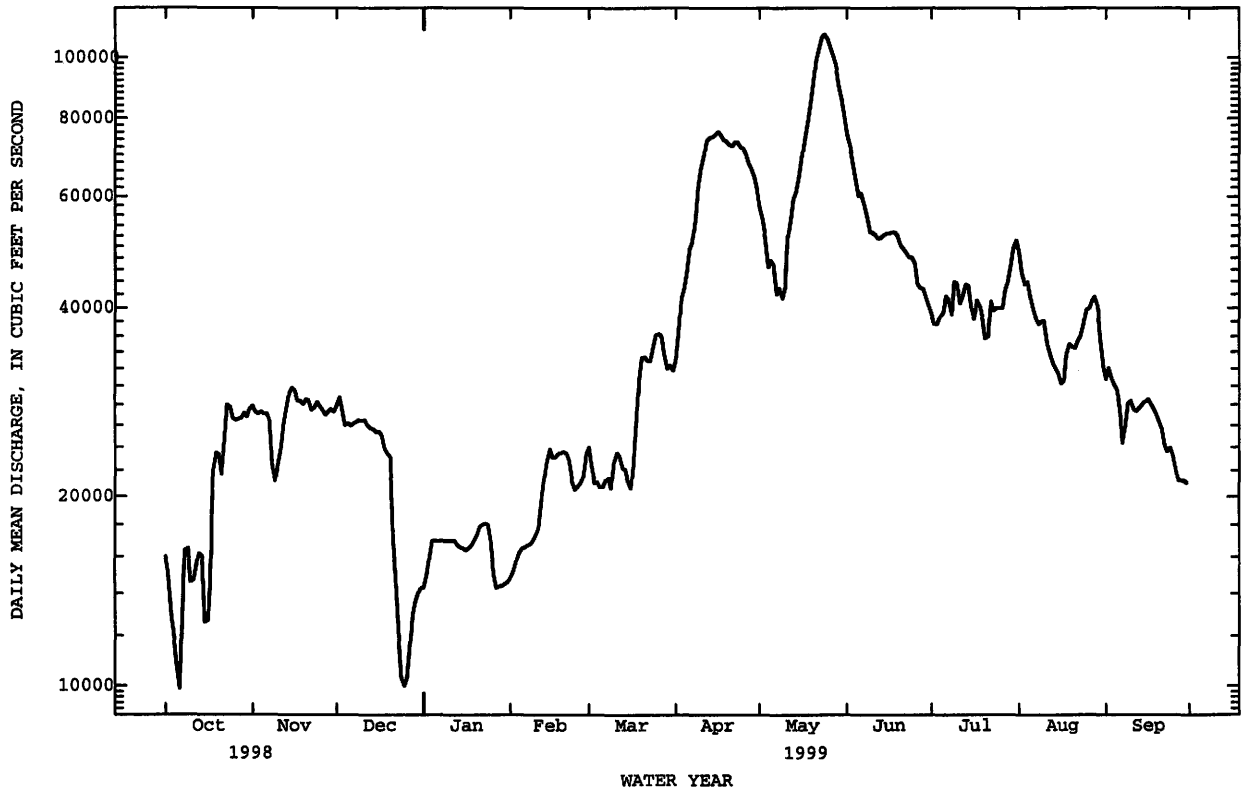
05378500 MISSISSIPPI RIVER AT WINONA, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1928 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	22600	23020	17800	15300	15600	30610	61780	48840	39310	31870	21650	22490
MAX	85950	50040	40440	30480	35900	86420	152600	111500	100200	118800	67560	69490
(WY)	1987	1972	1992	1983	1984	1983	1965	1986	1993	1993	1993	1986
MIN	6774	7367	6286	6742	7874	9023	12810	11930	8450	7063	5391	6790
(WY)	1934	1934	1934	1940	1977	1934	1931	1931	1934	1934	1934	1933

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1928 - 1999	
ANNUAL TOTAL	11722100		12957100			
ANNUAL MEAN	32120		35500		29270	
HIGHEST ANNUAL MEAN					56850	1986
LOWEST ANNUAL MEAN					9742	1934
HIGHEST DAILY MEAN	117000	Apr 5	109000	May 24	264000	Apr 20 1965
LOWEST DAILY MEAN	9900	Oct 6	9900	Oct 6	2250	Dec 29 1933
ANNUAL SEVEN-DAY MINIMUM	11500	Dec 23	11500	Dec 23	3210	Dec 27 1933
INSTANTANEOUS PEAK FLOW			110000	May 24	268000	Apr 19 1965
INSTANTANEOUS PEAK STAGE			12.35	May 24	20.77[a]	Apr 19 1965
INSTANTANEOUS LOW FLOW					1940[b]	Dec 12 1980
ANNUAL RUNOFF (AC-FT)	23250000		25700000		21200000	
ANNUAL RUNOFF (CFSM)	.54		.60		.49	
10 PERCENT EXCEEDS	64400		67100		60500	
50 PERCENT EXCEEDS	26800		28300		21200	
90 PERCENT EXCEEDS	15000		16100		10000	

a From highwater mark.
b Result of ice jam upstream.



05378500 MISSISSIPPI RIVER AT WINONA, MN--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.-- Daily sediment, temperature, and specific conductance station, water years 1976 to 88. Periodic sediment station, water years 1989 to current.

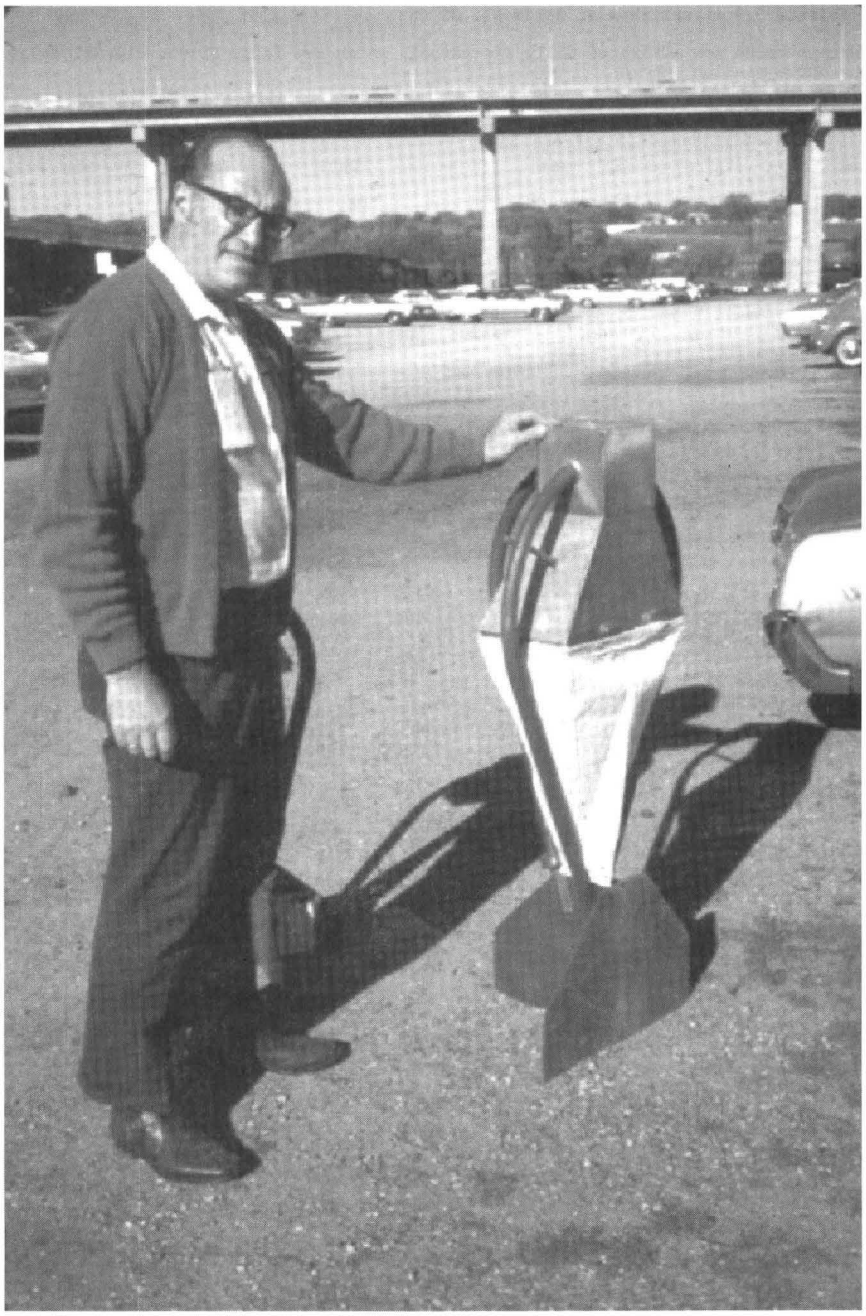
REMARKS.-- Suspended-sediment samples were collected at five points in a river cross-section.

SUSPENDED-SEDIMENT CONCENTRATIONS, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SEDI-MENT SUS-SPENDED MG/L (80154	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
OCT 22...	1400	24,600	17	--
JUN 28...	1705	42,800	22	--

PARTICLE-SIZE DISTRIBUTION OF BED-MATERIAL SEDIMENT, WATER YEAR OCTOBER 1997 TO SEPTEMBER 1998

DATE	TIME	NUMBER OF SAM-PLING POINTS (COUNTS) (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)
*APR 04	1440	4	0.1	0.8	10	50	89	97	98	100
OCT 22	1353	8	0.7	2.9	12	54	88	97	99	100
JUN 28	1740	9	0.3	1.6	13	63	95	99	100	100



Helley-Smith Stream Bedload sampler.

05385000 ROOT RIVER NEAR HOUSTON, MN

LOCATION.--43°46''07", long 91°34'11", in SW¼NW¼ sec. 33, T.104 N., R.6 W., Houston County, Hydrologic Unit 07040008, on right bank 0.2 mi north of Houston and 1.6 mi upstream from South Fork and 18.2 mi upstream from mouth.

DRAINAGE AREA.--1,250 mi^2.

PERIOD OF RECORD.--May 1909 to September 1917, May to November 1929, March 1930 to 1983, 1991 to current year. Operated as high-flow partial-record station October 1983 to September 1990. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WSP 1508: 1911-12. WSP 1628: 1948(P).

GAGE.--Water-stage recorder. Datum of gage is 667.00 ft above sea level. May 28, 1909 to Sept. 30, 1917, nonrecording gage at site 1.3 mi downstream at different datum. May 4, 1929 to Sept. 27, 1933, nonrecording gage and Sept. 28, 1933 to June 26, 1980, recording gage at site 0.9 mi upstream at datum 671.86 ft.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Slight diurnal fluctuation at low flows caused by power plants above station.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 4,000 ft^3/s (revised) and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Apr 10	2100	6,360	11.03	May 19	1000	4,580	9.23
Apr 24	0500	4,670	9.33	Jul 21	1300	*8,000	*12.41

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	689	1010	741	e540	e610	907	814	1820	1380	855	2910	1250
2	681	954	733	e530	e620	898	813	1720	1350	876	2780	1200
3	696	904	727	e520	e620	899	937	1640	1300	1140	2230	1150
4	713	856	719	e510	e560	863	1260	1560	1260	1390	1960	1090
5	763	830	720	e500	e580	847	1510	1550	1240	1200	1760	1070
6	800	802	710	e500	e590	842	1880	1490	1290	1060	1620	1070
7	798	779	690	e500	e610	799	2660	1440	1550	972	1500	1020
8	793	766	678	e500	624	771	2720	1390	1920	920	1410	1030
9	781	762	678	e505	652	759	2900	1340	1940	946	1360	980
10	774	857	672	e515	671	723	5380	1280	1680	942	1480	955
11	764	953	664	e525	821	726	5050	1260	1580	955	1430	938
12	751	1050	659	e540	e1000	728	4120	1310	1490	911	1300	1020
13	732	1130	665	e570	e1040	697	3520	1380	1420	875	1240	1050
14	717	1100	664	e590	1070	690	2990	1710	1340	e885	1180	970
15	718	1050	661	e600	1100	696	2640	2050	1270	e804	1120	933
16	735	1030	653	e620	1130	745	2380	1910	1200	e751	1080	910
17	761	1020	646	e660	e1100	993	2170	1850	1160	e751	1040	888
18	784	984	643	e680	e1080	1420	1990	2550	1130	e730	1020	877
19	814	955	635	e700	e1060	1360	1840	4170	1090	e715	2270	868
20	828	919	623	e720	e1030	1160	1730	2910	1060	e2140	2330	851
21	818	887	561	e740	e980	1070	1650	2460	1040	e7020	1690	834
22	798	879	454	e740	948	1020	1780	2930	1010	6440	1510	824
23	779	872	e470	e740	923	982	2930	2700	1030	3920	1610	822
24	763	836	e490	e720	907	918	4380	2220	1010	2810	2530	815
25	747	823	e520	e710	868	866	3500	2010	973	2290	2870	807
26	734	801	e540	e700	837	835	2940	1840	930	2250	2220	805
27	801	784	e570	e700	894	814	2610	1700	896	2980	1910	813
28	872	772	e600	e680	937	817	2400	1600	899	2650	1710	804
29	995	765	e620	e650	---	828	2160	1510	886	2310	1550	790
30	1140	768	e580	e610	---	830	1960	1450	851	2110	1420	781
31	1050	---	e560	e600	---	820	---	1400	---	2450	1330	---
TOTAL	24589	26898	19546	18915	23862	27323	75614	58150	37175	57048	53370	28215
MEAN	793	897	631	610	852	881	2520	1876	1239	1840	1722	940
MAX	1140	1130	741	740	1130	1420	5380	4170	1940	7020	2910	1250
MIN	681	762	454	500	560	690	813	1260	851	715	1020	781
AC-FT	48770	53350	38770	37520	47330	54200	150000	115300	73740	113200	105900	55960
CFSM	.63	.72	.50	.49	.68	.71	2.02	1.50	.99	1.47	1.38	.75
IN.	.73	.80	.58	.56	.71	.81	2.25	1.73	1.11	1.70	1.59	.84

e Estimated

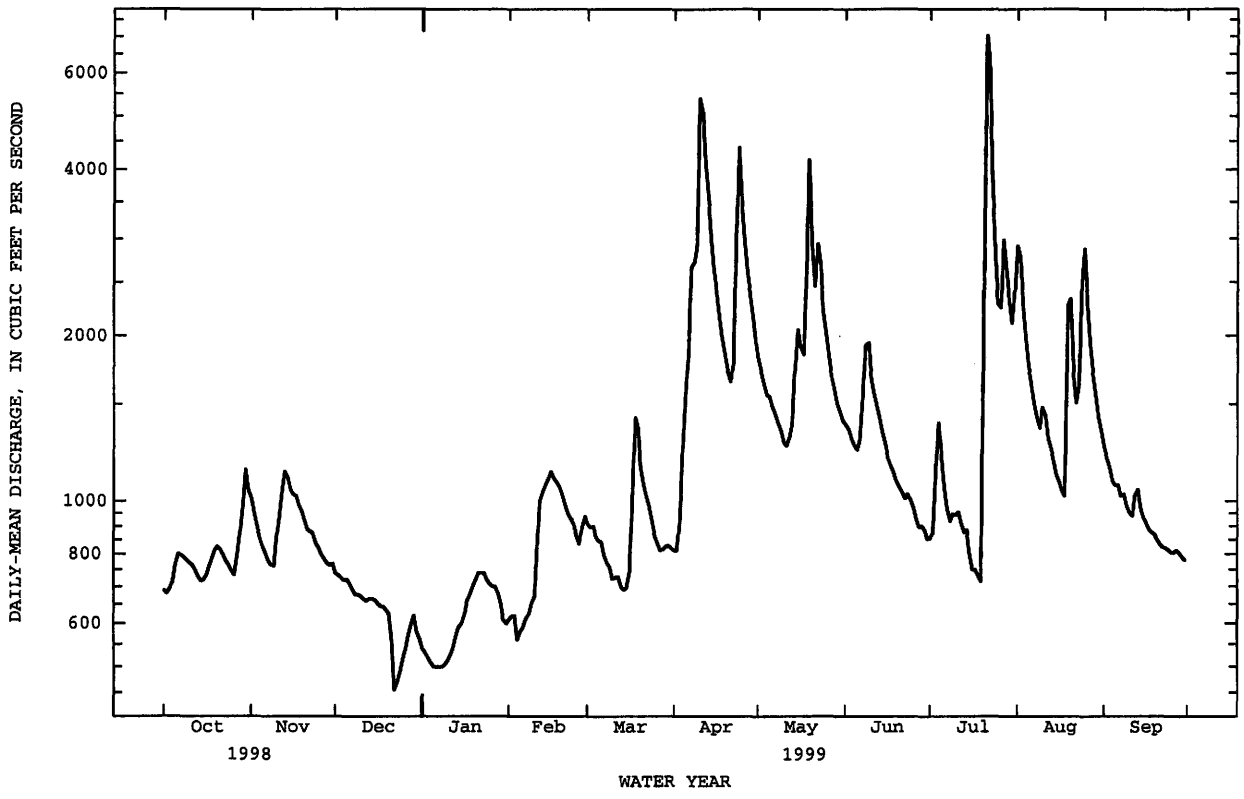
05385000 ROOT RIVER NEAR HOUSTON, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1910 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	518	518	433	413	496	1403	1210	837	901	809	662	574
MAX	1465	1494	1671	1152	1427	3512	4963	2440	2803	3252	2257	2105
(WY)	1974	1983	1992	1973	1966	1961	1965	1973	1974	1978	1993	1938
MIN	193	218	189	172	168	251	274	234	261	236	231	243
(WY)	1934	1934	1934	1959	1959	1931	1931	1934	1934	1964	1958	1933

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1910 - 1999	
ANNUAL TOTAL	370273		450705			
ANNUAL MEAN	1014		1235		737	
HIGHEST ANNUAL MEAN					1590	1993
LOWEST ANNUAL MEAN					294	1931
HIGHEST DAILY MEAN	6830	Jun 29	7020	Jul 21	31100	Apr 1 1952
LOWEST DAILY MEAN	370	Jan 13	454	Dec 22	82	Nov 28 1937
ANNUAL SEVEN-DAY MINIMUM	417	Jan 11	504	Jan 4	113	Dec 25 1933
INSTANTANEOUS PEAK FLOW			8000	Jul 21	37000	Apr 1 1952
INSTANTANEOUS PEAK STAGE			12.41a	Jul 21	18.32b	Mar 2 1965
INSTANTANEOUS LOW FLOW			362c	Dec 22	65d	Dec 26 1933
ANNUAL RUNOFF (AC-FT)	734400		894000		534100	
ANNUAL RUNOFF (CFSM)	.81		.99		.59	
ANNUAL RUNOFF (INCHES)	11.02		13.41		8.01	
10 PERCENT EXCEEDS	1710		2280		1320	
50 PERCENT EXCEEDS	838		933		468	
90 PERCENT EXCEEDS	473		622		262	

a From highwater mark.
b Backwater from ice.
c Result of freezeup.
d Also occurred, Feb. 25, 1935.



05457000 CEDAR RIVER NEAR AUSTIN, MN

LOCATION.--Lat 43°38'11", long 92°58'26", in NE¼SE¼ sec. 15, T.102 N., R.18 W., Mower County, Hydrologic Unit 07080201, on left bank 200 ft upstream from abandoned powerhouse, 500 ft downstream from highway bridge, 1.1 mi downstream from Turtle Creek, and 1.1 mi south of Austin.

DRAINAGE AREA.--399 mi^2.

PERIOD OF RECORD.--May 1909 to September 1914, October 1944 to current year.

REVISED RECORDS.--WSP 1145: 1945, 1948.

GAGE.--Water-stage recorder. Datum of gage is 1,162.10 ft above sea level. May 1909 to April 1912, nonrecording gage in tailwater of power plant 200 ft downstream at datum 3.1 ft lower. May 1912 to September 1914, nonrecording gage on highway bridge 500 ft downstream at datum 1.1 ft lower.

REMARKS.--Records good except those for estimated daily discharges, which are fair.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,500 ft^3/s (revised) and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Apr 7	0030	1,740	6.61	May 18	1100	4,450	11.24
Apr 12	0230	3,280	9.38	May 21	1000	4,400	11.16
Apr 23	1230	2,530	8.10	Jul 19	0730	*6,110	*14.54
May 13	1800	3,030	8.96	Jul 20	2330	4,430	12.55

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	95	544	193	82	79	198	273	509	492	238	1010	189
2	95	468	189	e82	82	246	269	469	459	234	682	181
3	120	407	188	e80	87	198	371	439	410	317	497	171
4	112	364	184	e78	77	232	587	431	401	425	437	157
5	179	333	181	e78	84	215	664	445	429	339	391	149
6	202	308	176	e78	82	174	1440	422	1170	292	340	143
7	205	286	168	e79	80	155	1660	403	1210	254	308	144
8	187	271	161	e80	93	128	1340	373	865	436	286	163
9	172	271	154	e76	112	115	2270	341	768	684	292	146
10	162	348	149	e79	144	166	3010	321	1090	406	376	136
11	146	491	144	e80	404	180	2960	350	1040	300	356	124
12	140	489	145	e93	397	150	3010	1270	989	261	314	148
13	130	454	141	e90	439	167	2030	2920	774	232	289	136
14	134	431	139	88	392	208	1480	2630	642	212	264	125
15	296	392	140	77	418	311	1180	1890	551	189	239	119
16	595	373	139	77	649	529	1060	1480	496	226	229	114
17	640	341	136	76	582	745	967	2430	449	290	211	110
18	656	319	136	77	478	607	825	4200	401	1180	255	107
19	524	314	106	69	351	459	722	2790	407	4750	653	107
20	405	286	e95	67	300	378	645	2480	374	3450	451	105
21	342	265	e86	73	264	349	594	4250	348	3560	339	101
22	297	266	e80	76	242	311	1390	3120	325	2080	511	100
23	272	261	e85	74	222	283	2460	2070	344	1430	669	103
24	252	238	e88	73	211	267	2020	1550	355	1060	564	98
25	230	236	92	74	194	243	1410	1210	317	803	448	96
26	219	226	e90	76	199	228	1080	977	289	678	372	94
27	652	215	e90	76	200	222	878	818	273	648	320	94
28	1290	211	e92	76	200	267	747	718	265	623	279	92
29	1090	209	e93	75	---	288	636	631	250	562	248	88
30	860	209	e90	74	---	275	559	558	238	505	222	88
31	668	---	e86	73	---	271	---	517	---	876	203	---
TOTAL	11367	9826	4036	2406	7062	8565	38537	43012	16421	27540	12055	3728
MEAN	367	328	130	77.6	252	276	1285	1387	547	888	389	124
MAX	1290	544	193	93	649	745	3010	4250	1210	4750	1010	189
MIN	95	209	80	67	77	115	269	321	238	189	203	88
AC-FT	22550	19490	8010	4770	14010	16990	76440	85310	32570	54630	23910	7390
CFSM	.92	.82	.33	.19	.63	.69	3.22	3.48	1.37	2.23	.97	.31
IN.	1.06	.92	.38	.22	.66	.80	3.59	4.01	1.53	2.57	1.12	.35

e Estimated

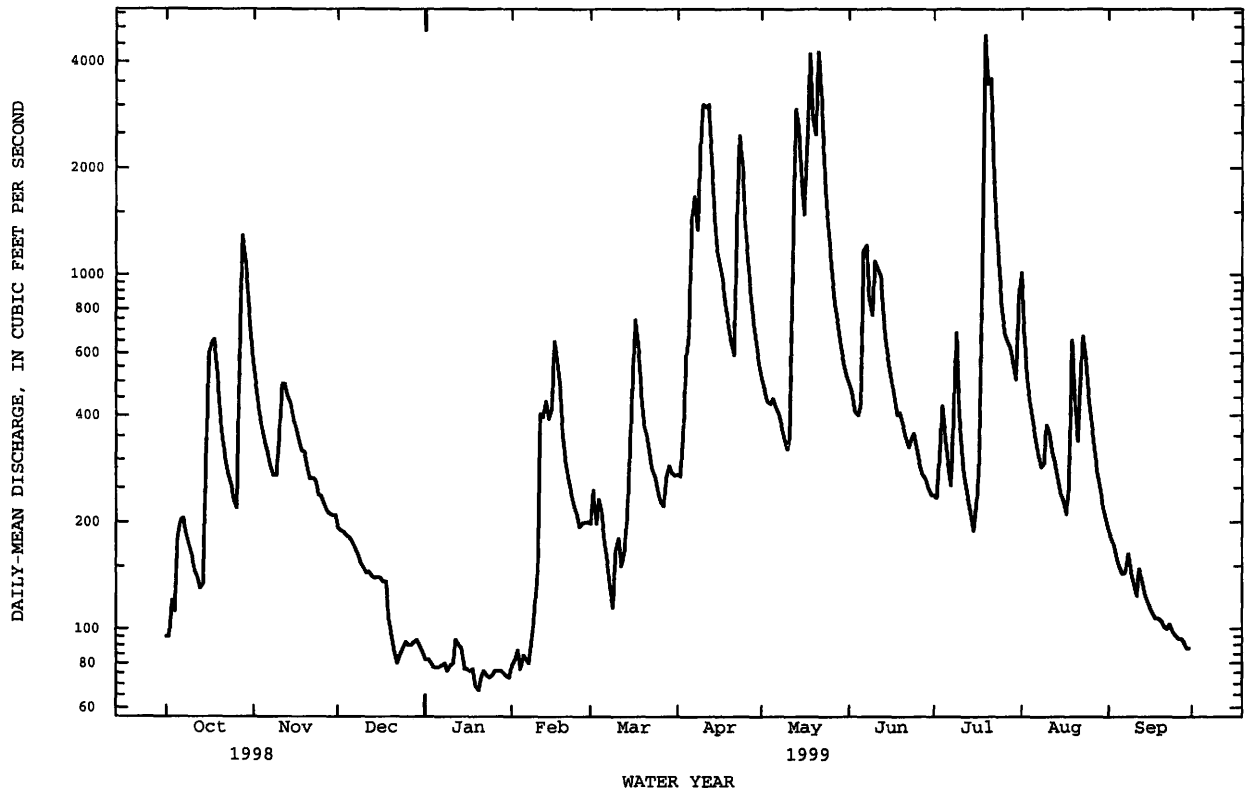
05457000 CEDAR RIVER NEAR AUSTIN, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	166	161	107	74.9	109	484	525	318	296	263	188	148
MAX	884	997	431	261	701	1428	2011	1387	1624	1456	1720	734
(WY)	1974	1910	1992	1973	1984	1973	1993	1999	1993	1978	1993	1993
MIN	37.3	35.7	26.6	26.5	25.0	53.3	52.9	67.9	48.9	22.6	32.3	30.9
(WY)	1959	1959	1913	1913	1913	1968	1911	1910	1950	1911	1948	1911

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1909 - 1999	
ANNUAL TOTAL	126967		184555			
ANNUAL MEAN	348		506		237[a]	
HIGHEST ANNUAL MEAN					824	1993
LOWEST ANNUAL MEAN					58.1	1977
HIGHEST DAILY MEAN	3800	Jun 29	4750	Jul 19	8720	Mar 29 1962
LOWEST DAILY MEAN	50	Jan 13	67	Jan 20	.00[b]	Jan 15 1911
ANNUAL SEVEN-DAY MINIMUM	55	Jan 10	72	Jan 19	13	Sep 1 1912
INSTANTANEOUS PEAK FLOW			5940	Jul 19	12400	Jul 17 1978
INSTANTANEOUS PEAK STAGE			14.54	Jul 19	20.35[c]	Jul 17 1978
INSTANTANEOUS LOW FLOW			43[d]	Feb 4	.00	Jan 15 1911
ANNUAL RUNOFF (AC-FT)	251800		366100		172000	
ANNUAL RUNOFF (CFSM)	.87		1.27		.59	
ANNUAL RUNOFF (INCHES)	11.84		17.21		8.08	
10 PERCENT EXCEEDS	761		1170		495	
50 PERCENT EXCEEDS	209		275		96	
90 PERCENT EXCEEDS	72		86		44	

a Median of annual mean discharges is 220 ft^3/s.
b Occurred on several days in 1911, result of regulation.
c From floodmark.
d Result of freezeup.



05476000 DES MOINES RIVER AT JACKSON, MN

LOCATION.--Lat 43°37'10", long 94°59'10", in SE¼SW¼ sec. 24, T.102 N., R.35 W., Jackson County, Hydrologic Unit 07100001, on right bank in atold dam.

DRAINAGE AREA.--1,250 mi^2.

PERIOD OF RECORD.--May 1909 to December 1913, August 1930 to current year (winter record incomplete prior to 1936). Published as Des Moines River near Jackson, 1930-35, as West Fork Des Moines River near Jackson, 1936-44, and as West Fork Des Moines River at Jackson, 1945-69.

REVISED RECORDS.--WSP 1115: 1942. WSP 1175: Drainage area. WSP 1238: 1950. WSP 1308: 1938(M).

GAGE.--Water-stage recorder. Datum of gage is 1,287.75 ft above+ sea level. May 31, 1909 to Dec. 20, 1913, nonrecording gage at site 0.6 mi downstream at datum 0.99 ft lower. Aug. 22, 1930 to Sept. 30, 1944, nonrecording gage at site 7 mi upstream at datum 17.10 ft higher. Oct. 1, 1944 to Oct. 26, 1949, nonrecording gage at site 600 ft upstream at datum 10.64 ft higher. Oct. 27, 1949 to Dec. 15, 1965, water-stage recorder 200 ft downstream at present datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Regulation at times from Yankton, Long, Shetek, and Heron Lakes.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 540 ft^3/s (revised) and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Nov 23	0130	1,040	6.71	Jun 12	2200	893	6.17
Mar 20	1630	835	6.00	Jul 6	0530	1,050	6.62
Apr 16	1400	*2,360	*9.76	Jul 19	(daily)	e650	--

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	18	393	898	e280	e180	e300	591	1490	820	637	229	17
2	21	400	874	e260	e182	e310	568	1490	815	629	207	16
3	32	397	844	e230	e182	e320	562	1420	807	e800	197	15
4	26	395	807	e210	e182	e320	552	1380	787	e1000	185	22
5	21	386	784	e190	e185	e320	583	1400	785	e1020	168	27
6	38	379	759	e185	e187	e320	666	1350	760	1040	146	21
7	83	391	726	e175	e188	e320	734	1470	727	979	138	17
8	117	381	704	e170	e190	e320	798	1510	676	e900	132	14
9	120	388	668	e175	e196	e320	1160	1480	639	e800	115	14
10	137	504	646	e170	e200	e350	1490	1460	692	e730	111	13
11	136	634	619	e170	e190	e365	1770	1450	792	e640	108	12
12	126	618	588	e170	e180	e380	2000	1400	876	e570	91	12
13	118	725	588	e170	e190	e410	2120	1320	878	e500	88	12
14	104	786	578	e170	e210	e430	2170	1260	826	e460	79	15
15	104	831	572	e170	e250	449	2270	1230	766	e430	58	25
16	129	846	547	e172	e260	534	2350	1220	726	e400	58	24
17	175	861	529	e172	e270	675	2340	1240	678	365	69	20
18	195	877	521	e172	e260	699	2270	1160	644	e450	59	26
19	200	909	342	e172	e260	752	2190	1110	665	e650	50	24
20	197	925	187	e172	e260	824	2100	1100	684	e500	50	19
21	212	927	180	e173	e250	781	1980	1140	671	529	44	17
22	221	1030	e180	e175	e250	714	1880	1120	658	549	44	19
23	223	1040	e235	e176	e250	674	1770	1140	656	533	39	19
24	218	1010	e340	e176	e260	639	1690	1220	630	512	32	19
25	209	995	e330	e176	e270	603	1630	1270	595	475	28	18
26	201	998	e330	e177	e280	578	1580	1220	570	438	26	19
27	237	989	e340	e177	e290	565	1550	1130	605	380	24	19
28	279	980	e350	e177	e290	583	1510	1040	670	347	22	19
29	307	962	e320	e178	---	579	1480	972	688	323	20	17
30	342	936	e300	e179	---	549	1470	910	657	291	20	21
31	405	---	e300	e180	---	589	---	849	---	261	19	---
TOTAL	4951	21893	15986	5699	6342	15572	45824	38951	21443	18138	2656	552
MEAN	160	730	516	184	226	502	1527	1256	715	585	85.7	18.4
MAX	405	1040	898	280	290	824	2350	1510	878	1040	229	27
MIN	18	379	180	170	180	300	552	849	570	261	19	12
AC-FT	9820	43420	31710	11300	12580	30890	90890	77260	42530	35980	5270	1090
CFSM	.13	.58	.41	.15	.18	.40	1.22	1.01	.57	.47	.07	.01
IN.	.15	.65	.48	.17	.19	.46	1.36	1.16	.64	.54	.08	.02

e Estimated

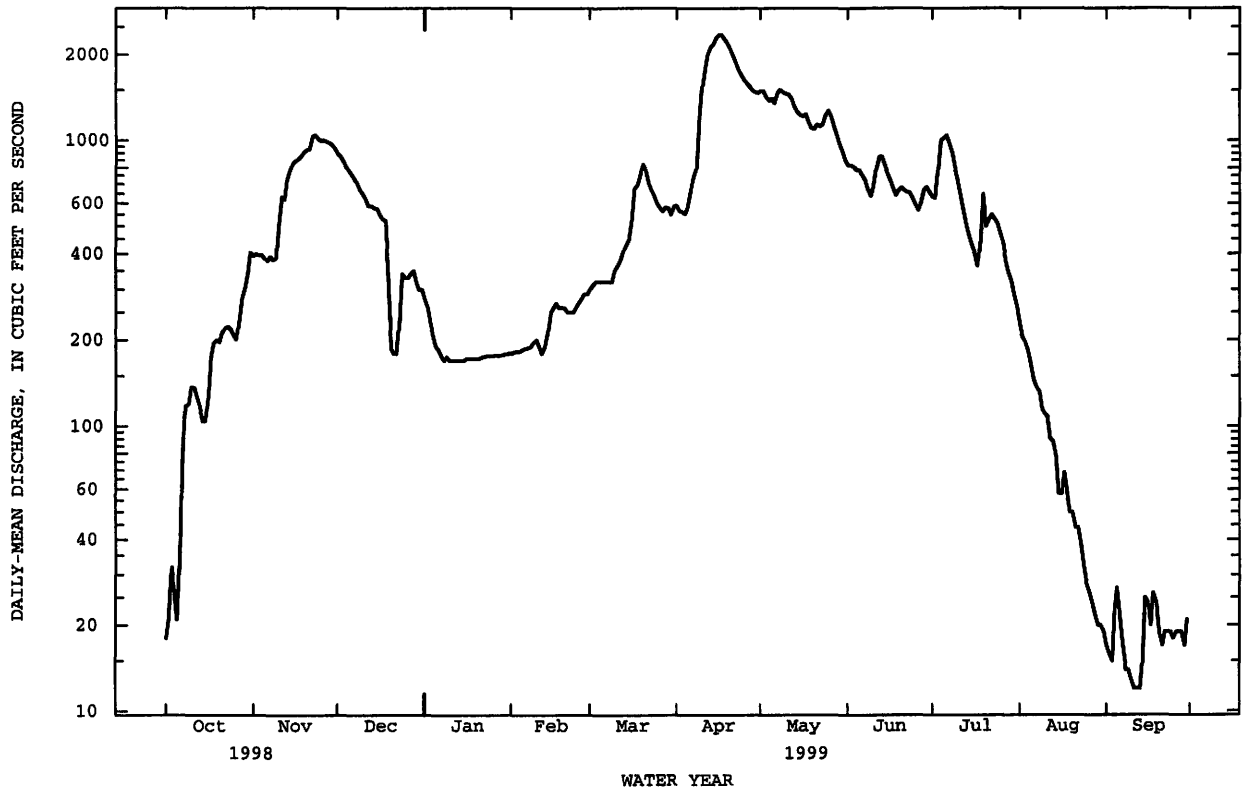
05476000 DES MOINES RIVER AT JACKSON, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1930 - 1999, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	168	186	111	51.1	71.1	469	1079	653	628	544	233	177
MAX	1724	1833	792	298	504	2250	6045	3923	4892	6018	2192	2243
(WY)	1987	1980	1980	1980	1983	1983	1969	1993	1993	1993	1993	1942
MIN	.000	.000	.000	.000	.000	11.8	9.37	2.59	3.76	1.04	.13	.000
(WY)	1956	1956	1956	1956	1936	1959	1959	1934	1931	1931	1955	1931

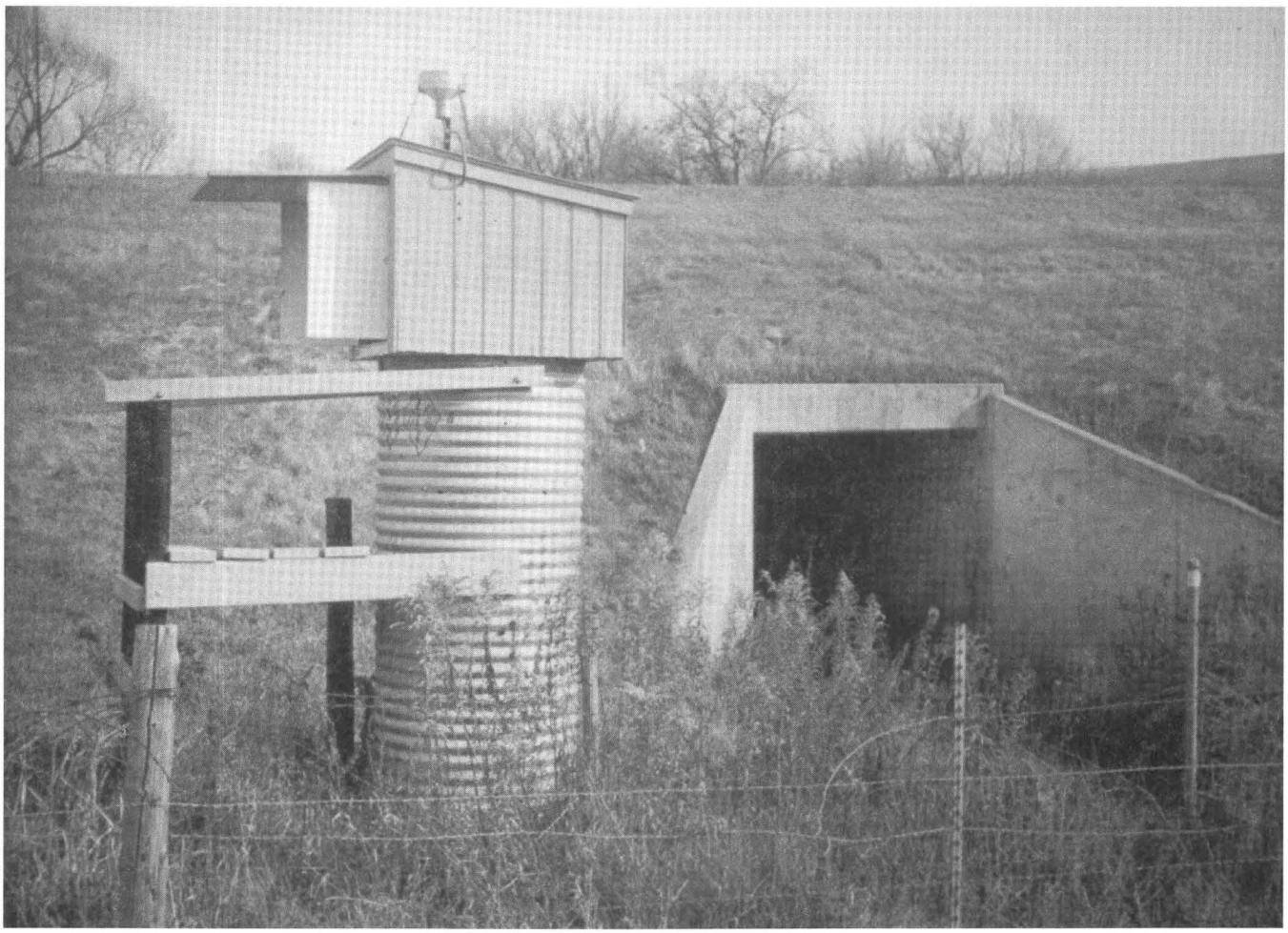
SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1930 - 1999	
ANNUAL TOTAL	132558		198007			
ANNUAL MEAN	363		542		386[a]	
HIGHEST ANNUAL MEAN					2098	1993
LOWEST ANNUAL MEAN					15.1	1956
HIGHEST DAILY MEAN	1870	Apr 3	2350	Apr 16	15500	Apr 11 1969
LOWEST DAILY MEAN	14	Sep 24	12	Sep 11-13	.00[b]	Jul 19 1931
ANNUAL SEVEN-DAY MINIMUM	15	Sep 22	13	Sep 8	.00	Jul 19 1931
INSTANTANEOUS PEAK FLOW			2360	Apr 16	15700	Apr 11 1969
INSTANTANEOUS PEAK STAGE			9.76	Apr 16	19.45	Apr 11 1969
INSTANTANEOUS LOW FLOW			10	Sep 11	.00[b]	Jul 19 1931
ANNUAL RUNOFF (AC-FT)	262900		392700		279500	
ANNUAL RUNOFF (CFSM)	.29		.43		.31	
ANNUAL RUNOFF (INCHES)	3.94		5.89		4.19	
10 PERCENT EXCEEDS	903		1250		1030	
50 PERCENT EXCEEDS	229		381		90	
90 PERCENT EXCEEDS	32		26		3.2	

a Median of annual mean discharges is 260 ft^3/s.
b Many days, several years.



Discharge at High-Flow Partial-Record Stations, Low-Flow Sites, and Miscellaneous Sites

Discharge at High-Flow Partial-Record Stations



High-flow partial record station with precipitation recorder.

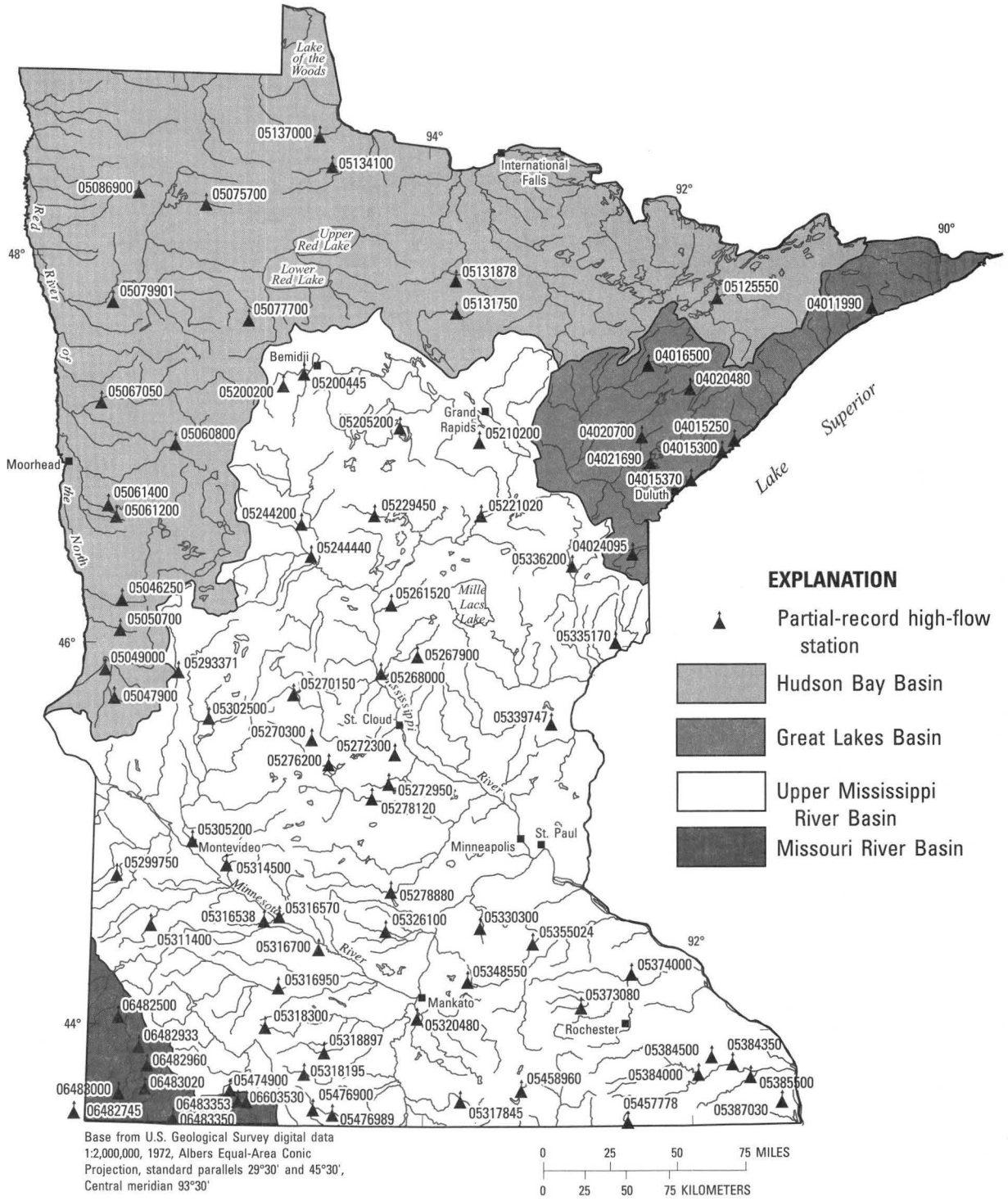


Figure 7. Location of high-flow partial-record stations.

As the number of streams on which streamflow information is likely to be desired far exceeds the number of stream-gaging stations feasible to operate at one time, the Geological Survey collects limited streamflow data at sites other than stream-gaging stations. When limited streamflow data are collected on a systematic basis over a period of years for use in hydrologic analyses, the site at which the data are collected is called a partial-record station. Data collected at these partial-record stations are usable in low-flow or flood-flow analyses, depending on the type of data collected. In addition, discharge measurements are made at other sites not included in the partial-record program. 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.

Records collected at high-flow partial-record stations are presented in a table of annual maximum stage and discharge. Discharge measurements made at miscellaneous sites for both low flows and high flows are given in a second table.

The following table contains annual maximum discharges for high-flow (crest-stage) partial-record 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. The years given in the period of record represent water years for which the annual maximum has been determined.

Annual maximum discharge at high-flow sites during water year 1999

Station Name and [Station Number]	Location and [Drainage area]	Period of Record	Water year 1999 Maximum			Period of Record Maximum		
			Date	Gage height (feet)	Discharge (ft^3/s)	Date	Gage height (feet)	Discharge (ft^3/s)
Cascade River near Grand Marais [04011990]	Lat 47°47'24", long 90°31'35", in $SE^1/_4$ sec.1, T. 61 N., R. 2 W., Cook County, Hydrologic Unit 04010101, at bridge on Forest Road 45, 6.6 miles upstream from mouth, 9.5 miles west of Grand Marais. [Drainage area: 87.6 mi^2]	1985-current year	04-15-99	a11.51	696	05-19-96	a12.95	1,350
Silver Creek tributary near Two Harbors [04015250]	Lat 47°04'40", long 91°36'49", in $SW^1/_4NE^1/_4$ sec. 16, T. 53 N.,R. 10 W., Lake County, Hydrologic Unit 04010102, at culvert on County Highway 3, 1.0 mile upstream from mouth, 4.5 miles northeast of Two Harbors. [Drainage area: 3.62 mi^2]	1965-current year	07-05-99	a12.68	1,260	9-20-72	17.08	1,880
Little Stewart River near Two Harbors [04015300]	Lat 47°03'52", long 91°40'03",in $SE^1/_4NE^1/_4$ sec. 24, T. 53 N.,R. 11 W., Lake County, Hydrologic Unit 04010102, at culvert on County Highway 2, 2.0 miles upstream from mouth, 2.7 miles north of Two Harbors. [Drainage area: 4.96 mi^2]	1960-current year	07-05-99	12.13	320	9-20-72	15.18	598
Talmadge River at Duluth [04015370]	Lat 46°53'20", long 91°55'21",in $SE^1/_4NE^1/_4$ sec.24, T.51 N.,R.13 W., St. Louis County, Hydrologic Unit 04010102, at culvert on U.S. Highway 61, 0.6 mile upstream from mouth, 0.5 mile northeast of Duluth city limits. [Drainage area: 5.86 mi^2]	1964-current year	07-05-99	b23.62	1,470	07-05-99	23.62	1,470
St. Louis River near Aurora [04016500]	Lat 47°29'30", long 92°14'20",in $NW^1/_4SW^1/_4$ sec.22, T.58 N.,R.15 W., St. Louis County, Hydrologic Unit 04010201, at bridge on County Highway 100, 0.8 mile downstream from Partridge River and 1.5 mile south of Aurora. [Drainage area: 293 mi^2]	1942-87#, 1988-current year	07-05-99	a6.29	3,280	05-14-50	8.37	5,380
North Branch Whiteface River near Fairbanks [04020480]	Lat 47°22'20", long 91°56'28", in $NW^1/_4NW^1/_4$ sec. 1, T. 56 N., R. 13 W., St. Louis County, Hydrologic Unit 04010201, at culvert on County Highway 16, 2 miles upstream from the mouth of Jenkins Creek, 0.7 mile west of Fairbanks. [Drainage area: 17.1 mi^2]	1979-current year	07-05-99	a12.81	235	04-23-79	13.67	660
Bug Creek at Shaw [04020700]	Lat 47°06'40", long 92°21'03", in $SW^1/_4SE^1/_4$ sec. 34, T. 54 N., R. 16 W., St. Louis County, Hydrologic Unit 04010201, at culverts on County Road 15 at Shaw, 7.5 miles upstream from mouth. [Drainage area: 24.8 mi^2]	1979-current year	07-05-99	18.00	c1,350	07-05-99	18.00	1,350

Annual maximum discharge at high-flow sites during water year 1999--Continued

Station Name and [Station Number]	Location and [Drainage area]	Period of Record	Water year 1999 Maximum			Period of Record Maximum		
			Date	Gage height (feet)	Discharge (ft^3/s)	Date	Gage height (feet)	Discharge (ft^3/s)
Cloquet River near Toimi [04021690]	Lat 47°21'00", long 91°39'30", in $NE^1/_4SW^1/_4$ sec. 7, T. 56 N., R. 10 W., Lake County, Hydrologic Unit 04010202, at bridge on County Highway 2, 5.8 miles southeast of Toimi, 23 miles north of Two Harbors. [Drainage area: 40.8 mi^2]	1986-current year	09-26-99	a7.97	831	07-04-93	9.06	1,540
Nemadji River near Holyoke [04024095]	Lat 46°31'04", long 92°23'22", in $NE^1/_4NE^1/_4$ sec. 32, T. 47 N., R. 16 W, Carlton County, Hydrologic Unit 04010301, at bridge on State Highway 23, 3.5 miles north of Holyoke, 7 miles south of Wrenshall. [Drainage area: 127 mi^2]	1972-current year	07-26-99	13.80	2,980	09-03-85	17.38	4,420
Ottertail River near Foxhome [05046250]	Lat 46°12'48", long 96°18'24", in $SW^1/_4SW^1/_4$ sec. 26, T. 132 N., R. 45 W., Wilkin County, Hydrologic Unit 09020103, at bridge on County Road 19, 4 miles south of Foxhome., 10.8 miles below Orwell Dam.	1990-current year	06-05-99	a16.25	1,460	04-04-97	d18.10	1,980
Twelvemile Creek near Dumont [05047900]	Lat 45°42'58", long 96°20'54", in $SE^1/_4SW^1/_4$ sec. 17, T.126 N., R.45 W., Traverse County, Hydrologic Unit 09020102, at bridge on Traverse County Road 6, 3 miles east of Dumont.	1996-current year	07-08-99	8.44	470	04-06-97	13.63	c3,720
Mustinka River above Wheaton [05049000]	Lat 45°49'15", long 96°29'25", in $SW^1/_4$ sec.8, T. 127 N., R. 46 W., Traverse County, Hydrologic Unit 09020102, at bridge on U.S. Highway 75, 1 mile upstream from Chicago, Milwaukee and St. Paul railroad bridge, 0.5 mile north of Wheaton, about 8 miles above Lake Traverse. [Drainage area: 810 mi^2]	1915-24#, 1930-58#, 1985-current year	06-07-99	7.80	787	04-07-97	23.63	8,800
Rabbit River near Nashua [05050700]	Lat 46°04'30", long 96°18'24", in $SE^1/_4NE^1/_4$ sec. 15, T. 130 N., R. 45 W., Wilkin County, Hydrologic Unit 09020101, at bridge on County Road 19, 2.6 miles north of Nashua, 4.8 miles upstream from mouth of South Fork Rabbit River. [Drainage area: 99.2 mi^2]	1979-current year	06-06-99	12.86	523	04-05-97	de15.76	1,640
Buffalo River near Callaway [05060800]	Lat 47°01'17", long 95°54'43", in $SW^1/_4SW^1/_4$ sec. 17, T. 141 N., R. 41 W., Becker County, Hydrologic Unit 09020106, at culvert on U.S. Highway 59, 2.7 miles north of Callaway. [Drainage area: 76.4 mi^2]	1960-current year	07-06-99	14.70	367	07-16-93	24.90	1,630
Whiskey Creek at Barnesville [05061200]	Lat 46°39'35", long 96°23'54", in $SE^1/_4SW^1/_4$ sec. 20, T. 137 N., R. 45 W., Clay County, Hydrologic Unit 09020106, at culvert on State Highway 34, 0.7 mile upstream from Blue Eagle Lake, 1.0 mile northeast of Barnesville. [Drainage area: 76.3 mi^2]	1961-64, 1965-66#, 1967-current year	09-04-99	4.88	129	05-31-85	7.12	660
Spring Creek above Downer [05061400]	Lat 46°44'37", long 96°25'12", in $NW^1/_4NW^1/_4$ sec. 30, T. 138 N., R. 45 W., Clay County, Hydrologic Unit 09020106, at culvert on county road, 3.1 miles east of Downer. [Drainage area: 7.93 mi^2]	1961-current year	05-10-99	7.77	78	06-29-75	13.52	1,460
Marsh River Ditch near Ada [05067050]	Lat 47°17'46", long 96°26'09", in $NE^1/_4NE^1/_4$ sec. 13, T. 144 N., R 46 W., Norman County, Hydrologic Unit 09020108, at bridge on County Highway 24, 3.5 miles southeast of Ada.	1985-current year	f03-29-99	13.11	0	04-06-89	16.74	1,070

Annual maximum discharge at high-flow sites during water year 1999--Continued

Station Name and [Station Number]	Location and [Drainage area]	Period of Record	Water year 1999 Maximum			Period of Record Maximum		
			Date	Gage height (feet)	Discharge (ft^3/s)	Date	Gage height (feet)	Discharge (ft^3/s)
Mud River near Grygla [05075700]	Lat 48°19'31", long 95°44'35", in $NE^1/_4NE^1/_4$ sec. 23, T. 156 N., R. 40 W., Hydrologic Unit 09020304, Marshall County, at bridge on State Highway 89, 6 miles west of Grygla. [Drainage area: 150 mi^2]	1979-current year	03-31-99	18.18	1,960	04-19-96	a18.57	1,950
Ruffy Brook near Gonvick [05077700]	Lat 47°44'50", long 95°24'45", in $SE^1/_4SE^1/_4$ sec. 5, T. 149 N., R. 37 W., Clearwater County, Hydrologic Unit 09020305, at culvert on County Highway 67, 4.0 miles upstream from mouth, 4.8 miles east of Gonvick. [Drainage area: 46.2 mi^2]	1960-78#, 1979-85, 1986#, 1987-current year	05-13-99	d3.41	210	04-19-96	a5.78	455
Burnham Creek near Crookston [05079901]	Lat 47°43'59", long 96°39'52", in $SE^1/_4SW^1/_4$ sec. 10, T. 149 N., R. 47 W., Polk County, Hydrologic Unit 09020303, at triple box culvert on U.S. Highway 75, 0.75 mile northeast of Girard, 3 miles southwest of Crookston, 7 miles above mouth. [Drainage area: 134 mi^2]	1986-current year	03-29-99	20.04	2,200	04-15-97	22.63	3,000
Middle River near Newfolden [05086900]	Lat 48°22'04", long 96°16'47", in $NE^1/_4NE^1/_4$ sec. 3, T. 156 N., R. 44 W., Marshall County, Hydrologic Unit 09020309, at bridge on township road, 2.0 miles northeast of Newfolden. [Drainage area: 88.8 mi^2]	1979-current year	04-03-99	18.69	1,100	05-18-96	18.31	2,300
Stony River near Babbitt [05125550]	Lat 47°41'36", long 91°45'38", in $SW^1/_4SW^1/_4$ sec.8, T.60 N., R.11 W., Lake County, Hydrologic Unit 09030001, in Superior National Forest, at bridge on Forest Road 424, 4.7 miles upstream from mouth, 8.5 miles southeast of Babbitt. [Drainage area: 215 mi^2]	1975-80#, 1986-current year	07-06-99	7.16	1,400	04-19-76	8.71	2,490
Big Fork River near Bigfork [05131750]	Lat 47°44'56", long 93°46'31", in $SE^1/_4SE^1/_4$ sec. 1, T.149 N., R.25 W., Itasca County, Hydrologic Unit 09030006, at bridge on State Highway 6, 5.5 miles west of Bigfork. [Drainage area: 606 mi^2]	1973-current year	05-12-99	13.59	1,870	04-22-79	15.48	2,830
Bowerman Brook near Craigville [05131878]	Lat 47°55'29", long 93°45'34", in $NE^1/_4NW^1/_4$ sec.26, T. 63 N., R.27 W., Koochiching County, Hydrologic Unit 09030006, at culvert on State Highway 6,2.4 miles upstream from mouth, 7.0 miles west of Craigville. [Drainage area: 25.7 mi^2]	1979-current year	05-13-99	14.06	276	04-21-79	14.73	650
North Branch Rapid River near Baudette [05134100]	Lat 48°31'56", long 94°38'50", in $NW^1/_4SW^1/_4$ sec.4, T.158 N., R.31 W., Lake of the Woods County, Hydrologic Unit 09030007, at bridge on County Highway 1, 12.7 miles southwest of Baudette. [Drainage area: 174 mi^2]	1986-current year	05-14-99	c12.49	1,190	05-18-96	13.27	1,550
Winter Road River near Baudette [05137000]	Lat 48°42'39", long 94°41'52", in $NW^1/_4NE^1/_4$ sec.1, T.160 N., R.32 W., Lake of the Woods County, Hydrologic Unit 09030008, at bridge on State Highway 11, 4.5 miles west of Baudette, 1.8 miles east of Pitt, 5 miles upstream of mouth. [Drainage area: 140 mi^2]	1986-current year	04-07-99	12.56	1,170	05-18-96	15.35	2,420

Annual maximum discharge at high-flow sites during water year 1999--Continued

Station Name and [Station Number]	Location and [Drainage area]	Period of Record	Water year 1999 Maximum			Period of Record Maximum		
			Date	Gage height (feet)	Discharge (ft^3/s)	Date	Gage height (feet)	Discharge (ft^3/s)
Hennepin Creek near Becida [05200200]	Lat 47°23'52", long 95°05'12", in $NW^1/_4NE^1/_4$ sec. 11, T.145 N., R.35 W., Hubbard County, Hydrologic Unit 07010101, at culvert on Stumphges Rapids Trail approximately 0.5 mile west of Hubbard County Road 3, 3 miles north of Becida, 1.5 miles upstream from mouth. [Drainage area: 36.0 mi^2]	1979-current year	06-05-99	dg12.87	180	05-11-85	15.25	375
Mississippi River at Bemidji [05200445]	Lat 47°27'04", long 94°54'23", in $NW^1/_4NW^1/_4$ sec.20, T.146 N., R.33 W., Beltrami County, Hydrologic Unit 07010101, at bridge on County Highway 11, 1.4 miles southwest of intersection of State Highway 197 and County Highway 7 in Bemidji. [Drainage area: 358 mi^2]	1973-87, 1988-89#, 1990-current year	04-05-99	12.28	981	04-18-97	13.17	1,820
Boy River near Remer [05205200]	Lat 47°04'51", long 94°05'54", in $NE^1/_4NE^1/_4$ sec. 33 T.142 N., R.27 W., Cass County, Hydrologic Unit 07010102, at bridge on County Highway 53, 1.9 miles upstream from Boy Lake and 9 miles northwest of Remer. [Drainage area: 289 mi^2]	1986-current year	04-05-99	ad10.74	435	04-10-96 07-23-87	e11.59 11.64	660 660
Smith Creek near Hill City [05210200]	Lat 47°04'58", long 93°34'59", in $SE^1/_4NW^1/_4$ sec.13, T.53 N.,R.26 W., Itasca County, Hydrologic Unit 07010101, at culvert on U.S. Highway 169, 6.2 miles north of Hill City. [Drainage area: 8.01 mi^2]	1961-current year	05-12-99	a4.85	75	08-05-81	7.95	445
Willow River below Palisade [05221020]	Lat 46°42'36", long 93°33'21", in $NW^1/_4NE^1/_4$ sec.30, T.49 N., R.25 W., Aitkin County, Hydrologic Unit 07010103, at bridge on County Highway 3, 3.2 miles west of Palisade. [Drainage area: 523 mi^2]	1972-current year	05-13-99	15.22	2,650	04-25-79	17.25	3,730
Pine River near Pine River [05229450]	Lat 46°41'39", long 94°22'11", in $NE^1/_4SE^1/_4$ sec.8, T.137 N., R.29 W., Cass County, Hydrologic Unit 07010105, at bridge 2.3 miles southeast of Pine River, on U.S. Highway 371, 4.9 miles upstream of upper Whitefish Lake. [Drainage area: 261 mi^2]	1986-current year	05-14-99	5.15	1,520	04-06-97	a5.19	1,410
Cat River near Nimrod [05244200]	Lat 46°37'49", long 94°55'51", in $SW^1/_4SW^1/_4$ sec.36, T.137 N., R.34 W., Wadena County, Hydrologic Unit 07010106, at bridge on State Highway 227, 2.5 miles west of Nimrod, 3.0 miles upstream from mouth. [Drainage area: 57.1 mi^2]	1961-current year	05-13-99	7.47	300	10-12-73	9.43	560
Leaf River near Aldrich [05244440]	Lat 46°27'25", long 94°50'29", in $SW^1/_4SW^1/_4$ sec.34, T.135 N., R.33 W., Wadena County, Hydrologic Unit 07010107, at bridge on County Highway 29, 3.3 miles upstream from mouth, 7.0 miles northeast of Aldrich. [Drainage area: 870 mi^2]	1972-current year	05-13-99	14.66	2,680	04-22-79	16.15	5,170
Nokasippi River near Fort Ripley [05261520]	Lat 46°12'02", long 94°19'03", in $NE^1/_4NE^1/_4$ sec. 24,T.43 N., R.32 W., Crow Wing County, Hydrologic Unit 07010104, at bridge on County Highway 2, 3 miles northeast of Fort Ripley. [Drainage area: 193 mi^2]	1967-70+,74+,1976+, 1986-current year	05-13-99	a14.92	1,100	04-09-97	a14.93	1,030

Annual maximum discharge at high-flow sites during water year 1999--Continued

Station Name and [Station Number]	Location and [Drainage area]	Period of Record	Water year 1999 Maximum			Period of Record Maximum		
			Date	Gage height (feet)	Discharge (ft^3/s)	Date	Gage height (feet)	Discharge (ft^3/s)
Hillman Creek near Pierz [05267900]	Lat 45°58'27", long 94°04'21", in $NE^1/_4SE^1/_4$ sec. 9, T.40 N., R.30 W., Morrison County, Hydrologic Unit 07010201, at bridge on county highway, 1.1 miles upstream from mouth, 1.5 miles east of Pierz. [Drainage area: 45.0 mi^2]	1964-current year	06-28-99	14.52	1,320	04-09-69	15.48	2,960
Platte River at Royalton [05268000]	Lat 45°50'43", long 94°17'40", in $SE^1/_4NW^1/_4$ sec.26, T.39 N.,R.32 W., Morrison County, Hydrologic Unit 07010201, at bridge on County Highway 27, 0.6 mile north of Royalton, 6.6 miles upstream from mouth. [Drainage area: 432 mi^2]	1929-36, 1972-current year	05-13-99	12.94	2,410	07-26-72	7.84	6,850
Ashley Creek near Sauk Centre [05270150]	Lat 45°46'46", long 94°58'52", in $NW^1/_4SE^1/_4$ sec.29, T.127 N., R.34 W., Todd County, Hydrologic Unit 07010202, at bridge on County Highway 11, 3 miles north of Sauk Centre. [Drainage area: 119 mi^2]	1963-70+,74+, 1976+, 1986-88, 1989#, 1990-current year	05-16-99	14.71	390	04-06-97	a17.12	740
Sauk River tributary at Spring Hill [05270300]	Lat 45°31'22", long 94°48'31",in $SW^1/_4NE^1/_4$ sec.27, T.124 N.,R.33 W., Stearns County, Hydrologic Unit 07010202, at culvert on State Highway 4, 1.0 mile east of Spring Hill, 2.7 miles upstream from mouth. [Drainage area: 7.11 mi^2]	1960-current year	04-06-99	h10.05	c101	07-08-78	22.76	1,440
Johnson Creek near St.Augusta [05272300]	Lat 45°27'49", long 94°09'19", in $NW^1/_4SW^1/_4$ sec.13, T.123 N.,R.28 W., Stearns County, Hydrologic Unit 07010203, at bridge on County Highway 7, 1.0 mile south of St. Augusta, 3.3 miles upstream from mouth. [Drainage area: 45.6 mi^2]	1964-current year	04-06-99	12.50	202	09-09-85	16.37	2,350
Clearwater River near South Haven [05272950]	Lat 45°16'45", long 94°15'04", in $NE^1/_4NW^1/_4$ sec.19, T.121 N., R.28 W., Wright County, Hydrologic Unit 07010203, at culvert 3.4 miles southeast of Kimball, 0.25 mile downstream of Scott Lake Outlet, 2.0 miles southeast of South Haven. [Drainage area: 78.8 mi^2]	1985-current year	05-13-99	14.65	222	09-09-85	17.11	1,040
North Fork Crow River at Paynesville [05276200]	Lat 45°23'09", long 94°42'41", in $SW^1/_4SE^1/_4$ sec.9, T. 122 N., R.32 W., Stearns County, Hydrologic Unit 07010204, at bridge on county road at northeast edge of Paynesville city limits. [Drainage area: 243 mi^2	1973-current year	05-15-99	a4.00	663	04-03-97	a8.85	2,460
North Fork Crow River near Kingston [05278120]	Lat 45°12'13", long 94°23'16", in $SW^1/_4SE^1/_4$ sec.13, T. 120 N., R. 30 W., Meeker County, Hydrologic Unit 07010204, at bridge on State Highway 24, 3.7 miles west of Kingston, 3.9 miles east of Forest City. [Drainage area: 779 mi^2]	1986-current year	05-17-99	i	c1,000	05-01-86	17.82	4,850
Buffalo Creek near Glencoe [05278930]	Lat 44°45'50", long 94°05'27", in $SW^1/_4SW^1/_4$ sec. 16, T. 115 N., R. 27 W., McLeod County, Hydrologic Unit 07010205, at bridge on County Hwy 1, 2.6 miles east of Glencoe. [Drainage area: 373 mi^2]	1972-95, 1998-current year	06-15-99	14.67	1,010	09-12-91	11.78	4,300

Annual maximum discharge at high-flow sites during water year 1999--Continued

Station Name and [Station Number]	Location and [Drainage area]	Period of Record	Water year 1999 Maximum			Period of Record Maximum		
			Date	Gage height (feet)	Discharge (ft^3/s)	Date	Gage height (feet)	Discharge (ft^3/s)
Pomme de Terre River near Elbow Lake [05293371]	Lat 45°57'47", long 95°53'07", in $SE^1/_4SW^1/_4$ sec. 19, T. 129 N., R. 41 W., Grant County, Hydrologic Unit 07020002, at bridge on County Road 47, 4 miles southeast of Elbow Lake, 2.5 miles south of the outlet of Pomme de Terre Lake. [Drainage area: 340 mi^2]	1986-current year	06-07-99	5.02	247	04-07-97	6.72	550
Florida Creek near Burr [05299750]	Lat 44°44'10", long 96°25'10", in $SE^1/_4SE^1/_4$ sec. 29, T. 115 N., R.46 W., Yellow Medicine County, Hydrologic Unit 07020003, at culvert on County Road 15, 3.0 miles west of Burr, 7.6 miles northwest of Canby. [Drainage area: 77.3 mi^2]	1982, 1983-84#, 1991-current year	06-10-99	14.49	75	06-17-92	20.85	996
Little Chippewa River near Starbuck [05302500]	Lat 45°36'52", long 95°37'12", in $NW^1/_4NE^1/_4$ sec.30, T. 125 N., R.39 W., Pope County, Hydrologic Unit 07020005, at culvert on State Highway 28, 4.4 miles west of Starbuck. [Drainage area: 96.2 mi^2]	1979-current year	05-16-99	12.66	100	04-06-97	e15.45	850
Spring Creek near Montevideo [05305200]	Lat 44°58'41", long 95°42'57", in $NW^1/_4NW^1/_4$ sec. 5, T. 117 N., R. 40 W., Chippewa County, Hydrologic Unit 07020005, at culvert on State Highway 29, 1.2 miles upstream from mouth, 2.0 miles north of Montevideo. [Drainage area: 15.8 mi^2]	1959-current year	05-17-99	13.06	34	06-17-92	19.73	660
South Fork Yellow Medicine River near Minneota [05311400]	Lat 44°33'50", long 95°59'50", in $SE^1/_4SE^1/_4$, sec.26, T.113 N., R.43 W., Lyon County, Hydrologic Unit 07020004, on downstream side of bridge on State Highway 68, on northwest edge of Minneota and 6 miles upstream from mouth. [Drainage area: 115 mi^2]	# 1960-81, 1981-87, 1998-current year	06-09-99	7.33	†	04-18-69	13.41	4,430
Hawk Creek near Maynard [05314500]	Lat 44°52'10", long 95°28'58", in $SW^1/_4NW^1/_4$ sec. 7, T. 116 N., R.38 W., at Renville and Chippewa County line, Hydrologic Unit 07020004, at bridge on State Highway 23, 3.0 miles southwest of Maynard. [Drainage area: 315 mi^2]	1949-54#, 1981-current year	04-13-99	i	c250	06-18-57	16.10	6,970
Ramsey Creek near Redwood Falls [05316538]	Lat 44°33'08", long 95°10'38", in $SE^1/_4NE^1/_4$ sec. 33, T. 113 N., R.36 W., Redwood County, Hydrologic Unit 07020006 at bridge on township road 2.3 miles northeast of KLGR radio towers, on west side of Redwood Falls. [Drainage area: 629 mi^2]	1991-93, 1995 - current year	04-11-99	a22.00	305	06-17-93	25.94	920
Beaver Creek at Beaver Falls [05316570]	Lat 44°35'03", long 95°02'49", in $NE^1/_4NW^1/_4$ sec. 22, T. 113 N., R.35 W., Renville County, Hydrologic Unit 07020004, at bridge on County Highway 2 in Beaver Falls, 2.2 miles upstream from mouth, 3.8 miles northwest of Morton. [Drainage area: 191 mi^2]	1972-current year	06-11-99	9.86	667	04-02-97	14.73	3,300
Spring Creek near Sleepy Eye [05316700]	Lat 44°24'12", long 94°44'41", in $NE^1/_4SE^1/_4$ sec. 24, T. 111 N., R. 33 W., Brown County, Hydrologic Unit 07020007, at culvert on county highway, 4.3 miles upstream from mouth, 7.5 miles north of Sleepy Eye. [Drainage area: 32.8 mi^2]	1959-current year	04-09-99	d10.23	108	06-17-93	17.91	960

Annual maximum discharge at high-flow sites during water year 1999--Continued

Station Name and [Station Number]	Location and [Drainage area]	Period of Record	Water year 1999 Maximum			Period of Record Maximum		
			Date	Gage height (feet)	Discharge (ft^3/s)	Date	Gage height (feet)	Discharge (ft^3/s)
Cottonwood River near Springfield [05316950]	Lat 44°12'12", long 95°02'53", on line between secs. 33 and 34, T.109 N., R.35 W., Brown County, Hydrologic Unit 07020008, at bridge on County Highway 2, 1.3 miles downstream from Mound Creek, 1.0 mile upstream from Coal Mine Creek, 3.5 miles southwest of Springfield. [Drainage area: 777 mi^2]	1973-current year	04-12-99	20.20	2,080	03-29-97	28.77	7,860
East Branch Blue Earth River near Walters [05317845]	Lat 43°37'58", long 93°42'28", in $SE^1/_4SE^1/_4$ sec. 16, T.102 N., R.24 W., Faribault County, Hydrologic Unit 07020009, at culvert on State Highway 22, 2.5 miles northwest of Walters. [Drainage area: 30.2 mi^2]	1979-current year	07-20-99	17.92	506	08-15-93	18.73	595
Elm Creek near Trimont [05318195]	Lat 43°45'27", long 94°50'30", in $NW^1/_4NW^1/_4$ sec. 5, T. 103 N., R. 33 W., Martin County, Hydrologic Unit 07020009, at bridge on County Road 103, 12.5 miles northeast of Jackson, 5 miles west of Trimont.	1991-current year	04-09-99	20.00	359	06-04-91	22.92	2,000
North Fork Watonwan River near Delft [05318300]	Lat 43°59'55", long 95°07'11", in $NE^1/_4SE^1/_4$ sec. 11, T. 106 N. R.36 W., Cottonwood County, Hydrologic Unit 07020010, at culvert on U.S. Highway 71, 1.7 miles northwest of Delft. [Drainage area: 13.5 mi^2]	1960-current year	04-10-99	15.02	44	06-18-93	g17.70	1,000
South Fork Watonwan River near Ormsby [05318897]	Lat 43°53'08", long 94°41'27", in $SE^1/_4NW^1/_4$ sec.21, T. 105 N., R.32 W., Watonwan County, Hydrologic Unit 07020010, at bridge on township road, 2.6 miles north of Ormsby, 5.0 miles upstream from Willow Creek. [Drainage area: 107 mi^2]	1979-current year	04-10-99	a11.68	240	05-31-80	18.40	1,920
Maple River near Rapidan [05320480]	Lat 44°03'54", long 94°01'32", in $SW^1/_4SW^1/_4$ sec.13, T. 107 N., R.27 W., Blue Earth County, Hydrologic Unit 07020011, at bridge on County Highway 35, 3.0 miles southeast of Rapidan, 3.3 miles upstream from mouth. [Drainage area: 338 mi^2]	1972-current year	04-11-99	11.56	3,030	03-01-83	12.73	4,550
Middle Branch Rush River near Gaylord [05326100]	Lat 44°30'27", long 94°15'00", in $SW^1/_4NW^1/_4$ sec. 18, T. 112 N., R. 28 W., Sibley County, Hydrologic Unit 07020012, at culvert on township road, 3.0 miles southwest of Gaylord, 10.5 miles upstream from the main branch of Rush River. [Drainage area: 67.3 mi^2]	1979-current year	03-22-99	i	525	03-28-97	d19.22	3,200
Sand Creek near New Prague [05330300]	Lat 44°32'37", long 93°32'16", in $NE^1/_4NW^1/_4$ sec.1, T.112 N., R.23 W., Le Sueur County, Hydrologic Unit 07020012, at culvert on State Highway 13 and 19, 1.9 miles east of New Prague. [Drainage area: 62.2 mi^2]	1960-current year	05-17-99	10.83	456	05-21-60	14.84	1,100
Crooked Creek near Hinckley [05335170]	Lat 46°00'42", long 92°31'45", in $NE^1/_4NE^1/_4$ sec.30, T.41 N., R. 17 W., Pine County, Hydrologic Unit 07030001, at culvert on State Highway 48, 2.7 miles upstream from mouth, 8 miles south of Duxbury, 19 miles east of Hinckley. [Drainage area: 94.4 mi^2]	1966-70+,74+, 76+, 79-80+, 1986-current year	07-26-99	11.84	415	05-28-89	15.52	1,630
Glaisby Brook near Kettle River [05336200]	Lat 46°27'19", long 92°51'34", in $SE^1/_4NW^1/_4$ sec.22, T.46 N., R.20 W., Carlton County, Hydrologic Unit 07030003, at bridge on State Highways 27 and 73, 1.0 mile upstream from mouth, 2.4 miles south of Kettle River. [Drainage area: 27.0 mi^2]	1960-70#, 1971-current year	08-25-99	a5.27	286	07-22-72	10.18	1,370

Annual maximum discharge at high-flow sites during water year 1999--Continued

Station Name and [Station Number]	Location and [Drainage area]	Period of Record	Water year 1999 Maximum			Period of Record Maximum		
			Date	Gage height (feet)	Discharge (ft^3/s)	Date	Gage height (feet)	Discharge (ft^3/s)
Goose Creek at Harris [05339747]	Lat 45°35'11", long 92°58'39", in $SW^1/_4SW^1/_4$ sec.21, T.36 N., R.21 W., Chisago County, Hydrologic Unit 07030005, at culverts on County Highway 9, 0.15 mile west of County Highway 30 in Harris, 8 miles above mouth. [Drainage area: 47.3 mi^2]	1986-current year	05-14-99	d5.15	100	04-19-96	7.50	295
Cannon River below Sabre Lake near Kilkenny [05348550]	Lat 44°17'50", long 93°37'44", in $NE^1/_4NE^1/_4$ sec.31, T. 110 N., R.23 W., Le Sueur County, Hydrologic Unit 07040002, at bridge on township road, 0.25 mile downstream of Sabre Lake, 3 miles southeast of Kilkenny. [Drainage area: 87.9 mi^2]	1985-current year	07-03-99	13.16	350	06-17-93	14.36	535
Cannon River at Northfield [05355024]	Lat 44°27'19", long 93°09'46", in $NE^1/_4NE^1/_4$ sec.1, T.111 N., R.20 W., Rice County, Hydrologic Unit 07040002, at Fifth Street bridge in Northfield. [Drainage area: 929 mi^2]	1980-current year	05-23-99	904.05	5,060	06-18-93	j905.00	8,000
Milliken Creek near Concord [05373080]	Lat 44°07'13", long 92°49'08", in $NW^1/_4NW^1/_4$ sec.36, T. 108 N., R.17 W., Dodge County, Hydrologic Unit 07040004, at bridge on County Road 9, 8.0 miles upstream from mouth, 2.1 miles southeast of Concord. [Drainage area: 22.1 mi^2]	1979-current year	05-21-99	13.98	509	05-31-82	14.50	580
Zumbro River at Zumbro Falls [05374000]	Lat 44°17'12", long 92°25'56", in sec.36, T.110 N., R.14 W., Wabasha County, Hydrologic Unit 07040004, in Zumbro Falls, 1,000 ft downstream from Cold Creek, 0.7 mi upstream from bridge on U.S. Highway 63, and 6.3 mi downstream from North Fork. [Drainage area: 1,150 mi^2]	1909-17#, 1929-80#, 1990-current year	05-18-99	16.95	10,100	07-21-51	30.80	35,900
Root River near Lanesboro [05384000]	Lat 43°44'58", long 91°58'43", in sec. 1, T.103 N., R.10 W., Fillmore County, Hydrologic Unit 07040008, 0.5 mi upstream from highway bridge, 1.2 mi upstream from South Branch, and 2.5 mi northeast of Lanesboro. [Drainage area: 615 mi^2]	1910-17# 1940-85#, 1986, 87-90#, 1991-current year	07-20-99	8.53	6,630	03-29-62	16.11	22,100
Root River at Rushford [05384350]	Lat 43°48'11", long 91°45'10", in $NE^1/_4NE^1/_4$ sec.23, T.104 N., R.8 W., Fillmore County, Hydrologic Unit 07040008, at U.S. Highway 16 bridge on south side of Rushford. [Drainage area: 992 mi^2]	1985-current year	07-21-99	23.09	9,140	04-01-93	26.10	15,200
Rush Creek near Rushford [05384500]	Lat 43°50'00", long 91°46'40", in $SW^1/_4SW^1/_4$ sec. 3, T.104 N., R.8 W., Fillmore County, Hydrologic Unit 07040008, at bridge, 1.5 miles northwest of Rushford, 3.0 miles upstream from mouth. [Drainage area: 132 mi^2]	1942-79#, 1980-current year	08-10-98 07-21-99	j5.60 3.36	j1,540 510	03-26-50	13.54	11,600
South Fork Root River near Houston [05385500]	Lat 43°44'19", long 91°33'50", in $NE^1/_4SW^1/_4$ sec.9, T.103 N., R.6 W., Houston County, Hydrologic Unit 07040008, at bridge on State Highway 76, 0.5 mile upstream from Badger Creek, 1.5 mile south of Houston. [Drainage area: 275 mi^2]	1953-83#, 1985-current year	07-31-99	8.15	1,850	06-21-74	13.81	11,000
Crooked Creek at Freeburg [05387030]	Lat 43°36'37", long 91°21'39", in $SW^1/_4NE^1/_4$ sec.30, T.102 N., R.4 W., Houston County, Hydrologic Unit 07060001, at bridge on State Highway 249 at Freeburg 6.5 miles upstream from mouth. [Drainage area: 44.8 mi^2]	1979-current year	10-18-99	a9.24	247	03-04-92	19.02	2,200

Annual maximum discharge at high-flow sites during water year 1999--Continued

Station Name and [Station Number]	Location and [Drainage area]	Period of Record	Water year 1999 Maximum			Period of Record Maximum		
			Date	Gage height (feet)	Discharge (ft^3/s)	Date	Gage height (feet)	Discharge (ft^3/s)
Little Cedar River near Johnsburg [05457778]	Lat 43°30'52", long 92°45'19", in $NW^1/_4NE^1/_4$ sec.33, T.101 N., R.16 W., Mower County, Hydrologic Unit 07080201, at bridge on County Road 6, 1 mile northeast of Johnsburg, 1 mile north of Minnesota-Iowa border. [Drainage area: 45.8 mi^2]	1986-current year	07-21-99	a16.49	5,580	08-16-93	17.58	9,280
Bancroft Creek at Bancroft [05458960]	Lat 43°42'09", long 93°21'23", in $SW^1/_4SE^1/_4$ sec.21, T.103 N., R.21 W., Freeborn County, Hydrologic Unit 07080202, at bridge on County Road 14, 1.6 miles northeast of Fountain Lake, 1 mile north of Interstate 90. [Drainage area: 28.7 mi^2]	1985+, 1986-current year	07-21-99	a6.82	427	08-16-93	8.26	700
Elk Creek near Brewster [05474900]	Lat 43°40'43", long 95°27'10", in $NE^1/_4SE^1/_4$ sec.36, T.102 N., R.39 W., Nobles County, Hydrologic Unit 07100001, on County Highway 1 bridge 0.7 miles south of Brewster.	1996-current year	04-10-99	19.88	554	06-17-96	24.37	1,380
Fourmile Creek near Dunnell [05476900]	Lat 43°34'57", long 94°46'26", in $SW^1/_4NW^1/_4$ sec.2, T.101 N., R.33 W., Martin County, Hydrologic Unit 07100003, at bridge on State Highway 4, 0.6 mile upstream from mouth, 1.6 miles north of Dunnell. [Drainage area: 15.9 mi^2]	1960-current year	06-11-99	13.65	284	07-04-62	16.15	2,200
East Fork Des Moines River near Ceylon [05476989]	Lat 43°33'53", long 94°39'15", in $NW^1/_4SW^1/_4$ sec.11, T.101 N., R.32 W., Martin County, Hydrologic Unit 07010003, at bridge on County Road 23, 2.4 miles northwest of Ceylon. [Drainage area: 128 mi^2]	1986-current year	06-11-99	19.85	826	07-05-93	21.65	1,350
North Branch Pipestone Creek near Pipestone [06482500]	Lat 44°04'54", long 96°18'27", in $SE^1/_4SE^1/_4$ sec.12, T.107 N., R.46 W., Pipestone County, Hydrologic Unit 10170203, at bridge on U.S. Highway 75, 5.5 miles north of Pipestone. Formerly "Pipestone Creek near Pipestone"	1991-current year	06-09-99	a19.03	1,260	05-08-93	20.28	2,650
Beaver Creek at Valley Springs, S.D. [06482745]	Lat 43°35'10", long 96°28'20", in $NW^1/_4NW^1/_4$ sec.3, T.101 N., R.47 W., Minnehaha County, South Dakota, Hydrologic Unit 10170203, at bridge on County Road 103 (Valley Drive), 1 mile west of South Dakota-Minnesota border, 2.5 miles south of Interstate 90. [Drainage area: 104 mi^2]	1986-current year	04-09-99	17.15	363	06-13-94	24.89	2,280
Chanarambi Creek near Edgerton [06482933]	Lat 43°53'59", long 96°03'39", in $NW^1/_4SW^1/_4$ sec.18, T.105 N., R.43 W., Murray County, Hydrologic Unit 10170204, at bridge on township road, 3.8 miles northeast of Edgerton, 7.4 miles upstream from mouth. [Drainage area: 57.3 mi^2]	1979-current year	04-09-99	d12.62	285	05-08-93 03-22-97	18.14 c16.70	850 850
Champepadan Creek at Co. Rd. 18 near Leota [06482970]	Lat 43°47'24", long 96°00'40", in $NW^1/_4NW^1/_4$ sec.28, T.104 N., R. 43 W., Nobles County, Hydrologic Unit 10170204, at bridge on Nobles County Road 18 near junction with County Road 19, 3 miles south of Leota.	1996-current year	04-09-99	14.09	†	04-06-97	17.20	†
Rock River at Luverne [06483000]	Lat 43°39'15", long 96°12'03", in $SW^1/_4$ $NE^1/_4$ sec. 11, T.102N., R45W., Rock County, Hydrologic Unit 10170204, at left bank downstream side of bridge on Main Street (County Highway 4) in Luverne. [Drainage area: 419 mi^2]	# 1911-14, 1968-69, 1971-current year.	04-10-99	6.51	1,670	05-08-93	14.23	35,400

Annual maximum discharge at high-flow sites during water year 1999--Continued

Station Name and [Station Number]	Location and [Drainage area]	Period of Record	Water year 1999 Maximum			Period of Record Maximum		
			Date	Gage height (feet)	Discharge (ft^3/s)	Date	Gage height (feet)	Discharge (ft^3/s)
Elk Creek near Lismore [06483020]	Lat 43°41'38", long 96°00'46", in $NE^1/_4SE^1/_4$ sec. 29, T.103 N., R. 43 W., Nobles County, Hydrologic Unit 10170204, at bridge on Nobles County Road 19, 4.6 miles southwest of Lismore.	1996-current year	04-06-99	13.46	†	04-06-97	a15.01	†
Little Rock River near Rushmore [06483350]	Lat 43°32'36", long 95°48'58", in $NE^1/_4NE^1/_4$ sec. 24, T. 101 N., R.42 W., Nobles County, Hydrologic Unit 10170204, at bridge #4967, on County Road 6, 1.5 miles west of Ransom, 5.1 miles south of Rushmore.	1991-current year	06-28-99	22.80	100	07-11-93	27.04	4,290
Little Rock Creek near Rushmore [06483353]	Lat 43°32'37", long 95°50'50", in $NE^1/_4NW^1/_4$ sec.23, T. 101 N., R. 42 W., Nobles County, Hydrologic Unit 10170204, at bridge on County Road 6, 5.5 miles southwest of Rushmore.	1996-current year	06-28-99	22.50	258	04-06-97	24.60	†
Little Sioux River near Spafford [06603530]	Lat 43°36'08", long 95°15'27", in $NE^1/_4NE^1/_4$ sec. 34, T. 102 N., R. 37 W., Jackson County, Hydrologic Unit 10230003, at bridge on county highway, 1.6 miles downstream from Jackson County ditch No. 11, 5.8 miles east of Spafford. [Drainage area: 40.5 mi^2]	1962-current year	04-11-99	8.04	167	06-29-69	12.06	4,500

\+ Operated as low flow site.

\# Operated as a continuous-record gaging station.

† Not available at time of printing.

a Affected by shifting control.

b From highwater mark.

c Estimated.

d Not annual maximum gage height.

e Backwater from ice.

f Approximate.

g Stage from downstream gage.

h Backwater from Beaver Dam.

i Not determined

j Revised.

Discharge at Low-Flow Sites

Measurements of streamflow made at low-flow partial record stations are given in the following table. These measurements were made during periods of base flow when streamflow is primarily from ground-water sources. These measurements, when correlated with simultaneous discharge of a nearby stream (when continuous records are available), will give a picture of the low-flow potentiality of a stream. The column headed "Period of record" shows the water years in which measurements were made at the same, or practically the same, site.

Stream	Tributary to	Location	Drainage area (mi^2)	Period of record	Measurements	
					Date	Discharge (ft^3/s)
		Minnesota River Basin				
St. James Creek on 7th Ave. S. in St. James [05318718]	Minnesota River	Lat 43°58'44", long 94°36'44", in SW1/4 SW1/4 sec. 18, T.106 N., R.31 W., Watonwan County, Hydrologic Unit 07020010, at culvert on 7th Ave. South on East edge of St. James, above sewage treatment plant outfall.		1999	09-21-99	0.30
Watonwan River in Madelia [05318820]	Minnesota River	Lat 44°02'36", long 94°24'38", in NE1/4 SE1/4 sec. 27, T107 N., R.30 W., Watonwan County, Hydrologic Unit 07020010, at bridge on city road in Madelia		1999	09-21-99	16
		Des Moines River Basin				
Beaver Creek near Currie [05474770]	Des Moines River	Lat 44°03'30",Long 95°43'08", in NW1/4 SW1/4 sec. 24, T.107 N., R.41 W., Murray County, Hydrologic Unit 07100001, at bridge on county road, 2.8 miles southwest of Currie.	177	1969-70, 1972-76, 1983, 1985, 1987, 1999	09-22-99	1.8
Lime Creek near Avoca [05474800]	Des Moines River	Lat 43°56'58", long 95°31'17", in NW1/4 NW1/4 sec. 34, T.106 N., R.39 W., Murray County, Hydrologic Unit 07100001, at bridge on County Highway 6, 0.6 mile upstream from mouth, 6.2 miles east of Avoca.	95	1969-70, 1972-74, 1983, 1985, 1987, 1999	09-22-99	0
Okabena Creek at Okabena [05474920]	South Heron Lake	Lat 43°44'38", long 95°18'54", in NE1/4 NE1/4 sec. 7, T.103 N., R.37 W., Jackson County, Hydrologic Unit 07100001, at bridge on County Highway 9, 0.3 mile north of Okabena, 1 mile downstream of gage run by DNR.	141	1969-70, 1973-76, 1983, 1985, 1987-88, 1999	09-22-99	3.07
Jack Creek near Heron Lake [05474980]	Heron Lake	Lat 43°10", long 95°18'54", in SE1/4 NE1/4 sec. 31, T.104 N., R.37 W., Jackson County, Hydrologic Unit 07100001, at bridge on County Highway 9, 1.8 miles south of Heron Lake.	218	1969-70, 1973-74, 1983, 1985, 1987-88	09-22-99	0
Four Mile Creek near Dunnell [05476900]	East Fork Des Moines River	Lat. 43°34' 57", Long 94°46'26", in SW 1/4 NW1/4 sec. 2, T. 101 N, R. 33 W., Martin County, at left bank on downstream side of bridge on State Highway 4, 0.6 mile upstream from mouth and 1.6 miles north of Dunnel.	15.4	+ 1959 to current year	09-22-99	0
East Fork Des Moines River near Ceylon [05476989]	Des Moines River	Lat 43°33'53", long 94°39'15", in $NW^1/_4$ $SW^1/_4$ sec. 11, T.101 N., R 32 W., Martin County Hydrologic Unit 07010003, at bridge on County Road 23, 2.4 miles northwest of Ceylon.	128	1971-76, 1983, 1985, + 1986 to current year	09-23-99	0.28

Stream	Tributary to	Location	Drainage area (mi^2)	Period of record	Measurements	
					Date	Discharge (ft^3/s)
		Missouri River Basin				
Little Sioux River near Spafford [06603530]	Missouri River	Lat. 43°36'08", Long 95°15'27", in NE 1/4 NE1/4 sec. 34, T. 102 N., R. 37 W., Jackson County, at left bank on downstream side of bridge on county road, 1.6 miles below Jackson County ditch Number 11, and 5.8 miles east of Spafford.	40.5	+ 1961 to current year	09-22-99	0
West Fork Little Sioux River near Sioux Valley [06603690]	Little Sioux River	Lat 43°30'02", Long 95°16'46", in SE1/4SE1/4 sec.33, T.101 N., R.37 W., Jackson County, Hydrologic Unit at bridge on County Highway 62, 3.3 miles southeast of Sioux Valley.		1971-75, 1983, 1985, 1988, 1999	09-22-99	0

Previously operated as a continuous-record gaging station.
+ Previously operated as a high-flow partial-record station.

Discharge at Miscellaneous Sites

Discharge measurements made at miscellaneous sites during the 1999 water year are listed in the following table. Those measurements of base flow are designated by an asterisk (*) and measurements from earlier water years but not previously published by an (a). Stations previously published as Continuous Record Sites are designated by an (#), those sites published as an High-Flow Partial-Record are designated by an (+).

Stream Name and [Station No.]	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements	
					Date	Discharge (ft^3/s)
		Sauk River Basin --Seepage Run				
Sauk River at Co. Rd. 49 in Cold Spring	Mississippi River	Lat 45°26'32", long 94°26'30", in NW1/4 NW1/4 sec. 27, T.123 N., R.30 W., Stearns County, Hydrologic Unit 07010202, at bridge on County Road 49, in Cold Spring.	--	--	10-20-98	229
Sauk River at Co. Rd. 2 in Cold Spring	Mississippi River	Lat 45°26'55", long 94°25'43", in NE1/4 SE1/4 sec. 22, T.123 N., R.30 W., at bridge on County Road 2 (Red River Ave So.), in Cold Spring.	--	--	10-20-98	248
Sauk River at Main St. in Cold Spring [05270440]	Mississippi River	Lat 46°27'22", long 94°25'21", in SW1/4 SW1/4 sec.14, T.123 N., R.30 W., Stearns County, Hydrologic Unit 07010202, at bridge on Main Street, 0.3 mile downstream from dam in Cold Spring, 0.3 mile upstream from sewage effluent outfall.	--	1976, 1988-89	10-30-98	274
Brewery Creek above Co. Rd. 2 at Cold Spring	Sauk River	Lat 45°27'31", long 94°25'57", in SW1/4 SE1/4 sec. 15, T.123 N., R.30 W., Stearns County, Hydrologic Unit 07010202, at outlet to swamp, 3 blocks above County Road 2 (Red River Ave. N.) in Cold Spring.	--	--	10-19-98	0.14
Brewery Creek on Co. Rd. 2 at Cold Spring	Sauk River	Lat 45°27'31", long 94°25'44", in SE1/4 SE1/4 sec. 15, T.123 N., R.30 W., sec. 15, T.123 N., R.30 W., Stearns County, Hydrologic Unit 07010202, at bridge on County Road 2, (Red River Ave. N.) in Cold Spring.	--	--	10-19-98	1.9
Brewery Creek at mouth in Cold Spring	Sauk River	Lat 45°27'27", long 94°25'19", in SW1/4 SW1/4 sec. 14, T.123 N., R.30 W., Stearns County, Hydrologic Unit 07010202, at mouth of Brewery Creek in Cold Springs.	--	--	10-19-98	2.9
Sauk River at Sewage Treatment Plant outfall in Cold Spring	Mississippi River	Lat 45°27'38", long 94°24'38", in NE1/4 SW1/4 sec. 14, T.123 N., R.30 W., Stearns County, Hydrologic Unit 07010202, at Sewage Plant outfall, 0.6 mile below dam in Cold Spring.	--	--	10-20-98	289
Sauk River above Golden Plump wells at Cold Spring	Mississippi River	Lat 45°27'52", long 94°24'23", in SE1/4 NE1/4 sec.14, T.123 N., R.30 W., Stearns County, Hydrologic Unit 07010202, above Golden Plump wells at Cold Spring.	--	--	10-21-98	244
Sauk River below Golden Plump wells at Cold Spring	Mississippi River	Lat 45°27'48", long 94°24'15", in NE1/4 SE1/4 sec. 14, T.123 N., R.30 W., Stearns County, Hydrologic Unit 07010202, below Golden Plump wells at Cold Spring.	--	--	10-21-98	240
Sauk River two miles below Cold Spring	Mississippi River	Lat 45°27'50", long 94°22'52", in NW1/4 SW1/4 sec.18, T.123 N., R.29 W., Stearns County, Hydrologic Unit 07010202, two miles below Cold Spring.	--	--	10-21-98	239
Sauk River at Sauk River Rd. in Rockville	Mississippi River	Lat 45°28'28", long 94°20'24", in SW1/4 SW1/4 sec. 9, T.123 N., R.29 W., Stearns County, Hydrologic Unit 07010202, at bridge on Sauk River Road in Rockville.	--	--	10-20-98	289

Stream Name and [Station No.]	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements	
					Date	Discharge (ft^3/s)
		Minnesota River Basin				
Chippewa River at Canton Ave. in Montevideo [05305400]	Minnesota River	Lat 44°56'53", long 95°43'50, in NE1/4 NW1/4 sec. 18, T.117 N., R.40 W., Chippewa County, Hydrologic Unit 07020005, at bridge on Canton Ave. in Montevideo.	--	1989-90, 1992	05-20-99	845
Seepage face at Wehrspann Spring near Montevideo [455450095402301]	Ditch 69A	Lat 45°54'50", long 95°40'23", in SW1/4 SW1/4 sec. 27, T.117 N. R.40 W., Chippewa County, Hydrologic Unit 07020004, at spring near mouth of Ditch 69A, 1.8 miles northwest of Wegdahl.	--	--	04-28-99 08-31-99	0.47 0.87
Palmer Creek near Granite Falls [05311100]	Minnesota River	Lat 44°50'54", long 95°33'47", in SW1/4 SW1/4 sec.16, T.116 N., R.39 W., Chippewa County, Hydrologic Unit 07020004, at bridge on county road, 2.5 miles north of Granite Falls.	34.2	1969-70, 1974, 1976, 1978-81, 1983	04-05-99 04-28-99 07-21-99	5.4 8.1 3.9
Hawk Creek at Eagle Lake outlet near Willmar	Minnesota River	Lat 45°10'18", long 95°00'42", SW1/4 SE1/4, sec. 25, T.120 N., R.35 W., Kandiyohi County, Hydrologic Unit 07020004, at dam for Eagle Lake outlet, 4.1 miles northeast of Willmar.	--	# 1972-73	04-26-99 06-01-99 07-19-99 08-30-99	14 6.1 1.5 0
Hawk Creek at Willmar Lake inlet in Willmar	Minnesota River	Lat 45 °08'58", long 95°01'24",in NE1/4 NE1/4 sec. 2, T.119 N., R.35 W., Kandiyohi County, Hydrologic Unit 07020004, at inlet to Willmar Lake in Willmar.	--	--	04-26-99 07-20-99	12 2.5
Hawk Creek at Foot Lake Outlet at Willmar	Minnesota River	Lat 45°07'28", long 95° 04'32", in SW1/4 SW1/4 sec. 9, T.119 N., R.35 W., Kandiyohi County, Hydrologic Unit 07020004, at outlet to Foot Lake in Willmar.	--	--	04-26-99 08-24-99 09-01-99	17 1.3 2.2
Hawk Creek at Co. Rd. 116 near Willmar	Minnesota River	Lat 45° 05'27", long 95° 08'42" in SW1/4 NE1/4 sec. 26, T.119 N. R.36 W., Kandiyohi County, Hydrologic Unit 07020004, at bridge on County Road 116, 3 miles southwest of Willmar.	--	--	04-27-99 06-02-99 07-08-99 08-11-99 08-24-99 08-30-99	27 19 149 47 8.5 16
Hawk Creek at Township Rd. 8 above Raymond	Minnesota River	Lat 45°02'06", long 95°13'01", in NW1/4 NE1/4 sec. 17, T.118 N., R.36 W., Kandiyohi County, Hydrologic Unit 07020004, at bridge on Township Road 8, 1 mile northeast of Raymond.	--	--	04-27-99 06-02-99 07-20-99 08-17-99 08-31-99	35 34 14 20 23
Hawk Creek at 160 Ave. SW below Raymond	Minnesota River	Lat 45°01'12", long 95°16'05", in NE1/4 NE1/4 sec. 23, T.118 N., R. 37 W., Chippewa County, Hydrologic Unit 07020004, at bridge on 160th Ave SW, 1 mile west of Raymond.	--	--	04-27-99 06-02-99 08-17-99 08-31-99 09-28-99	39 42 24 27 8.9
Long Lake Outlet near Willmar	Hawk Creek	Lat 45°11'09", long 95°03'46", in SW1/4 SW1//4 sec. 22, T.120 N., R.35 W., Kandiyohi County, Hydrologic Unit 07020004, at bridge on township road, below Long Lake Outlet, 3 miles north of Willmar.	--	--	04-27-99 07-19-99 08-11-99 08-24-99 09-28-99	2.0 4.2 3.5 2.0 0.77
St. Johns Lake outlet near Pennock	Hawk Creek	Lat 45°08'43", long 95°08'47", in NE1/4 SE1/4 sec. 2, T.119 N., R.36 W., Kandiyohi County, Hydrologic Unit 07020004, at culvert on township road, just below St. Johns Lake outlet, 1 mile east of Pennock.	--	--	04-27-99 06-02-99 07-20-99 08-24-99 09-28-99	11 11 7.8 5.2 2.1

Stream Name and [Station No.]	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements	
					Date	Discharge (ft^3/s)
		Minnesota River Basin--continued				
Lateral E of Joint Ditch # 7 near Raymond	Hawk Creek	Lat 45°03'19", long 95°18'31", in SE1/4 SE1/4 sec. 4, T.118 N., R.37 W., Chippewa County, Hydrologic Unit 07020004, at bridge on township road, 4 miles northwest of Raymond.	--	--	04-27-99 07-22-99 08 31-99	17 9.5 13
Hawk Creek at County Road 4 in Maynard	Minnesota River	Lat 44°54'09", long 95°27'46", in SW1/4 NE1/4 sec. 32, T.117 N., R.38 W., Chippewa County, Hydrologic Unit 07020004, at culverton County Road 4, in Maynard.	--	--	04-27-99 07-22-99 08-31-99	689 29 38
County Ditch 11 at Co. Rd. 17 in Maynard	Hawk Creek	Lat 44° 54'18", long 95° 28'30", in NE1/4 NE1/4 sec. 31, T.117 N., R.38 W. Chippewa County, Hydrologic Unit 07020004, at bridge on County Road 17, on west edge of Maynard.	--	--	04-27-99 07-22-99 08-31-99	7.9 1.2 1.8
Chetomba Creek at State Highway 7 near Prinsburg [05313900]	Hawk Creek	Lat 44°56"06", long 95°12'05", in SE1/4 SW1/4, sec. 16, T.117 N., R.36W., Kandiyohi County, Hydrologic Unit 07020004, at State Highway 7, 0.7 mile west of Prinsburg.	--	1949-51	04-28-99 07-22-99 08-11-99	19 4.8 42
Chetomba Creek at 120th St. near Prinsburg	Spring Creek	Lat 44°55'04", long 95°12'26", in NE1/4 NE1/4 sec.29 T.117 N., R.36 W., Kandiyohi County, Hydrologic Unit 07020004, at bridge on township road, 1.0 mile southwest of Prinsburg.	--	--	04-28-99 06-02-99 07-22-99 08 25-99	19 20 5.4 2.6
Joint Ditch # 1 at Co. RD. 17 near Maynard	Chetomba Creek	Lat 44° 54'20", long 95 °22'30", in SE1/4 SE1/4 sec. 25, T.117 N., R.38 W., Chippewa County, Hydrologic Unit 07020004, at culvert on County Road 17, 5 miles east of Maynard.	--	--	04-28-99 06-03-99 08-31-99	1.2 1.9 e 0.3
Chetomba Creek above mouth near Maynard	Spring Creek	Lat 44°51'42", long 95°25'38", in SE1/4 SE1/4 sec. 9, T.116 N., R.38 W., Renville County, Hydrologic Unit 07020004, at drop structure on township road, 3 miles southeast of Maynard.	--	--	04-28-99 05-13-99 06-03-99 07-22-99	36.6 143 38.9 12.5
Hawk Creek near Maynard [05314500]	Minnesota River	Lat 44°52'10", long 95°28'58", in $SW^1/_4$ $NW^1/_4$ sec. 7, T. 116 N., R. 38 W., at Renville and Chippewa County line, Hydrologic Unit 07020004, at bridge on State Highway 23, 3.0 miles southwest of Maynard	315	# 1949-54, + 1981-current year	04-28-99 08-31-99	81 39
County Ditch # 45 near Renville	Sacred Heart Creek	Lat 44°45'35", long 95°13'20", in NE1/4 NE1/4 sec. 19, T.115 N., R.37 W., Renville County, Hydrologic Unit 07020004, at culvert on township road, 2 miles south of Renville.	--	--	04-29-99 06-02-99 07-20-99 09-01-99 09-30-99	2.4 2.2 1.8 3.5 0.91
Scared Heart Creek above mouth near Delhi [05314700]	Minnesota River	Lat 44°40'14", long 95°4'43", in NW1/4 NE1/4 sec. 24, T.114 N., R.37 W., Renville County, Hydrologic Unit 07020004, at bridge on County Highway 15, 4.8 miles northeast of Delhi.	42.7	1969, 1974-81, 1983	04-29-99 08-12-99 09-29-99	10 14 1.4
West Fork Beaver Creek near Renville	Beaver Creek	Lat 44°48'13", long 95°08'27", in SE1/4 SE1/4 sec. 35, T.116 N., R.36 W., Renville County, Hydrologic Unit 07020004, at bridge on township road, 2 miles northwest of Danube and 3 miles northeast of Renville.	--	--	10-20-98 04-29-99 06-09-99 06-16-99 06-30-99 06-22-99	0.19 9.5 99 20 48 16

Stream Name and [Station No.]	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements	
					Date	Discharge (ft^3/s)
		Minnesota River Basin--continued				
West Fork Beaver Creek near Danube	Beaver Creek	Lat 44°44'41", long 95°05'10", in NE1/4 NW1/4 sec. 29, T.115 N., R.35 W., Renville County, Hydrologic Unit 07020004, at twin box culverts on township road, 3 miles south of Danube.	--	--	04-29-99 06-16-99 09-30-99	18 40 5.1
West Fork Beaver Creek at Co. Rd. 62 near Olivia	Beaver Creek	Lat 44°42'04", long 95°02'33", in NW1/4 NE1/4 sec. 3, T.114 N., R.35 N., Renville County, Hydrologic Unit 07020004, at bridge on County Road 62, 5 miles southwest of Olivia.	--	--	10-20-98 04-29-99 06-02-99 07-21-99	4.9 22 32 19
West Fork Beaver Creek at Co. Rd. 4 near Bechyn	Beaver Creek	Lat 44°40'20", long 95°01'16", in NW1/4 NE1/4 sec. 23, T.114 N., R.23 W., Renville County, Hydrologic Unit 07020004, at bridge on County Road 4, 2 miles northeast of Bechyn.	--	--	10-20-98 04-29-99 07-09-99 07-13-99 09-01-99	5.7 24 97 47 33
East Fork Beaver Creek at U.S. Hwy 71 near Olivia	Beaver Creek	Lat 44°39'49", long 94°59'41",in NE1/4 SE1/4 sec. 24, T.114 N., R.35 W., Renville County, Hydrologic Unit 07020004, at culvert on U.S. State Hwy 71, 7 miles south of Olivia.	--	--	04-29-99 07-21-99 08-12-99 09-30-99	19 16 23 15
Beaver Creek near Beaver Falls [05316570]	Minnesota River	Lat 44°35'10", long 95°02'49", in $NE^1/_4$ $NW^1/_4$ sec. 22, T.113 N., R.35 W., Renville County, at bridge near Beaver Falls, 2.2 miles above mouth and 3.8 miles northwest of Morton.	191	+ 1972 - current year	04-29-99 08-12-99	49 55
		Zumbro River Basin--Seepage run				
South Fork Zumbro River at 16th St. SW in Rochester.	Zumbro River	Lat 44°00'02", long 92°28'39", in SW1/4 NW1/4 sec. 11, T.106 N., R.14 W., Olmstead County, Hydrologic Unit 07040004, at bridge on 16th St. SW, in Rochester.	--	--	11-19-98	70
South Fork Zumbro River at 8th St. in Rochester	Zumbro River	Lat 44°01'00", long 92°27'43", in SE1/4 NE1/4 sec. 2, T.106 N., R.14 W., Olmstead County, Hydrologic Unit 07040004, at 8th St. in Rochester.	--	--	11-19-98	78
Bear Creek at Rochester [05372930]	South Fork Zumbro River	Lat 44°00'28", long 92°26'45", in SW1/4 SE1/4 sec. 1, T.106 N., R.14 W., Olmstead County, Hydrologic Unit 07040004, at U. S. Hwy. 14 bridge, 1.1 miles from mouth, and in southeast part of Rochester.	78.8	+ 1968-83, # 1978 # 1981, 1998	11-19-98	38
Bear Creek at 4th St. in Rochester	South Fork Zumbro River	Lat. 44°01'10", long 92°27'20", in NW1/4 NW1/4 sec. 1, T.106 N., R.14 W., Olmstead County, Hydrologic Unit 07040004, at 4th St. in Rochester.	--	--	11-19-98	39
Silver Creek at 11th Ave. NE in Rochester	South Fork Zumbro River	Lat 44°01'45", long 92°278'00", in SE1/4 NW1/4 sec. 36, T.107 N., R.14 W., Olmstead County, Hydrologic Unit 07040004, at 11th Ave. NE, in Rochester.	--	--	11-19-99	9.0
		Des Moines River Basin				
Des Moines River above Great Bend near Windom [05475200]	Des Moines River	Lat 43°55'14", long 95°13'24", in SE1/4 SE1/4 sec. 1, T. 105 N., R.37 W., Cottonwood County, Hydrologic Unit 07100001, at bridge on County Road 14, 4 miles northwest of Windom.	--	--	09-07-99	3.0

Stream Name and [Station No.]	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements	
					Date	Discharge (ft^3/s)
		Des Moines River Basin--continued				
Des Moines River below Great Bend near Windom [05475250]	Des Moines River	Lat 43°54'59", long 95°10'55", in NE1/4 NE1/4 sec. 8, T.105 N., R.36 W., Cottonwood County, Hydrologic Unit 07100001, at bridge on County Road 14, 3 miles northwest of Windom.	--	--	09-08-99	7.4
Des Moines River above Windom [05475350]	Des Moines River	Lat 43°53'25", long 95°09'39", in NE1/4 NE1/4 sec. 21, T.105 N., R.36 W., Cottonwood County, Hydrologic Unit 07100001, at bridge on County Road 15, 2 miles northwest of Windom.	--	--	04-27-99 09-09-99	1,470 8.6
Des Moines River at Windom [05475600]	Des Moines River	Lat 43°51'30", long 95°06'55", in NE1/4 NW1/4 sec.36, T.105 N., R.36 W., Cottonwood County, Hydrologic Unit 07100001, at State Highway 60 in Windom.	--	1946, 1961-69, 1972, 1979, 1983, 1998	09-09-99 09-22-99	4.0 12

Water Quality at Miscellaneous Sites

Samples are collected at sites other than gaging stations and partial-record stations to give better areal coverage. Such stations are referred to as miscellaneous stations. Letter E indicates estimated value. Letter K indicates non-ideal colony count.

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

05061330 - UNNAMED POND, TRIB. TO BIG SLOUGH NEAR ROLLAG, MN

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
FEB							
08...	1345	1540	7.5	.5	E5.2	.2	1

05061340 - STONY CK (BIG SLOUGH) ABV OUTLT NR BARNESVILLE,MN

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
FEB							
08...	1245	2430	7.0	.5	726	.2	2

05061382 - SOUTH POOL OUTLET OF BJORNSON W.M.A. NR ROLLAG, MN

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
FEB							
08...	1630	1330	7.6	.8	E1.5	.3	2

05061385 - RUSHFIELDT LAKE NEAR DOWNER, MN

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
FEB								
08...	1530	1240	8.8	.5	E2.0	--	6.2	47
08...	1535	--	--	3.6	--	728	<.7	--

05061387 - NORTH POOL, BJORSON W.M.A., NEAR ROLLAG, MN NEAR DOWNER, MN

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
FEB							
08...	1450	1290	7.3	.1	E.20	.3	2

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

05061388 - NORTH POOL OUTLET OF BJORNSON W.M.A. NR ROLLAG, MN

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
FEB						
08...	1445	1360	7.3	.0	5.6	40

05062580 - GARDEN SLOUGH IMP. BELOW CO. RD. 19 NEAR GARY, MN

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
FEB								
09...	1145	950	7.4	.5	E.10	--	.2	2
09...	1215	1100	7.3	4.9	E6.5	742	.1	1
09...	1220	1030	7.5	3.6	--	--	--	--

05064000 - WILD RICE RIVER AT HENDRUM, MN

DATE	TIME	SEDI-MENT, SUS-PENDED (MG/L) (80154)
OCT		
28...	1025	92
DEC		
11...	1020	131
MAY		
10...	1510	408
JUN		
15...	1640	175
SEP		
18...	1240	117

05067317 - SANDE IMP POOL B2, IN SUNDAL TWP. NR FLAMING, MN

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
FEB							
24...	1345	1410	7.1	.8	735	.3	2

05067327 - POOL B3 ABOVE CO DITCH 45 NEAR FLAMING, MN

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
FEB							
24...	1300	1200	7.3	.9	734	.2	2
24...	1310	1210	7.3	1.9	734	.3	2

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

05067333 - POOL A4 ABOVE CO. DITCH 45 NEAR FLAMING, MN

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
FEB							
24...	1210	1360	7.0	1.5	733	1.4	11

05067395 - LOCKHART SWAMP IMP AGASSIZ NO2 WMA NR FLAMING, MN

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
FEB								
09...	1345	1230	7.3	.2	E10	736	.3	2
09...	1350	1310	7.3	2.4	--	736	.2	1

05074760 - UNNAMED DITCH ABOVE GOOD LAKE, NEAR ERIE, MN

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
OCT								
14...	1050	357	7.6	7.5	--	--	11.4	--
JAN								
21...	1115	472	6.8	.2	E.00	726	.2	1
FEB								
22...	1540	678	7.2	.2	E1.7	741	.2	1

05074765 - GOOD LAKE IMPOUNDMENT, MID-POOL, NEAR ERIE, MN

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
JAN								
20...	1425	447	7.4	1.1	E.00	726	3.1	23
20...	1426	447	7.3	2.7	--	726	1.1	9
FEB								
22...	1410	526	7.4	.3	--	741	.2	2
22...	1420	518	7.3	1.9	--	741	.1	1
22...	1430	514	7.2	2.9	--	741	.1	1

05074770 - GOOD LAKE ABOVE OUTLET NEAR ERIE, MN

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
FEB							
22...	1635	569	7.3	.2	741	.3	2

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

05074780 - GOOD LAKE OUTLET NEAR ERIE, MN

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
JAN								
20...	1500	525	7.1	.8	E3.0	726	8.4	62
FEB								
22...	1645	562	7.5	.5	--	744	6.9	50

05075380 - MOOSE RIVER IMPOUNDMENT, NORTH POOL, NR GRYGLA, MN

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
FEB							
10...	1510	376	7.5	1.3	722	.1	1

05075680 - MOOSE RIVER IMPOUNDMENT, SOUTH POOL, NR GRYGLA, MN

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
FEB								
10...	1350	498	7.3	.9	E.10	722	.1	1
10...	1400	581	7.1	3.6	E1.4	722	.1	1

05079698 - BURNHAM CREEK IMP., MID-POOL, NEAR TILDEN JCT., MN

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
FEB								
11...	0950	815	7.6	.6	E.00	741	3.6	26
11...	0955	825	7.5	1.7	E8.1	741	3.3	25
24...	1520	945	7.6	3.3	--	738	.2	2
24...	1525	934	7.6	1.3	E1.9	738	.5	4

05355250 - MISSISSIPPI RIVER AT RED WING, MN

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM) (90095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	PH WATER WHOLE LAB (STAND-ARD UNITS) (00403)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)
DEC										
22...	1200	470	502	8.0	8.1	.3	750	12.7	90	220
JAN										
19...	1140	535	554	7.6	7.8	1.0	748	11.8	85	240
FEB										
16...	1130	554	569	7.8	8.1	2.3	750	11.7	86	240

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

05355250 - MISSISSIPPI RIVER AT RED WING, MN

DATE	ALKALINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)	ANC UNFLTRD TIT 4.5 LAB (MG/L AS CACO3) (90410)	BICARBONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN, NITRITE DISSOLVED (MG/L AS N) (00613)	NITROGEN,AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITROGEN,AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	PHOSPHORUS TOTAL (MG/L AS P) (00665)	PHOSPHORUS DISSOLVED (MG/L AS P) (00666)
DEC										
22...	154	178	188	.066	.024	.56	.76	1.76	.099	.038
JAN										
19...	186	191	227	.257	.031	.76	.85	1.81	.119	.085
FEB										
16...	185	196	226	.230	.036	.63	.85	1.79	.174	.126

DATE	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	CARBON, ORGANIC DISSOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUSPENDED TOTAL (MG/L AS C) (00689)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)
DEC									
22...	.062	7.2	.80	52	21	14	.4	2.3	17
JAN									
19...	.068	6.7	.30	58	23	20	.6	3.0	25
FEB									
16...	.106	5.6	.30	58	22	24	.7	3.1	33

DATE	SULFATE DISSOLVED (MG/L AS SO4) (00945)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	IRON, DISSOLVED (UG/L AS FE) (01046)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SEDIMENT, SUSPENDED (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
DEC									
22...	50	.21	12	41	28	308	269	21	79
JAN									
19...	52	.18	14	40	54	341	315	17	92
FEB									
16...	48	.20	13	29	62	333	321	15	84

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

05475200 - DES MOINES RIVER ABOVE GREAT BEND NR WINDOM, MN

DATE	TIME	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN, NITRITE DISSOLVED (MG/L AS N) (00613)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	PHOSPHORUS TOTAL (MG/L AS P) (00665)	PHOSPHORUS DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	SULFATE DISSOLVED (MG/L AS SO4) (00945)
SEP										
07...	1500	<.020	<.010	1.3	<.050	.132	<.050	<.010	23	210

05475250 - DES MOINES RIVER BLW GREAT BEND NR WINDOM, MN

DATE	TIME	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN, NITRITE DISSOLVED (MG/L AS N) (00613)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	PHOSPHORUS TOTAL (MG/L AS P) (00665)	PHOSPHORUS DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	SULFATE DISSOLVED (MG/L AS SO4) (00945)
SEP										
08...	1000	<.020	<.010	1.1	<.050	.099	<.050	<.010	16	170

05475350 - DES MOINES RIVER ABOVE WINDOM, MN (DM4)

DATE	TIME	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)	BAROMETRIC PRESSURE (MM OF HG) (00025)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	ALKALINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)	BICARBONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)
APR										
27...	1250	1470	914	8.3	10.7	725	9.6	91	224	270
SEP										
09...	0935	--	--	--	--	--	--	--	--	--

DATE	TIME	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN, NITRITE DISSOLVED (MG/L AS N) (00613)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	PHOSPHORUS TOTAL (MG/L AS P) (00665)	PHOSPHORUS DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	SULFATE DISSOLVED (MG/L AS SO4) (00945)
APR											
27...		<.020	.027	.55	1.3	<.050	.156	.016	.025	--	--
SEP											
09...		<.020	<.010	--	2.7	<.050	.438	<.050	<.010	17	160

05475600 - DES MOINES RIVER AT WINDOM, MN

DATE	TIME	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN, NITRITE DISSOLVED (MG/L AS N) (00613)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	PHOSPHORUS TOTAL (MG/L AS P) (00665)	PHOSPHORUS DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	SULFATE DISSOLVED (MG/L AS SO4) (00945)
SEP										
09...	1530	<.020	<.010	1.2	<.050	.194	E.035	<.010	20	150

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

471213096122301 - HOME LAKE, NORTHEAST END, NEAR FOSSUM, MN

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
FEB								
09...	1010	536	7.4	1.3	E1.0	736	.2	2
09...	1015	580	7.2	3.8	E8.9	736	.1	1

473034096130501 - RAFF LAKE NEAR FERTILE, MN

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
FEB								
09...	1525	537	7.8	1.4	E.10	736	.6	4
09...	1535	604	7.6	4.4	--	736	.1	1

473533096142001 - KITTLESON LAKE NEAR FERTILE, MN

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
FEB							
09...	1640	589	7.6	.7	E.10	.2	1

480005095265901 - CURTIS LAKE, CLEARWATER CO., RED LAKE IND. RES., MN

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
JAN								
20...	1245	220	7.6	.8	E.45	726	.9	7
20...	1246	220	7.4	3.1	E.00	726	.2	2
FEB								
23...	1220	246	6.9	.2	--	740	.2	2
23...	1230	250	6.8	2.1	--	740	.1	1
23...	1240	247	6.8	1.6	--	740	.1	1

480028095264801 - MISKOGINEU LAKE, CLEARWATER CO., RED L. IND. RES., MN

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
JAN								
20...	1200	328	7.6	.1	E.00	726	2.5	18
20...	1201	340	7.7	2.3	--	726	1.5	12
FEB								
23...	1320	374	7.3	.7	--	740	.4	3
23...	1330	378	7.2	1.0	--	740	.3	2
23...	1340	379	7.2	1.3	--	740	.4	3

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

480052095275001 - CAHILL LAKE, CLEARWATER COUNTY, RED L. IND. RES., MN

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
JAN								
20...	1115	310	7.6	-.1	E7.6	--	1.3	9
FEB								
23...	1030	442	7.1	.5	--	739	.3	2
23...	1040	447	7.1	2.1	--	739	.2	1
23...	1050	442	7.1	1.6	--	739	.2	1

482430095532701 - WEBSTER LAKE AT AGASSIZ NWR NEAR GATZKE, MN

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
FEB						
10...	1145	1860	7.1	.5	.2	2

482226092283301 - SANDPOINT LK BL HARRISON NARROWS NR CRANE LK, MN

DATE	TIME	DEPTH AT SAMPLE LOC-ATION, TOTAL (FEET) (81903)	TRANS-PARENCY SECCHI DISC, WATER, UNFLTRD (FEET) (49701)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM) (90095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	PH WATER WHOLE LAB (STAND-ARD UNITS) (00403)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)
JUL												
28...	1315	6.90	6.9	64	69	7.7	7.0	23.0	730	7.3	89	<1
28...	1335	80.0	--	55	63	7.4	6.8	6.0	--	6.8	--	--

DATE	ALKA-LINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	CHLOR-A PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70954)
JUL											
28...	19	.022	.003	.50	.52	<.005	.013	.006	.001	1.60	E.120
28...	16	.003	.001	.39	.43	.164	.014	.011	.005	--	--

482451092471001 - ASH RIVER AT ENTRANCE TO SULLIVAN BAY NR RAY, MN

DATE	TIME	DEPTH AT SAMPLE LOC-ATION, TOTAL (FEET) (81903)	TRANS-PARENCY SECCHI DISC, WATER, UNFLTRD (FEET) (49701)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM) (90095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	PH WATER WHOLE LAB (STAND-ARD UNITS) (00403)	TEMPER-ATURE WATER (DEG C) (00010)	OXYGEN, DIS-SOLVED (MG/L) (00300)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	ALKA-LINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)
JUL											
29...	1100	3.00	3.0	182	193	7.9	7.4	24.5	6.5	K8	82

DATE	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	CHLOR-A PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70954)
JUL										
29...	.010	.001	.74	.89	<.005	.050	.028	.015	5.00	E.260

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

482616092372201 - NAMAKAN LAKE NEAR RAY, MN

DATE	TIME	DEPTH AT SAMPLE LOCATION, TOTAL (FEET) (81903)	TRANSPARENCY SECCHI DISC, WATER, UNFLTRD (FEET) (49701)	SPECIFIC CONDUCTANCE (US/CM) (00095)	SPECIFIC CONDUCTANCE LAB (US/CM) (90095)	PH WATER WHOLE FIELD (STANDARD UNITS) (00400)	PH WATER WHOLE LAB (STANDARD UNITS) (00403)	TEMPERATURE WATER (DEG C) (00010)	OXYGEN, DISSOLVED (MG/L) (00300)	COLIFORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	ALKALINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)
JUL											
28...	1445	8.00	8.0	44	47	8.0	7.3	23.4	6.6	<1	13
28...	1500	83.5	--	45	51	7.8	6.8	9.6	6.3	--	15

DATE	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN, NITRITE DISSOLVED (MG/L AS N) (00613)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	PHOSPHORUS TOTAL (MG/L AS P) (00665)	PHOSPHORUS DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	CHLOR-A PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70954)
JUL										
28...	.018	.002	.37	.46	.012	.014	.010	.006	1.70	<.100
28...	.004	.001	.29	.29	.093	.016	.005	.002	--	--

482709092264601 - NAMAKAN LAKE AT MOUTH OF NAMAKAN RIVER,ONTARIO

DATE	TIME	DEPTH AT SAMPLE LOCATION, TOTAL (FEET) (81903)	TRANSPARENCY SECCHI DISC, WATER, UNFLTRD (FEET) (49701)	SPECIFIC CONDUCTANCE (US/CM) (00095)	SPECIFIC CONDUCTANCE LAB (US/CM) (90095)	PH WATER WHOLE FIELD (STANDARD UNITS) (00400)	PH WATER WHOLE LAB (STANDARD UNITS) (00403)	TEMPERATURE WATER (DEG C) (00010)	OXYGEN, DISSOLVED (MG/L) (00300)	COLIFORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	ALKALINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)
JUL											
28...	1115	9.00	9.0	40	45	7.9	7.6	23.6	7.6	K3	12

DATE	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN, NITRITE DISSOLVED (MG/L AS N) (00613)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	PHOSPHORUS TOTAL (MG/L AS P) (00665)	PHOSPHORUS DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	CHLOR-A PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70954)
JUL										
28...	.017	.002	.32	.39	.021	.013	.005	.001	1.10	E.100

482721093003901 - KABETOGAMA LAKE NR RAY, MN

DATE	TIME	DEPTH AT SAMPLE LOCATION, TOTAL (FEET) (81903)	TRANSPARENCY SECCHI DISC, WATER, UNFLTRD (FEET) (49701)	SPECIFIC CONDUCTANCE (US/CM) (00095)	SPECIFIC CONDUCTANCE LAB (US/CM) (90095)	PH WATER WHOLE FIELD (STANDARD UNITS) (00400)	PH WATER WHOLE LAB (STANDARD UNITS) (00403)	TEMPERATURE WATER (DEG C) (00010)	OXYGEN, DISSOLVED (MG/L) (00300)	COLIFORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	ALKALINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)
JUL											
29...	1015	7.00	7.0	84	93	8.2	7.9	22.1	7.6	<1	34

DATE	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN, NITRITE DISSOLVED (MG/L AS N) (00613)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	PHOSPHORUS TOTAL (MG/L AS P) (00665)	PHOSPHORUS DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	CHLOR-A PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70954)
JUL										
29...	.003	.002	.38	.52	<.005	.033	.008	.003	2.70	.200

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

483304093062701 - RAINY LAKE AT BLACK BAY NR INT FALLS, MN

DATE	TIME	DEPTH AT SAMPLE LOCATION, TOTAL (FEET) (81903)	TRANSPARENCY SECCHI DISC, WATER, UNFLTRD (FEET) (49701)	SPECIFIC CONDUCTANCE (US/CM) (00095)	SPECIFIC CONDUCTANCE LAB (US/CM) (90095)	PH WATER WHOLE FIELD (STANDARD UNITS) (00400)	PH WATER WHOLE LAB (STANDARD UNITS) (00403)	TEMPERATURE WATER (DEG C) (00010)	BAROMETRIC PRESSURE (MM OF HG) (00025)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML) (31625)
JUL 27...	1015	3.70	3.7	92	95	7.6	7.1	21.6	735	6.7	79	K3

DATE	ALKALINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN, NITRITE DISSOLVED (MG/L AS N) (00613)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	PHOSPHORUS TOTAL (MG/L AS P) (00665)	PHOSPHORUS DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	CHLOR-A PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70954)
JUL 27...	37	.003	.001	.31	.47	<.005	.025	.008	.003	1.80	<.100

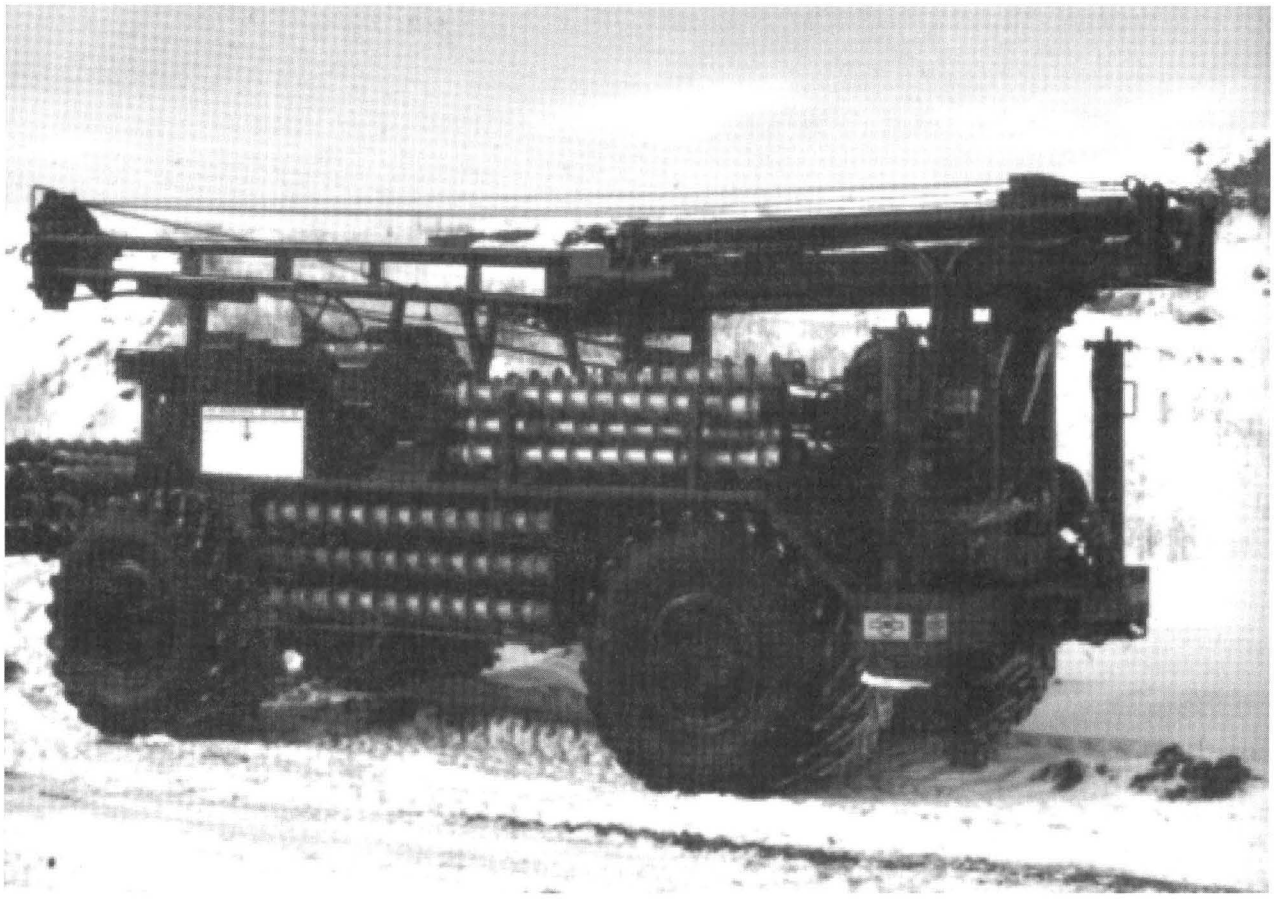
483622092560701 - RAINY LK AT BRULE NARROWS NR INTERNTNL FALLS, MM

DATE	TIME	DEPTH AT SAMPLE LOCATION, TOTAL (FEET) (81903)	TRANSPARENCY SECCHI DISC, WATER, UNFLTRD (FEET) (49701)	SPECIFIC CONDUCTANCE (US/CM) (00095)	SPECIFIC CONDUCTANCE LAB (US/CM) (90095)	PH WATER WHOLE FIELD (STANDARD UNITS) (00400)	PH WATER WHOLE LAB (STANDARD UNITS) (00403)	TEMPERATURE WATER (DEG C) (00010)	OXYGEN, DISSOLVED (MG/L) (00300)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML) (31625)	ALKALINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)
JUL 27...	1130	8.40	8.4	46	50	7.3	6.8	18.5	7.9	K1	14

DATE	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN, NITRITE DISSOLVED (MG/L AS N) (00613)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	PHOSPHORUS TOTAL (MG/L AS P) (00665)	PHOSPHORUS DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	CHLOR-A PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70954)
JUL 27...	.005	.001	.28	.31	.017	.010	.004	.001	1.10	<.100

Ground-Water Wells by County

Ground-Water
Levels



Drill Rig.

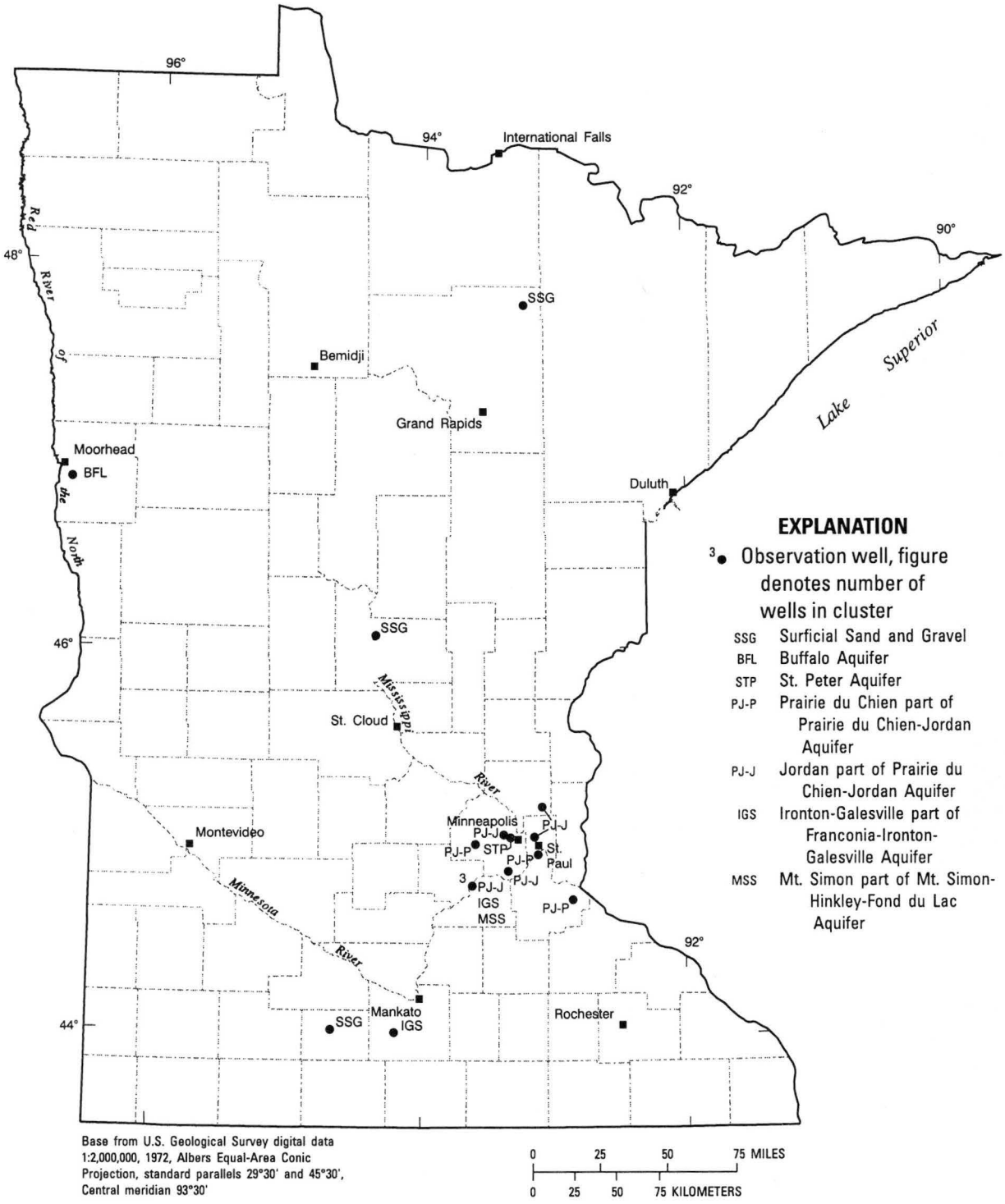


Figure 8. Location of ground-water wells.

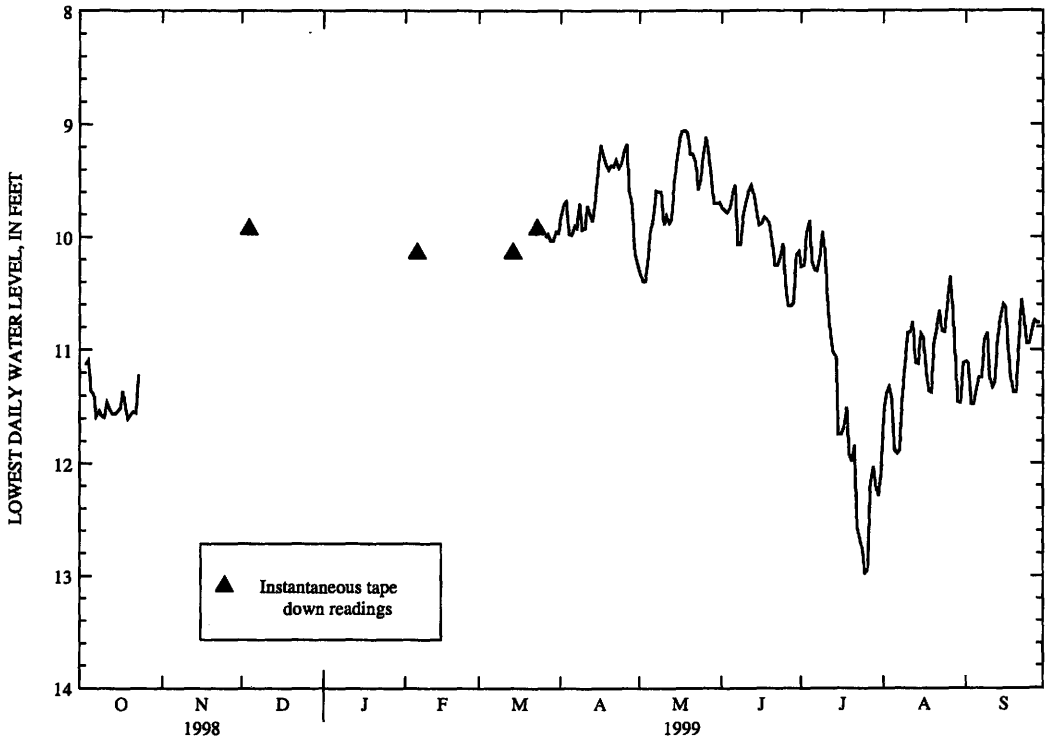
ANOKA COUNTY

450927093033802. Local number, 031N22W23CBC02.
LOCATION.-- Lat 45°09'27", long 93°03'38", in $SW^1/_4NW^1/_4SW^1/_4$ sec.23, T.31 N., R.22 W., Hydrologic Unit 07010206, at the city of Centerville.
Owner: U. S. Geological Survey.
AQUIFER.-- Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.-- Drilled artesian observation well, diameter 6 in. to 95 ft, 2.5 in. to 267 ft, total depth 277 ft, screened 267 to 277 ft, screen diameter 2.4 in.
INSTRUMENTATION.--Electronic data logger with 60-minute recording interval.
DATUM.-- Land-surface datum is 901.6 ft above sea level. Measuring point: Top of recorder platform, 2.20 ft above land-surface datum.
REMARKS.-- Water level affected by nearby flowing wells.
PERIOD OF RECORD.-- Feb. 1971 to Sep. 1999.
EXTREMES FOR PERIOD OF RECORD.-- Highest water level, 7.50 ft below land-surface datum, July 8, 1993; lowest, 18.57 ft below land-surface datum, Oct. 2, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

LOWEST 5TH-DAY WATER LEVEL

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	11.36	---	---	---	---	---	9.98	9.93	9.62	10.22	11.88	11.32
10	11.59	---	---	---	---	---	9.92	9.89	9.69	10.19	10.85	11.23
15	11.54	---	---	---	---	---	9.41	9.31	9.89	11.74	10.86	10.60
20	11.56	---	---	---	---	---	9.36	9.26	10.05	11.98	10.94	11.37
25	---	---	---	---	---	---	9.23	9.26	10.42	12.97	10.61	10.94
EOM	---	---	---	---	---	9.96	10.23	9.69	10.13	12.10	11.11	---



BLUE EARTH COUNTY

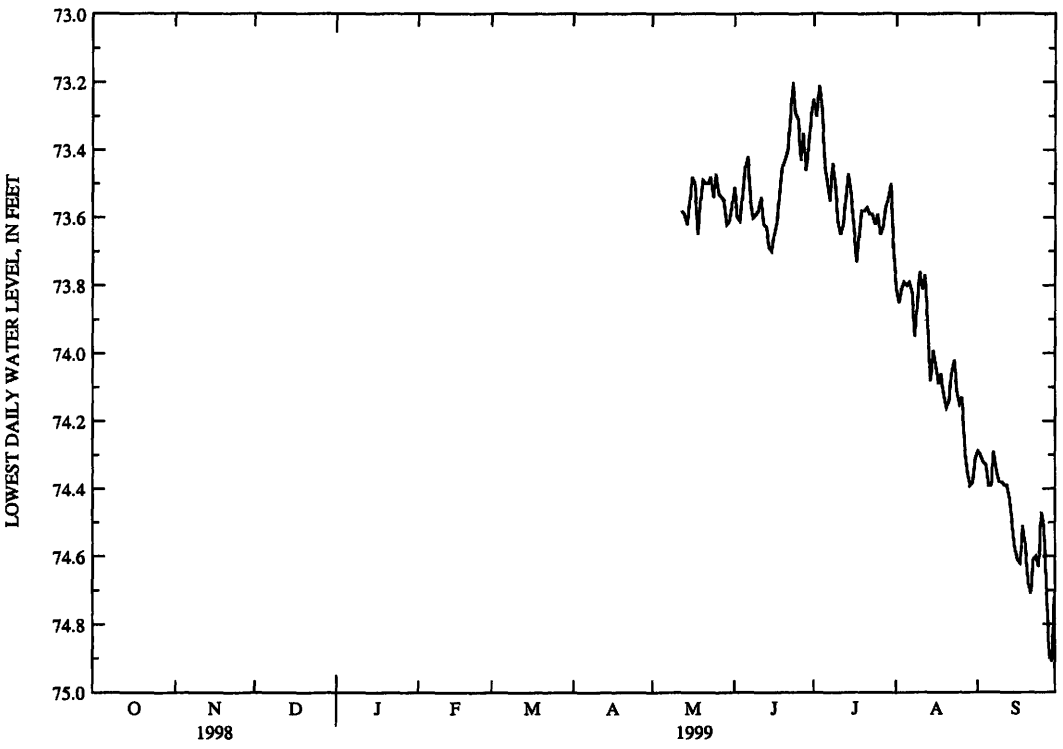
440050094102801. Local number, 106N28W03DBA01.
LOCATION.-- Lat 44°00'50", long 94°10'28", in NE$^1/_4$NW$^1/_4$SE$^1/_4$ sec.3, T.106 N., R. 28 W., Hydrologic Unit 07020010, at Farmland Industries Ammonia Plant, 3.2 mi north of Vernon Center.
Owner: Farmland Industries.
AQUIFER.-- Ironton-Galesville Sandstones of Late Cambrian Age.
WELL CHARACTERISTICS.-- Drilled, unused artesian well, diameter 16 in., depth 390 ft, cased to 150 ft.
INSTRUMENTATION.-- Electronic data logger with 30-minute recording interval.
DATUM.-- Land-surface datum is 1,005 ft above seal level. Measuring point: Top of recorder platform, 2.00 ft above land-surface datum.
PERIOD OF RECORD.-- Oct. 1973 to Sep. 1999.
EXTREMES FOR PERIOD OF RECORD.-- Highest water level, 71.25 ft below land-surface datum, July 4, 1993; lowest, 76.73 ft below land-surface datum, Oct. 18, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

LOWEST 5TH-DAY WATER LEVEL

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	---	---	---	---	---	---	---	---	73.45	73.44	73.80	74.39
10	---	---	---	---	---	---	---	---	73.58	73.61	73.76	74.38
15	---	---	---	---	---	---	---	73.56	73.70	73.53	73.99	74.58
20	---	---	---	---	---	---	---	73.49	73.43	73.58	74.16	74.68
25	---	---	---	---	---	---	---	73.47	73.31	73.59	74.15	74.47
EOM	---	---	---	---	---	---	---	73.57	73.29	73.69	74.31	74.72

WTR YR: LOWEST 74.91 FT, SEP. 29; HIGHEST, 73.10 FT, JULY 3.



GROUND WATER LEVELS-Continued

CLAY COUNTY

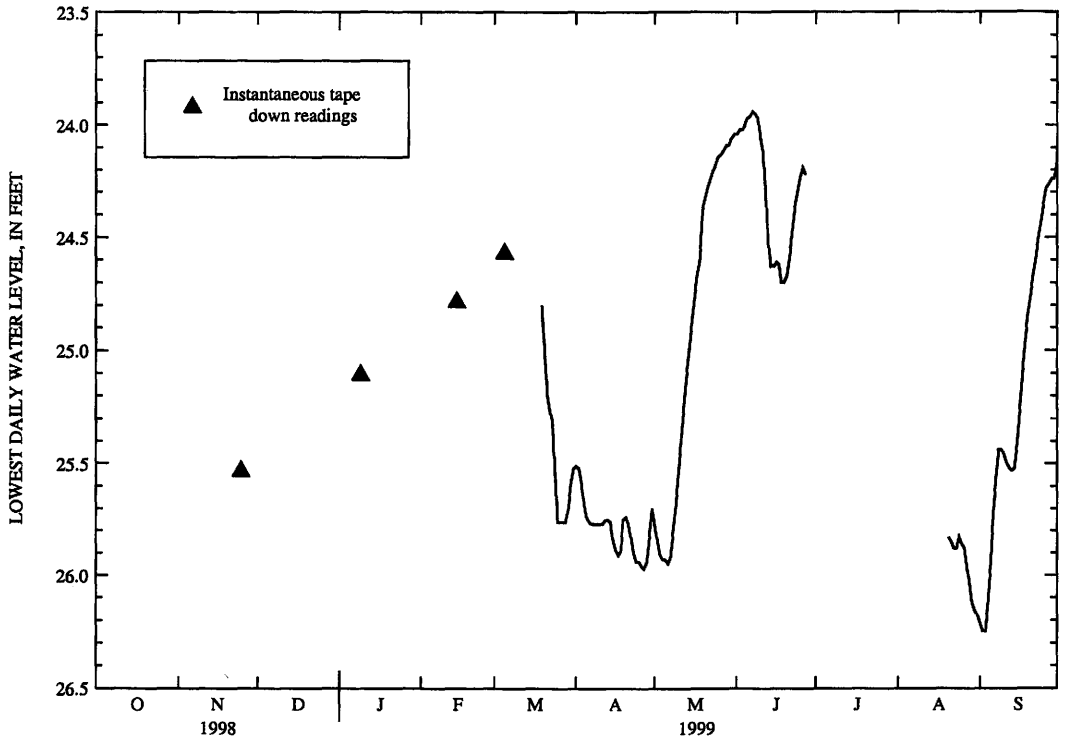
465237096383901. Local number, 139N47W05CDC01.
LOCATION.-- Lat 46°52'37", long 96°38'39", in $SW^1/_4SE^1/_4SW^1/_4$ sec.5, T.139 N., R.47 W., Hydrologic Unit 09020104, 2.4 mi east of Dilworth. Owner: Steven Schroeder.
AQUIFER.-- Surficial sand and gravel of Pleistocene Age (Buffalo Aquifer).
WELL CHARACTERISTICS.-- Drilled water-table observation well, diameter 8 in., depth 131.3 ft, slotted 91 to 107 ft.
INSTRUMENTATION.-- Electronic data logger with 30-minute recording interval.
DATUM.-- Land-surface datum is 916.7 ft above sea level. Measuring point: Top of recorder platform, 3.60 ft above land-surface datum.
REMARKS.-- Water level affected by pumping from nearby wells.
PERIOD OF RECORD.-- Jan. 1947 to Sep. 1999.
EXTREMES FOR PERIOD OF RECORD.-- Highest water level, 12.19 ft below land-surface datum, July 15, 1947; lowest, 32.94 ft below land-surface datum, Aug. 24, 1988.

WATER LEVEL,IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

LOWEST 5TH-DAY WATER LEVEL

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	---	---	---	---	---	---	25.74	25.93	23.97	---	---	25.94
10	---	---	---	---	---	---	25.77	25.54	24.06	---	---	25.46
15	---	---	---	---	---	---	25.84	24.88	24.63	---	---	25.41
20	---	---	---	---	---	24.99	25.74	24.33	24.67	---	25.83	24.76
25	---	---	---	---	---	25.76	25.94	24.14	24.23	---	25.86	24.35
EOM	---	---	---	---	---	25.52	25.70	24.04	---	---	26.18	24.17

WTR YR: LOWEST 26.25 FT, SEP. 2,3; HIGHEST 23.94 FT, JUN 6-9.



DAKOTA COUNTY

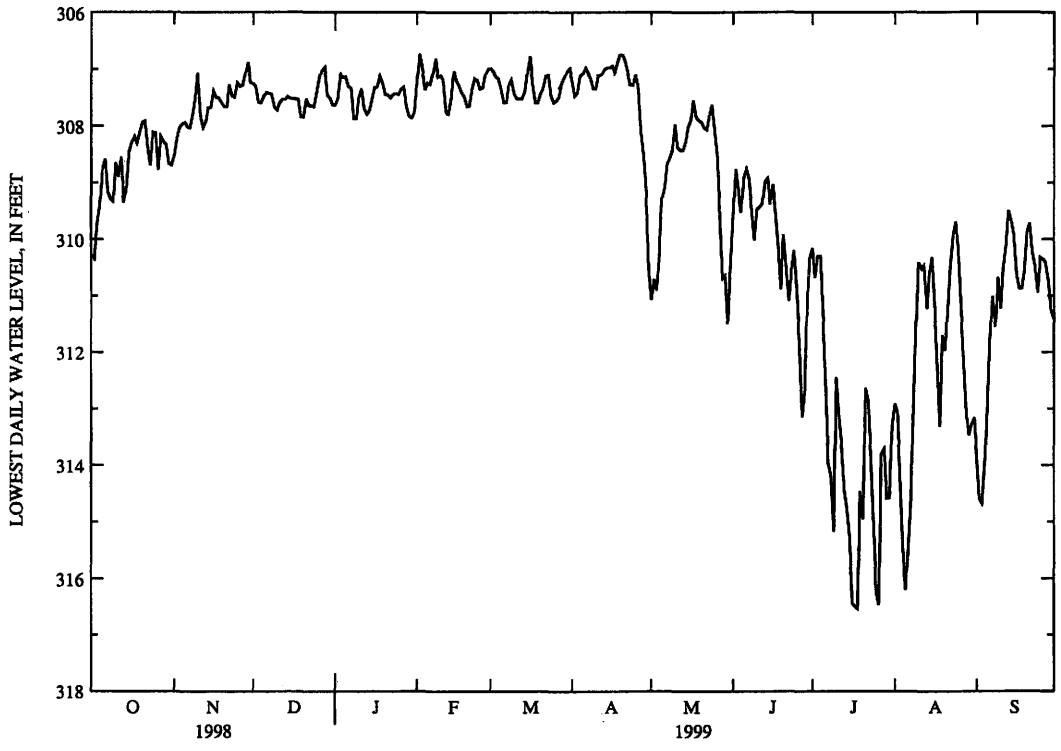
445330093054301. Local number, 028N22W19DCC02.
LOCATION.-- Lat 44°53'30", long 93°05'43", in $SW^1/_4SW^1/_4SE^1/_4$ sec.19, T.28 N., R. 22 W., Hydrologic Unit 07010206, in West St. Paul.
Owner: U.S. Geological Survey.
AQUIFER.--Prairie du Chien Group of Early Ordovician Age.
WELL CHARACTERISTICS.-- Drilled artesian observation well, diameter 6 in., depth 539 ft, cased to 409 ft.
INSTRUMENTATION.--Electronic data logger with 30-minute scan interval.
DATUM.--Land-surface datum is 1,036.9 ft above mean sea level. Measuring point: Top of recorder platform, 2.60 ft above land-surface datum.
REMARKS.--Water-level affected by regional pumping.
PERIOD OF RECORD.--Jan. 1971 to Sep. 1999.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 306.22 ft below land-surface datum, Apr. 15, 1997; lowest, 328.0 ft below land-surface datum, July 31, 1975.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

LOWEST 5TH-DAY WATER LEVEL

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	308.74	307.93	307.47	307.13	307.24	307.34	307.07	309.29	308.90	311.34	316.20	313.07
10	308.65	307.07	307.72	307.50	307.10	307.44	307.34	307.97	309.47	312.45	310.41	311.23
15	308.46	307.67	307.51	307.52	307.04	307.05	306.97	308.03	309.37	315.27	310.32	309.89
20	307.93	307.66	307.84	307.44	307.65	307.43	306.75	307.93	309.92	314.95	311.97	309.87
25	308.12	307.24	307.38	307.44	307.34	307.58	307.09	308.07	310.92	316.23	310.16	310.32
EOM	308.69	307.23	307.62	307.75	306.99	306.98	310.54	310.50	310.33	313.29	313.16	311.41

WTR YR; LOWEST 316.54 FT, JUNE 18; HIGHEST 306.36 FT, NOV. 10.



DAKOTA COUNTY--Continued

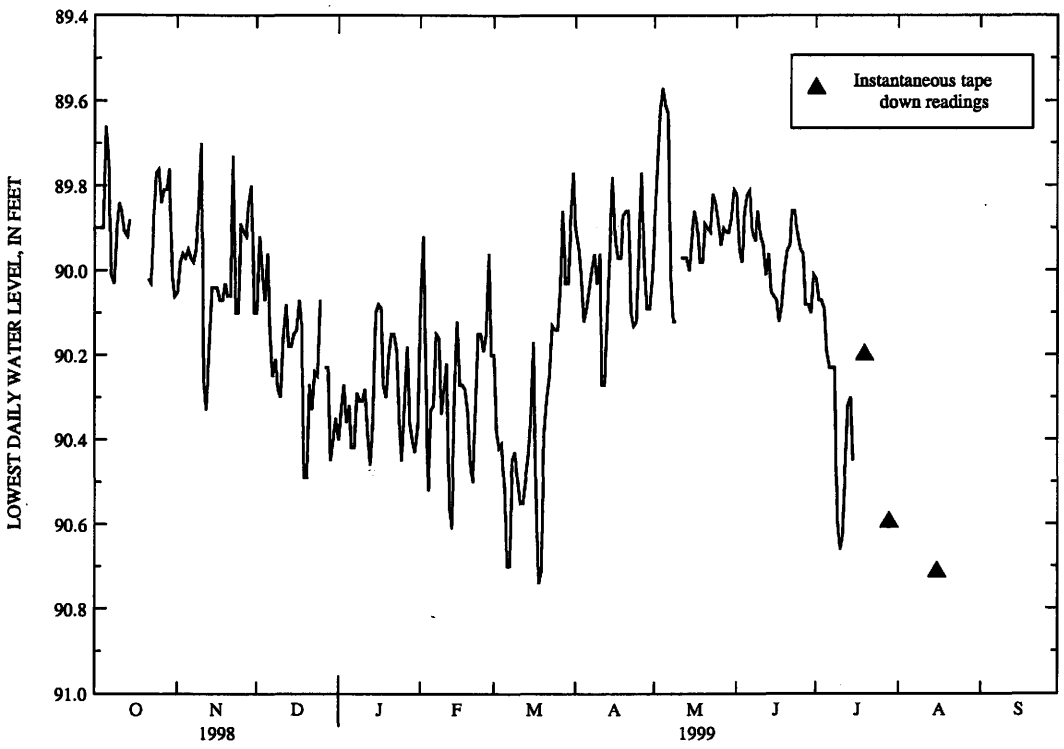
444205092500001. Local number, 114N17W10AAA01.
LOCATION.-- Lat 44°42'05", long 92°50'00", in NE¼NE¼NE¼ sec.10, T.114 N., R.17 W., Hydrologic Unit 07040001, southeast of Hastings.
Owner: John Conzemius.
AQUIFER.-- Prairie du Chien Group of Early Ordovician Age.
WELL CHARACTERISTICS.-- Drilled, unused artesian well, diameter 4 in., depth 151 ft, depth of casing unknown.
INSTRUMENTATION.-- Electronic data logger with one-hour scan interval.
DATUM.-- Land-surface datum is 827 ft above sea level. Measuring point: Top of platform, 2.50 ft above land-surface datum.
PERIOD OF RECORD.-- Apr. 1976 to Sep. 1999.
EXTREMES FOR PERIOD OF RECORD.-- Highest water level, 93.47 ft below land-surface datum, Sep. 30, 1993; lowest, 107.4 ft below land-surface datum, Mar. 12, 1978.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

LOWEST 5TH-DAY WATER LEVEL

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	97.33	97.50	97.35	97.75	---	---	97.41	96.98	96.95	97.40	96.02	94.23
10	97.47	97.59	97.49	97.72	97.88	---	97.60	96.96	97.13	97.27	95.77	94.22
15	97.34	97.37	97.63	97.67	---	---	97.38	96.99	97.36	97.12	95.24	94.10
20	97.38	97.38	97.65	97.75	97.89	97.87	97.03	97.01	97.49	97.12	95.20	94.26
25	97.43	97.52	97.73	97.80	---	97.86	97.09	96.83	97.56	96.81	94.93	93.90
EOM	97.65	97.33	97.70	97.76	---	97.84	96.84	96.82	97.34	96.37	94.58	94.20

WTR YR: LOWEST 90.74 FT, MAR. 18; HIGHEST 88.79 FT, NOV 10.



HENNEPIN COUNTY

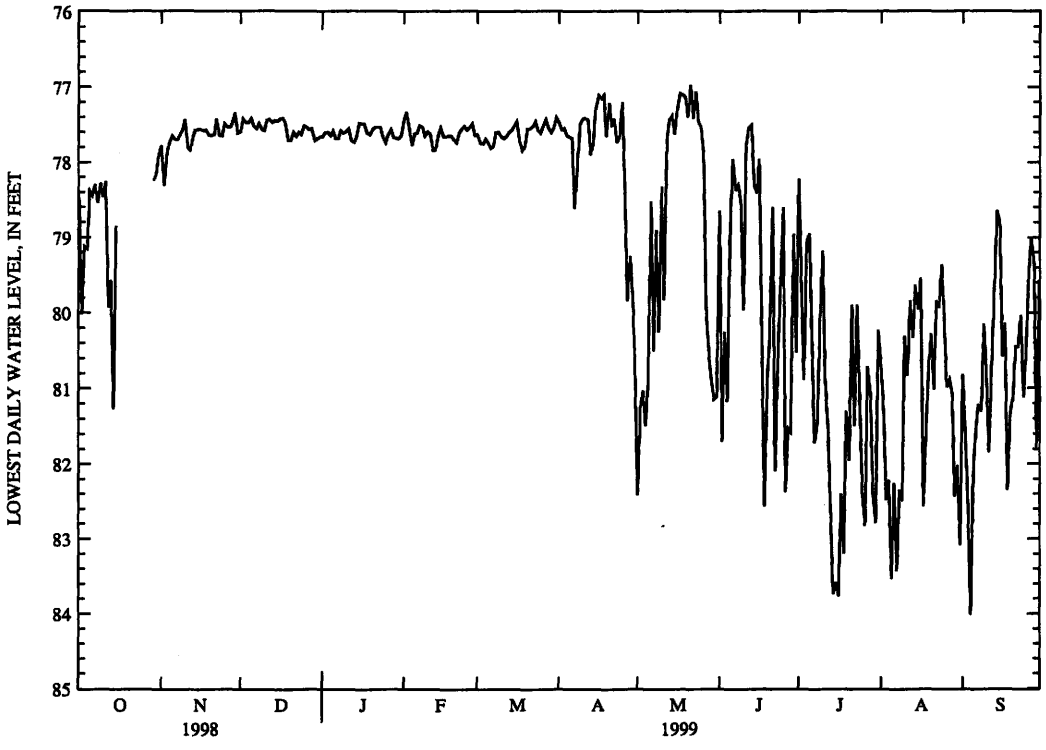
444801093202801. Local number, 027N24W30BDA01.
LOCATION.-- Lat 44°48'01", long 93°20'28", in NE¼SE¼NW¼ sec.30, T.27 N., R.24 W., Hydrologic Unit 07020012, by Southwood School in Bloomington.
Owner: City of Bloomington.
AQUIFER.-- Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled, unused artesian well, diameter 12 in. to 137 ft, 8 in. to 269 ft, total depth 365 ft, cased to 269 ft.
INSTRUMENTATION.-- Electronic data logger with 30-minute recording interval.
DATUM.-- Land-surface datum is 815 ft above sea level. Measuring point: Top of recorder platform, 2.20 ft above land-surface datum.
REMARKS.-- Water level affected by pumping.
PERIOD OF RECORD.-- Mar. 1969 to Sep. 1999.
EXTREMES FOR PERIOD OF RECORD.-- Highest water level, 63.05 ft below land-surface datum, Apr. 15, 1969; lowest, 87.34 ft below land-surface datum, Jan. 30, 1997.
REVISIONS.-- Water levels for Aug. 7 to Sep. 30, 1995.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

LOWEST 5TH DAY WATER LEVEL

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	78.39	77.65	77.41	77.58	77.62	77.73	77.66	80.89	78.82	78.95	83.53	82.12
10	78.46	77.43	77.58	77.59	77.59	77.66	77.42	78.33	79.96	79.18	80.31	80.84
15	78.85	77.56	77.45	77.48	77.54	77.51	77.27	77.62	78.41	83.58	79.95	78.79
20	---	77.64	77.71	77.56	77.71	77.55	77.21	77.39	80.30	81.95	80.28	81.11
25	---	77.49	77.51	77.74	77.57	77.61	77.20	77.53	78.60	82.39	80.07	80.49
EOM	77.92	77.61	77.66	77.63	77.64	77.40	80.78	81.11	80.52	80.23	83.08	79.58

WTR YR: LOWEST 84.01 FT, SEP. 4; HIGHEST 76.85 FT, NOV 10.



HENNEPIN COUNTY--Continued

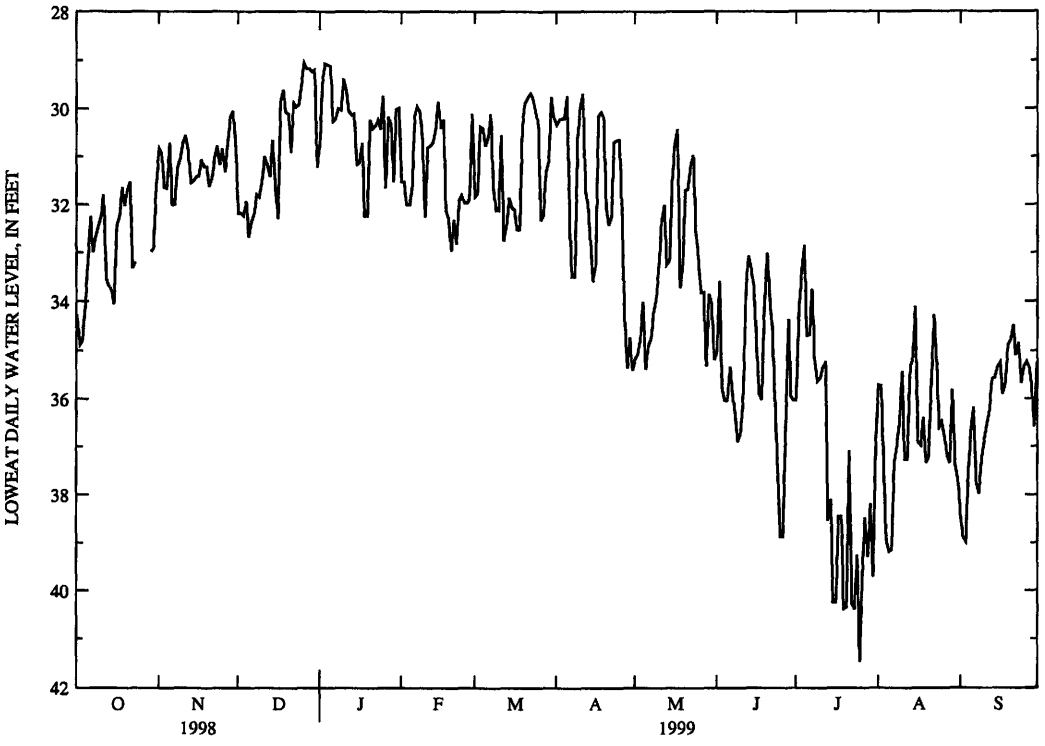
450116093205301. Local number, 029N24W06CCC01.
LOCATION.-- Lat 45°01'16", long 93°20'53", in $SW^1/_4SW^1/_4SW^1/_4$ sec.6, T.29 N., R.24 W., Hydrologic Unit 07010206, at the corner of 36th Avenue and Unity Avenue North, Robbinsdale.
Owner: Minnesota Department of Transportation.
AQUIFER.-- St. Peter Sandstone of Middle Ordovician Age.
WELL CHARACTERISTICS.-- Drilled, unused artesian well, diameter 5 in., depth 200 ft, cased to 152 ft.
INSTRUMENTATION.-- Electronic data logger with 30-minute recording interval.
DATUM.-- Land-surface datum is 870 ft above sea level. Measuring point: Top of casing, 3.50 ft above land-surface datum.
REMARKS.-- Water level affected by pumping.
PERIOD OF RECORD.-- Mar. 1973 to Sep. 1999.
EXTREMES FOR PERIOD OF RECORD.-- Highest water level, 24.54 ft below land-surface datum, Dec. 28, 29, 1975; lowest, 53.03 ft below land-surface datum, June 15, 1988.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

LOWEST 5TH-DAY WATER LEVEL

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	33.31	30.72	32.67	29.12	31.68	30.77	29.74	35.37	36.03	34.69	39.18	36.60
10	32.22	30.72	31.50	29.38	32.26	32.12	29.94	33.24	36.72	35.57	35.43	36.90
15	34.06	31.42	31.56	31.15	29.86	32.06	33.59	31.49	33.70	40.25	34.11	35.32
20	31.68	31.62	30.11	30.24	32.96	29.88	32.09	31.70	33.01	40.34	37.22	34.78
25	---	30.84	29.51	29.74	31.96	30.34	30.66	33.12	38.87	41.47	36.48	35.31
EOM	31.59	30.74	31.21	29.98	30.11	30.20	35.40	35.18	36.03	37.02	37.65	35.25

WTR YR: LOWEST 41.47 FT, JULY 25; HIGHEST 27.93 FT, DEC. 27.



HENNEPIN COUNTY--Continued

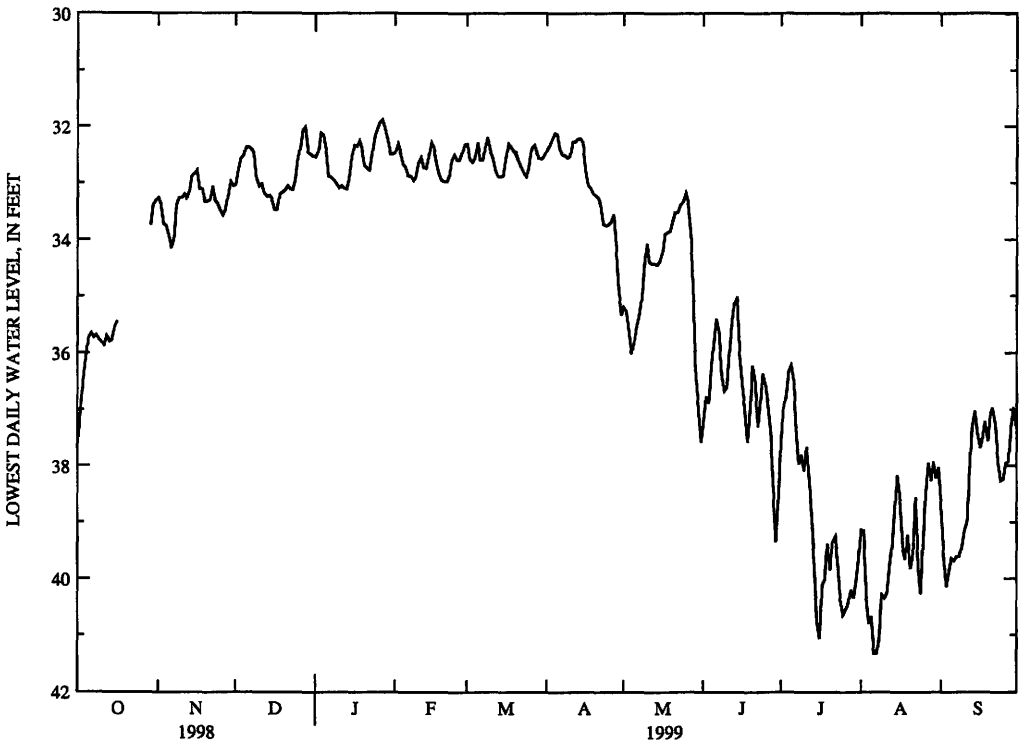
445740093333001. Local number, 117N23W11BBD01.
LOCATION.-- Lat 44°57'40", long 93°33'30", in SE$^1/_4$NW$^1/_4$NW$^1/_4$ sec.11, T.117 N., R.23 W., Hydrologic Unit 07010206, 2 mi southwest of Wayzata, at Lake Minnetonka.
Owner: Minnetonka Boat Works, Inc., Orono.
AQUIFER.-- Prairie du Chien Group of Early Ordovician Age and Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.-- Drilled artesian observation well, diameter 6 in., depth 437 ft, cased to 270 ft.
INSTRUMENTATION.-- Electronic data logger with 15-minute recording interval.
DATUM.-- Land-surface datum is 930.8 ft above sea level. Measuring point: Floor of recorder platform, 3.30 ft above land-surface datum.
REMARKS.-- Water level affected by pumping.
PERIOD OF RECORD.-- Aug. 1942 to Sep. 1999.
EXTREMES FOR PERIOD OF RECORD.-- Highest water level, 14.05 ft below land-surface datum, Apr. 30, 1954; lowest, 44.77 ft below land-surface datum, June 28, 1988.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

LOWEST 5TH-DAY WATER LEVEL

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	35.72	33.93	32.37	32.44	32.73	32.28	32.14	35.80	35.79	36.22	40.67	39.64
10	35.82	33.26	33.05	33.09	32.63	32.44	32.52	34.07	36.59	38.08	40.34	39.15
15	35.53	32.84	33.28	32.56	32.29	32.87	32.29	34.39	36.02	40.77	38.17	37.40
20	---	33.33	33.13	32.69	32.98	32.46	33.22	33.68	36.22	39.85	39.82	37.09
25	---	33.48	32.58	32.04	32.60	32.73	33.73	33.17	36.59	40.63	39.38	38.23
EOM	33.31	33.05	32.53	32.49	32.32	32.51	35.32	37.57	38.53	39.66	38.03	37.29

WTR YR: LOWEST 41.32 FT, AUG. 6,7; HIGHEST, 31.75 FT, JAN 27.



HENNEPIN COUNTY--Continued

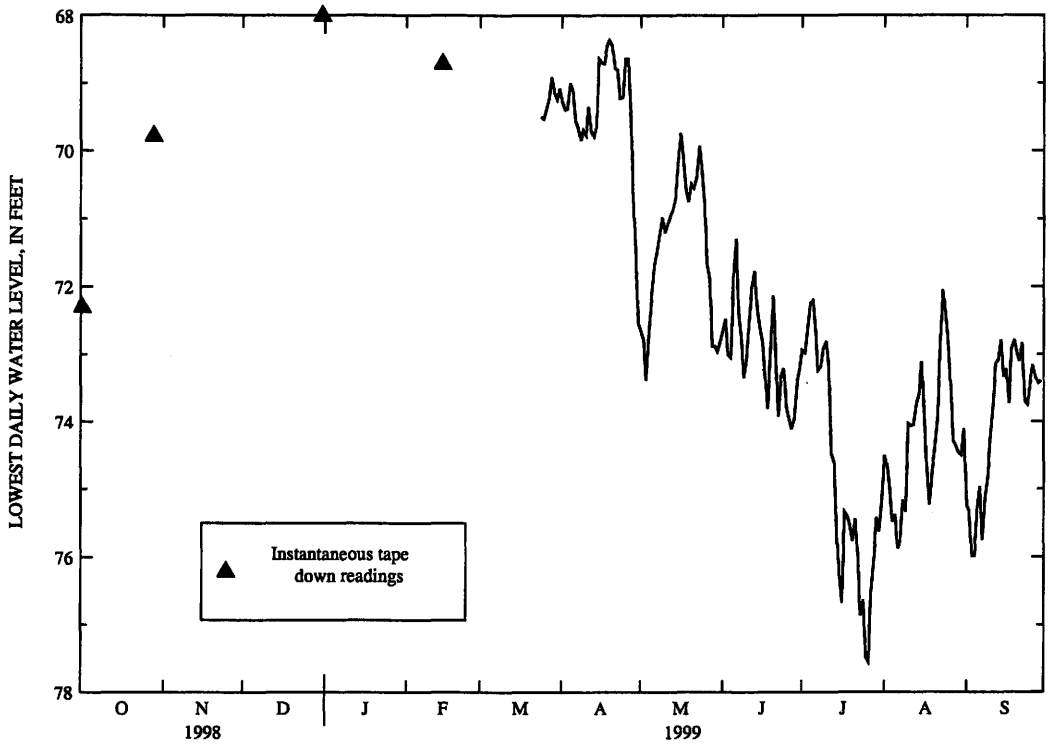
450223093231801. Local number, 118N21W07DCB01.
LOCATION.-- Lat 45°02'23", long 93°23'18", in NW¼SW¼SE¼ sec.7, T.118 N., R.21 W., Hydrologic Unit 07010206, by water tower at 47th Avenue North and Aquila Avenue.
Owner: City of New Hope.
AQUIFER.-- Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.-- Drilled, unused artesian well, diameter 16 in., depth 422 ft, cased to 339 ft.
INSTRUMENTATION.-- Electronic data logger with 30-minute scan interval.
DATUM.-- Land-surface datum is 933 ft above sea level. Measuring point: Top of recorder platform, 3.00 ft above land-surface datum.
REMARKS.-- Water level affected by pumping.
PERIOD OF RECORD.-- Oct. 1965 to Sep. 1999.
EXTREMES FOR PERIOD OF RECORD.-- Highest water level, 60.46 ft below land-surface datum, Dec. 17, 1967; lowest, 78.37 ft below land-surface datum, June 13, 1997.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

LOWEST 5TH-DAY WATER LEVEL

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	---	---	---	---	---	---	69.11	72.19	71.89	72.20	75.38	75.27
10	---	---	---	---	---	---	69.77	71.20	73.07	72.81	74.03	74.26
15	---	---	---	---	---	---	68.64	70.12	72.59	76.22	73.11	73.33
20	---	---	---	---	---	---	68.44	70.49	72.14	75.76	74.42	72.98
25	---	---	---	---	---	69.53	68.64	70.72	73.79	77.49	72.78	73.43
EOM	---	---	---	---	---	69.08	72.54	72.80	73.23	75.19	74.11	---

WTR YR: LOWEST 77.56 FT, JULY 26; HIGHEST 67.76 FT, MAR. 28.

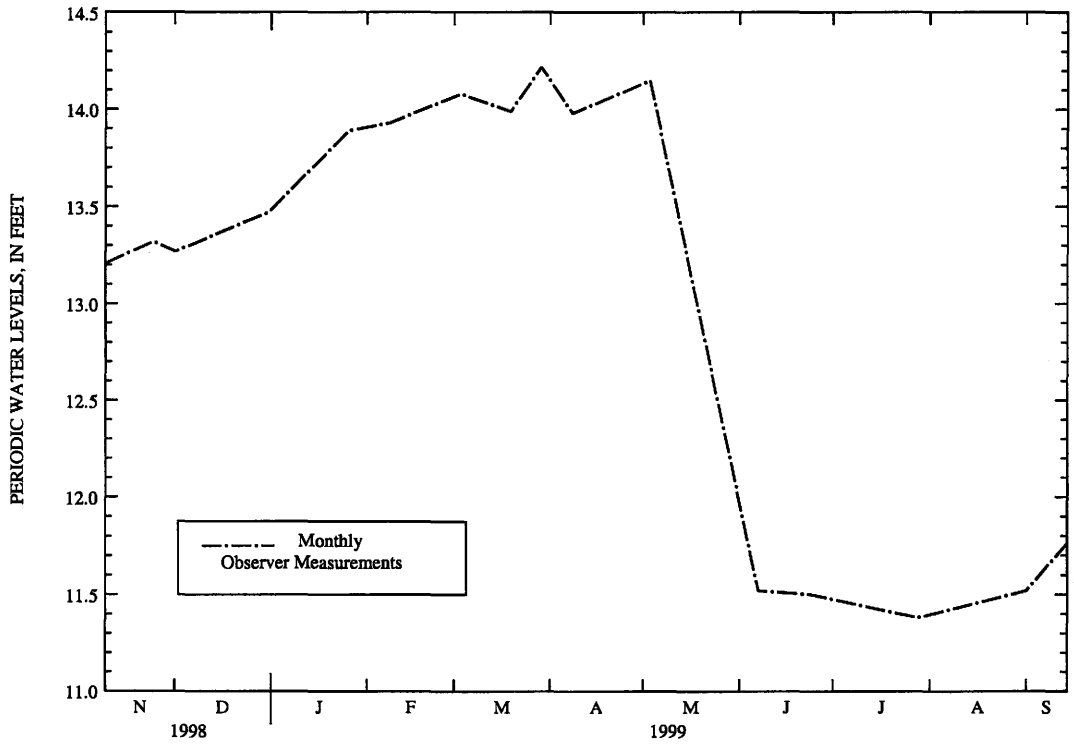


MORRISON COUNTY

460444094212501. Local number, 130N29W08DCC01.
LOCATION.-- Lat 46°04'44", long 94°21'25", in $SW^1/_4SW^1/_4SE^1/_4$ sec.8, T.130 N., R.29 W., Hydrologic Unit 07010104, at Camp Ripley.
Owner: Minnesota Army National Guard, Camp Ripley.
AQUIFER.-- Surficial outwash sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.-- Drilled water-table observation well, diameter 2 in., depth 59 ft, screened 56 to 59 ft.
INSTRUMENTATION.-- Monthly measurements by observer.
DATUM.-- Land-surface datum is 1,149.0 ft above sea level. Measuring point: Top of casing, 2.10 ft above land-surface datum.
REMARKS.-- Water levels used in monthly National Water Conditions Report.
PERIOD OF RECORD.-- Apr. 1949 to Sept. 1999.
EXTREMES FOR PERIOD OF RECORD.-- Highest water level observed, 7.35 ft below land-surface datum, July 28, 1972; lowest observed, 19.75 ft below land-surface datum, Aug. 4, 1961.
EXTREMES FOR CURRENT WATER YEAR.-- Highest water level observed, 11.38 ft below land-surface datum, July 28; lowest observed, 14.22 ft below land-surface datum, Mar. 29.

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 09	13.21	JAN 26	13.89	MAR 29	14.22	JUL 24	11.50
NOV 24	13.32	FEB 08	13.93	APR 08	13.98	JUL 28	11.38
DEC 01	13.27	MAR 03	14.08	MAY 03	14.15	SEP 01	11.52
DEC 31	13.47	MAR 19	13.99	JUN 07	11.52	SEP 14	11.76
JAN 26	13.79						



GROUND WATER LEVELS-Continued

RAMSEY COUNTY

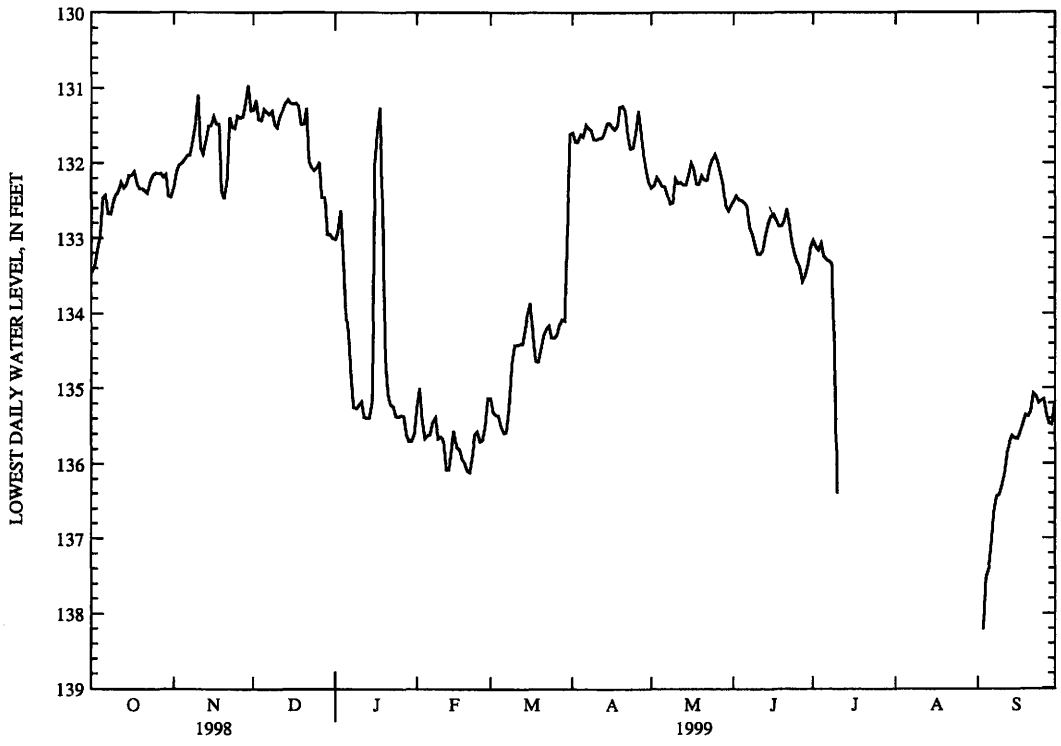
450238093082501. Local number, 030N23W35BDC01.
LOCATION.-- Lat 45°02'38", long 93°08'25", in $SW^1/_4SE^1/_4NW^1/_4$ sec.35, T.30 N., R.23 W., Hydrologic Unit 07010206, southeast corner of Arbogast Street and Richmond Avenue.
Owner: City of Shoreview.
AQUIFER.-- Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.-- Drilled unused artesian well, diameter 20 in. to 129 ft, 12 in to 465 ft, total depth 510 ft, cased to 465 ft.
INSTRUMENTATION.-- Electronic data logger with 30-minute recording interval.
DATUM.-- Land-surface datum is 960 ft above sea level. Measuring point: Top of recorder platform, 1.50 ft above land-surface datum.
PERIOD OF RECORD.-- Apr. 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.-- Highest water level, 129.26 ft below land-surface datum, Mar. 1, 1987; lowest, 146.01 ft below land-surface datum, July 28, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

LOWEST 5TH-DAY WATER LEVEL

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	132.47	131.95	131.28	134.00	135.62	135.51	131.65	132.31	132.53	133.24	---	137.40
10	132.42	131.09	131.53	135.22	135.64	134.42	131.69	132.21	133.21	136.40	---	136.30
15	132.17	131.50	131.20	135.18	135.56	134.01	131.47	132.16	132.71	---	---	135.66
20	132.34	132.47	131.48	134.63	136.09	134.47	131.24	132.17	132.76	---	---	135.37
25	132.13	131.37	132.06	135.38	135.70	134.32	131.60	131.88	133.32	---	---	135.16
EOM	132.45	131.30	133.00	135.60	135.13	131.61	132.26	132.55	133.12	---	---	135.23

WTR YR: LOWEST 137.65 FT, SEP. 3; HIGHEST 130.63 FT, NOV. 11.



SCOTT COUNTY

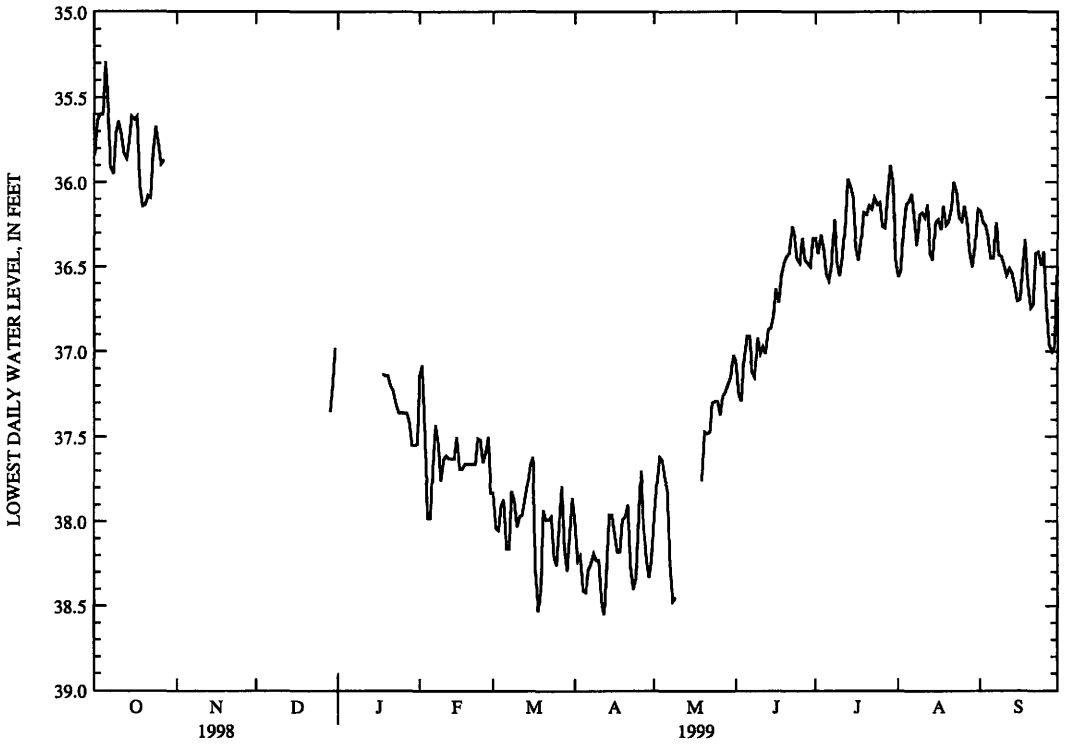
444427093353901. Local number, 115N23W28BDD01.
LOCATION.-- Lat 44°44'27", long 93°35'39", in $SE^1/_4SE^1/_4NW^1/_4$ sec.28, T.115 N., R.23 W., Hydrologic Unit 07020012, Merriam Junction.
Owner: Chicago and Northwestern Transportation Company.
AQUIFER.-- Jordan Sandstone of Early Cambrian Age.
WELL CHARACTERISTICS.-- Drilled artesian observation well, diameter 16 in., depth 140 ft, cased to 75 ft.
INSTRUMENTATION.-- Electronic data logger with one-hour scan interval.
DATUM.-- Land-surface datum is 758 ft above sea level. Measuring point: Top of casing, 0.90 ft above land-surface datum.
PERIOD OF RECORD.-- Periodic record since Nov. 1984; continuous record, July to Sep. 1999.
EXTREMES FOR PERIOD OF RECORD.-- Highest water level, 25.75 ft below land-surface datum, Mar. 8, 1985; lowest, 43.20 ft below land-surface datum, Feb. 28, 1990.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

LOWEST 5TH-DAY WATER LEVEL

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	35.29	---	---	36.97	37.98	37.87	38.42	37.74	36.91	36.54	36.11	36.45
10	35.64	---	---	36.97	37.63	38.03	38.23	---	37.01	36.55	36.18	36.49
15	35.61	---	---	36.97	37.50	37.66	37.96	---	36.79	36.08	36.24	36.70
20	36.13	---	---	37.14	37.66	37.93	37.97	37.47	36.44	36.19	36.23	36.74
25	35.77	---	---	37.36	37.65	38.26	38.02	37.29	36.48	36.12	36.23	36.41
EOM	---	---	36.98	37.54	37.83	37.86	38.22	37.02	36.33	36.45	36.16	36.55

WTR YR: LOWEST 38.55 FT, APR. 12; HIGHEST 35.17 FT, OCT. 5.



GROUND WATER LEVELS-Continued

SCOTT COUNTY

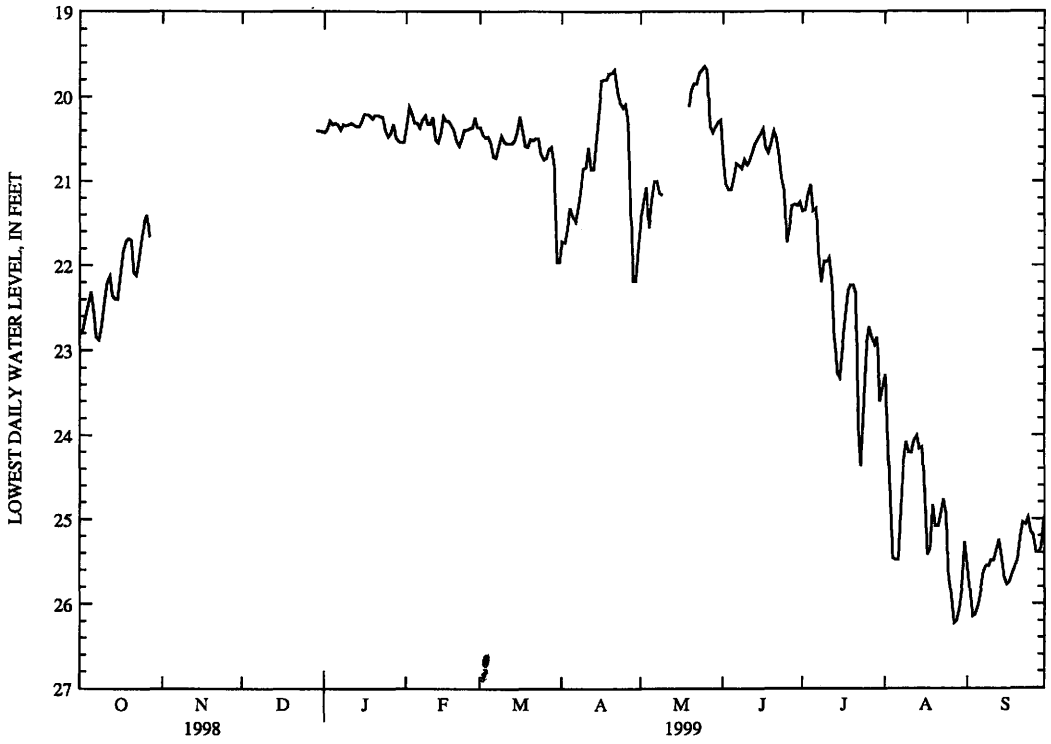
444427093353902. Local number, 115N23W28BDD02.
LOCATION.-- Lat 44°44'27", long 93°35'39", in $SE^1/_4SE^1/_4NW^1/_4$ sec.28, T.115 N., R.23 W., Hydrologic Unit 07020012, Merriam Junction.
Owner: Chicago and Northwestern Transportation Company.
AQUIFER.-- Ironton-Galesville Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.-- Drilled artesian observation well, diameter 4 in., depth 355 ft, screened 350 to 355 ft.
INSTRUMENTATION.-- Electronic data logger with 30-minute recording interval.
DATUM.-- Land-surface datum is 758 ft above sea level. Measuring point: Top of casing, 1.00 ft above land-surface datum.
PERIOD OF RECORD.-- Nov. 1984 to Sep. 1999.
EXTREMES FOR PERIOD OF RECORD.-- Highest water level, 19.59 ft below land-surface datum, Apr. 8, 1993; lowest, 45.28 ft below land-surface datum, July 29, 1991.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

LOWEST 5TH-DAY WATER LEVEL

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	22.31	---	---	20.31	20.31	20.55	21.41	21.25	20.96	21.35	25.48	26.01
10	22.41	---	---	20.33	20.32	20.53	20.83	---	20.80	21.95	24.21	25.49
15	22.40	---	---	20.29	20.23	20.41	20.19	---	20.44	23.32	24.14	25.69
20	21.70	---	---	20.22	20.53	20.50	19.72	19.93	20.40	22.23	25.08	25.48
25	21.49	---	---	20.47	20.37	20.74	20.09	19.64	21.72	22.94	25.63	25.15
EOM	---	---	20.41	20.54	20.36	21.96	21.77	20.27	21.25	23.45	25.27	24.98

WTR YR: LOWEST 26.22 FT, AUG. 27; HIGHEST 19.59 FT, APR. 24, 25.



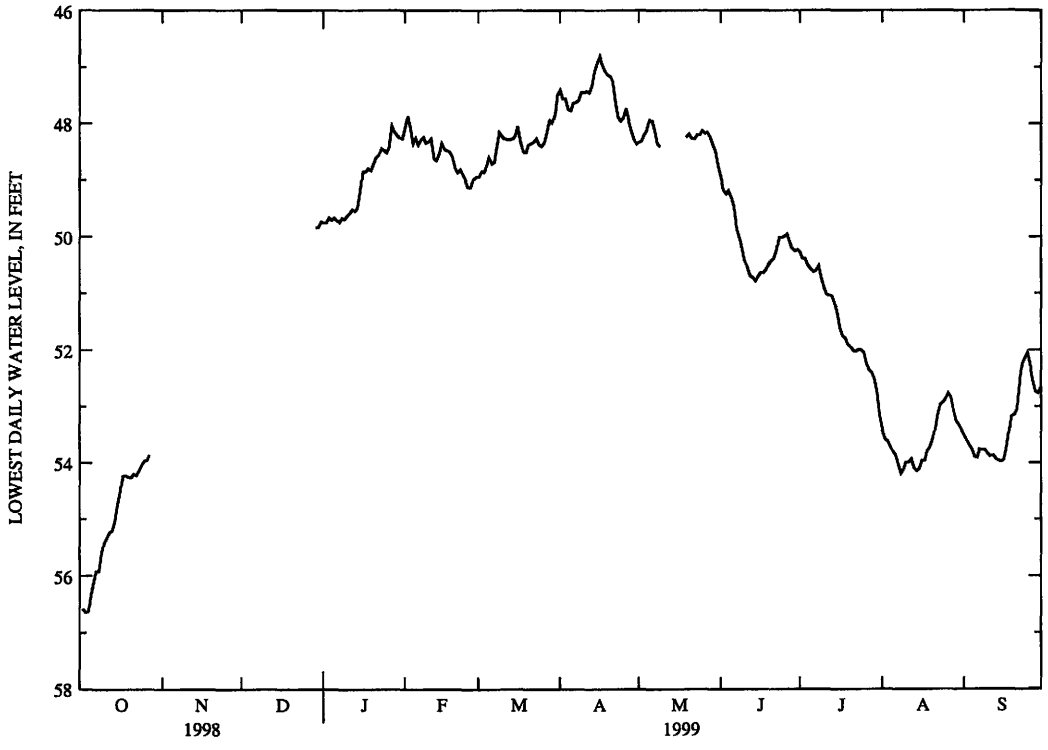
444427093353903. Local number, 115N23W28BDD03.
LOCATION.-- Lat 44°44'27", long 93°35'39", in SE¼SE¼NW¼ sec.28, T.115 N., R.23 W., Hydrologic Unit 07020012, at Merriam Junction.
Owner: Chicago and Northwestern Transportation Company.
AQUIFER.-- Mount Simon Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.-- Drilled artesian observation well, diameter 4 in., depth 525 ft, screened 520 to 525 ft.
INSTRUMENTATION.-- Electronic data logger with 30-minute recording interval.
DATUM.-- Land-surface datum is 758 ft above sea level. Measuring point: Top of casing, 1.00 ft above land-surface datum.
PERIOD OF RECORD.-- Nov. 1984 to Sep. 1999.
EXTREMES FOR PERIOD OF RECORD.-- Highest water level, 33.85 ft below land-surface datum, Mar. 8, 1985; lowest, 55.12 ft below land-surface datum, Aug. 1, 1988.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

LOWEST 5TH-DAY WATER LEVEL

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	56.33	---	---	49.67	48.25	48.60	47.77	47.93	49.31	50.57	53.80	53.89
10	55.41	---	---	49.63	48.32	48.23	47.45	---	50.43	50.90	53.99	53.84
15	54.76	---	---	49.19	48.35	48.21	46.95	---	50.70	51.30	54.10	53.98
20	54.26	---	---	48.71	48.80	48.37	47.16	48.18	50.43	51.95	53.59	53.14
25	53.97	---	---	48.51	49.13	48.40	47.88	48.12	49.98	52.04	52.86	52.04
EOM	---	---	49.73	48.26	48.94	47.47	48.36	48.74	50.22	53.16	53.42	52.66

WTR YR: LOWEST 56.64, OCT. 1,3; HIGHEST 46.62 FT, APR 16.

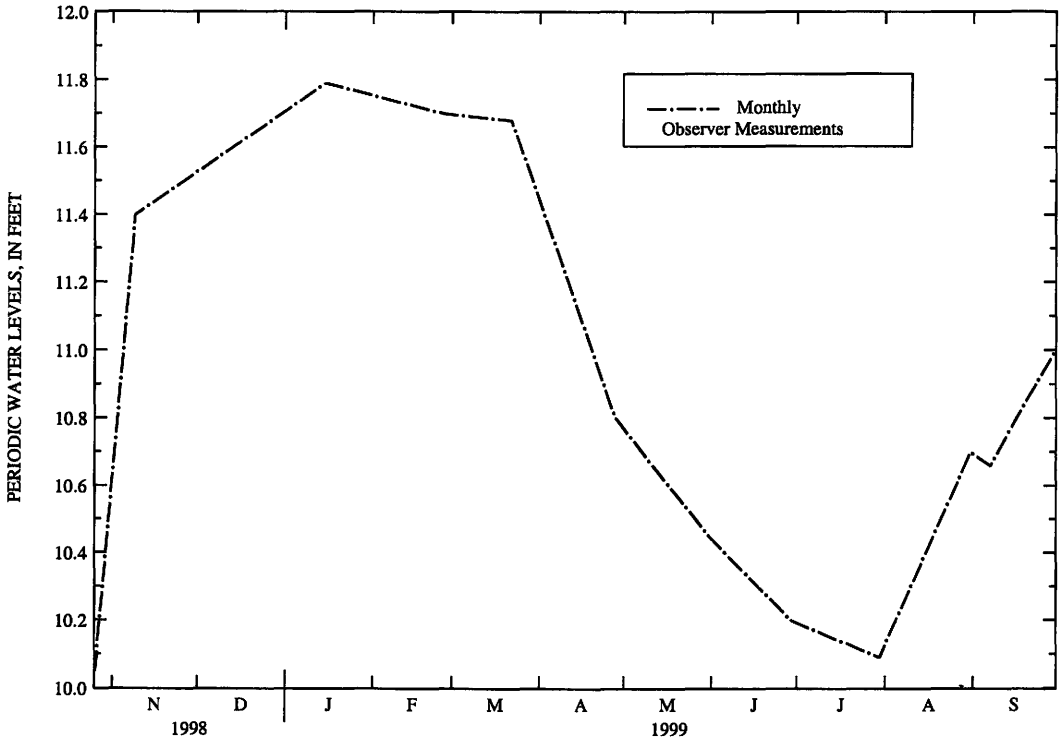


WATONWAN COUNTY

440037094372601. Local number, 106N32W01DDB01.
LOCATION.-- Lat 44°00'37", long 94°37'26", in NW¼SE¼SE¼ sec.1, T.106 N., R.32 W., Hydrologic Unit 07020010, north of St. James.
Owner: U.S. Geological Survey.
AQUIFER.-- Surficial outwash sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.-- Drilled water-table observation well, diameter 2 in., depth 22 ft, screened 19 to 22 ft.
INSTRUMENTATION.-- Monthly measurements by observer.
DATUM.-- Land-surface datum is 1,056.2 ft above sea level. Measuring point: Top of casing, 4.80 ft above land-surface datum.
REMARKS.-- Water levels used in monthly National Water Conditions Report.
PERIOD OF RECORD.-- Nov. 1965 to current year.
EXTREMES FOR PERIOD OF RECORD.-- Highest observed water level, 4.11 ft below land-surface datum, Apr. 27, 1969; lowest observed, 16.22 ft below land-surface datum, Mar. 7, 1990.
EXTREMES FOR CURRENT WATER YEAR.-- Highest water level observed,10.05 ft below land-surface datum, Oct 26; lowest observed, 11.79 ft below land-surface datum, Jan. 28.

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 26	10.05	MAR 22	11.68	JUN 29	10.20	SEP 07	10.66
NOV 09	11.40	APR 28	10.80	JUL 30	10.09	SEP 16	10.80
FEB 26	11.70	MAY 31	10.45	AUG 31	10.70	SEP 30	11.00



Quality of Ground Water

Letter E indicates estimated value.

ANOKA COUNTY

STATION NUMBER	DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM) (90095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	PH WATER WHOLE LAB (STAND-ARD UNITS) (00403)	TEMPER-ATURE WATER (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	BARO-METRIC PRES-SURE (MM OF HG) (00025)
451104093212801	06-29-99	1000	696	672	7.0	7.1	11.4	2.8	--
	06-29-99	1009	696	666	7.0	7.1	11.4	2.8	--
451315093202501	06-30-99	1000	584	580	7.4	7.5	14.9	3.8	736
	06-30-99	1009	584	561	7.4	7.5	14.9	3.8	736

DATE	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	ALKA-LINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)	BICAR-BONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, AM-MONIA+ ORGANIC DIS. (MG/L AS N) (00623)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)
06-29-99	1.5	--	320	227	277	<.020	.027	.24	11.5	.019
06-29-99	1.5	--	--	227	277	--	--	--	--	--
06-30-99	7.6	78	270	177	216	<.020	<.010	.11	6.45	.021
06-30-99	7.6	78	--	177	216	--	--	--	--	--

DATE	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)
06-29-99	.027	81	30	9.0	.2	.77	26	35	.15	19
06-29-99	--	--	--	--	--	--	--	--	--	--
06-30-99	.023	79	17	8.3	.2	1.4	44	9.3	.12	22
06-30-99	--	--	--	--	--	--	--	--	--	--

DATE	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	BARIUM, DIS-SOLVED (UG/L AS BA) (01005)	BERYL-LIUM, DIS-SOLVED (UG/L AS BE) (01010)	BROMIDE DIS-SOLVED (MG/L AS BR) (71870)	CADMIUM DIS-SOLVED (UG/L AS CD) (01025)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR) (01030)	COBALT, DIS-SOLVED (UG/L AS CO) (01035)	COPPER, DIS-SOLVED (UG/L AS CU) (01040)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)
06-29-99	--	--	--	.035	--	--	--	--	<10	--
06-29-99	<1	65	<1.0	--	<1.0	<1.0	1.9	5.5	--	<1.0
06-30-99	--	--	--	.042	--	--	--	--	<10	--
06-30-99	<1	46	<1.0	--	<1.0	2.0	<1.0	1.2	--	<1.0

DATE	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	NICKEL, DIS-SOLVED (UG/L AS NI) (01065)	SILVER, DIS-SOLVED (UG/L AS AG) (01075)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)	ANTI-MONY, DIS-SOLVED (UG/L AS SB) (01095)	ALUM-INUM, DIS-SOLVED (UG/L AS AL) (01106)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)
06-29-99	5.7	--	--	--	--	--	--	407	388
06-29-99	6.0	5.0	<1.0	1.7	<1.0	<1.0	<1	--	--
06-30-99	<3.0	--	--	--	--	--	--	357	316
06-30-99	<1.0	1.5	<1.0	<1.0	<1.0	<1.0	1	--	--

BELTRAMI COUNTY

STATION NUMBER	DATE	TIME	SPECIFIC CONDUCTANCE (US/CM) (00095)	SPECIFIC CONDUCTANCE LAB (US/CM) (90095)	PH WATER WHOLE FIELD (STANDARD UNITS) (00400)	PH WATER WHOLE LAB (STANDARD UNITS) (00403)	TEMPERATURE WATER (DEG C) (00010)	TURBIDITY (NTU) (00076)	BAROMETRIC PRESSURE (MM OF HG) (00025)	HARDNESS TOTAL (MG/L AS CACO3) (00900)	ALKALINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)
472533094284500	07-01-99	1100	208	209	8.3	8.1	8.6	4.2	724	110	92
	07-01-99	1109	208	210	8.3	8.1	8.6	4.2	724	--	92

DATE	BICARBONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN, NITRITE DISSOLVED (MG/L AS N) (00613)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	PHOSPHORUS DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)
07-01-99	112	<.020	<.010	<.10	<.050	.060	.051	33	6.3	2.2	.1	.35
07-01-99	112	--	--	--	--	--	--	--	--	--	--	--

DATE	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BARIUM, DISSOLVED (UG/L AS BA) (01005)	BERYLLIUM, DISSOLVED (UG/L AS BE) (01010)	BROMIDE DISSOLVED (MG/L AS BR) (71870)	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)
07-01-99	.71	4.0	<.10	19	--	--	--	<.010	--	--	--	--
07-01-99	--	--	--	--	<1	2.3	<1.0	--	<1.0	<1.0	<1.0	<1.0

DATE	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	SILVER, DISSOLVED (UG/L AS AG) (01075)	ZINC, DISSOLVED (UG/L AS ZN) (01090)	ANTIMONY, DISSOLVED (UG/L AS SB) (01095)	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	SELENIUM, DISSOLVED (UG/L AS SE) (01145)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)
07-01-99	<10	--	12	--	--	--	--	--	--	140	120
07-01-99	--	<1.0	13	<1.0	<1.0	159	<1.0	<1.0	<1	--	--

COOK COUNTY

STATION NUMBER	DATE	TIME	SPECIFIC CONDUCTANCE (US/CM) (00095)	SPECIFIC CONDUCTANCE LAB (US/CM) (90095)	PH WATER WHOLE FIELD (STANDARD UNITS) (00400)	PH WATER WHOLE LAB (STANDARD UNITS) (00403)	TEMPERATURE WATER (DEG C) (00010)	BAROMETRIC PRESSURE (MM OF HG) (00025)	OXYGEN, DISSOLVED (MG/L) (00300)
475237089515501	08-16-99	1045	313	340	9.2	9.3	8.2	743	.6
475325089491001	08-16-99	1420	1620	1700	8.8	8.5	14.1	739	.4
475400089470001	08-24-99	1400	50	58	5.7	6.0	15.1	--	1.3
475431089461601	08-16-99	1230	E1960	1930	8.2	7.8	15.4	742	.1
475500089510001	08-19-99	1500	4300	4450	7.2	7.4	10.9	--	.6
475508089444101	08-17-99	1100	617	546	8.4	8.3	6.6	750	1.8
475549089430201	08-17-99	1200	2150	2210	7.8	7.8	9.6	750	.3
475650089433401	08-18-99	1415	608	630	9.1	8.9	11.3	--	.2
475700089460001	08-24-99	1245	123	138	8.6	8.6	6.6	--	4.2
475700089500001	08-19-99	1300	124	136	7.1	7.5	9.6	--	7.9
475700089500002	08-19-99	1130	132	145	6.3	7.0	15.6	731	2.9
475800089400002	08-24-99	1735	252	262	6.2	6.5	11.5	--	4.9
475800089400004	08-24-99	1600	112	125	6.4	6.8	10.3	--	4.9
475800089410002	08-25-99	1100	181	188	7.4	7.4	16.1	--	7.4
475800089470001	08-17-99	1645	84	102	7.1	6.7	8.2	731	7.0
475801089410901	08-24-99	1100	878	839	7.4	7.5	7.5	--	.4
480001089353401	08-18-99	1225	729	772	9.2	8.6	6.5	--	.1
480035089424201	08-17-99	1500	109	120	6.8	6.8	10.1	--	6.5

COOK COUNTY--Continued

DATE	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	ALKA-LINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)	ANC UNFLTRD TIT 4.5 LAB (MG/L AS CACO3) (90410)	BICAR-BONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)
08-16-99	6	--	116	124	105	<.020	<.010	E.07	<.050	<.050
08-16-99	4	170	31	44	38	<.020	<.010	.21	<.050	<.050
08-24-99	13	25	17	18	21	.039	<.010	1.0	<.050	E.034
08-16-99	1	300	28	27	3	.072	<.010	<.10	<.050	<.050
08-19-99	6	1300	27	32	33	<.020	<.010	E.05	<.050	<.050
08-17-99	15	84	79	79	91	<.020	<.010	<.10	<.050	<.050
08-17-99	3	700	98	103	120	.029	<.010	.10	<.050	<.050
08-18-99	2	62	34	33	27	<.020	<.010	E.05	<.050	<.050
08-24-99	35	44	52	65	63	<.020	<.010	E.06	<.050	<.050
08-19-99	73	67	61	64	74	<.020	<.010	1.3	.255	<.050
08-19-99	30	69	61	67	74	<.020	<.010	.25	<.050	<.050
08-24-99	46	71	46	53	56	<.020	<.010	.30	.070	<.050
08-24-99	45	46	39	45	48	<.020	<.010	.25	<.050	<.050
08-25-99	77	57	49	56	60	<.020	<.010	.39	<.050	<.050
08-17-99	60	48	40	45	48	<.020	<.010	E.07	.108	<.050
08-24-99	0	340	170	195	207	.030	<.010	.10	<.050	.055
08-18-99	1	80	44	46	43	<.020	<.010	.11	<.050	<.050
08-17-99	58	56	60	56	73	<.020	<.010	.38	<.050	.060

DATE	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)
08-16-99	<.050	<.010	4.4	E.11	72	--	.48	23	6.7	1.0
08-16-99	<.050	<.010	66	.58	257	9	2.0	450	58	1.2
08-24-99	<.050	<.010	5.9	2.6	1.7	.1	.32	.15	4.4	<.10
08-16-99	<.050	<.010	92	16	219	6	2.0	470	50	1.6
08-19-99	<.050	<.010	500	3.7	321	4	1.1	1400	25	1.7
08-17-99	<.050	<.010	33	.37	91	4	.33	130	28	.29
08-17-99	<.050	<.010	250	20	135	2	1.8	620	11	.22
08-18-99	<.050	<.010	21	2.2	98	5	.60	32	190	.58
08-24-99	<.050	<.010	14	1.9	13	.8	.31	.41	4.9	.22
08-19-99	<.050	<.010	21	3.6	1.5	.1	.13	.37	3.8	<.10
08-19-99	<.050	<.010	18	6.0	1.6	.1	.30	.17	3.4	<.10
08-24-99	<.050	<.010	18	6.5	23	1	.86	41	6.4	<.10
08-24-99	<.050	<.010	12	3.9	7.4	.5	.63	5.5	5.9	<.10
08-25-99	<.050	<.010	14	5.1	16	.9	.62	20	2.7	<.10
08-17-99	<.050	<.010	13	3.9	1.7	.1	.35	<.10	<.10	<.10
08-24-99	<.050	<.010	75	37	46	1	3.7	89	120	.88
08-18-99	<.050	<.010	15	10	113	6	6.4	200	6.6	.71
08-17-99	<.050	<.010	14	5.2	2.0	.1	.36	.17	4.3	<.10

DATE	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	BARIUM, DIS-SOLVED (UG/L AS BA) (01005)	BERYL-LIUM, DIS-SOLVED (UG/L AS BE) (01010)	BORON, DIS-SOLVED (UG/L AS B) (01020)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)
08-16-99	13	<1	<1.0	<1.6	736	290	11	<.1	<20	--
08-16-99	22	<1	61	<1.6	305	<10	2.9	<.1	<20	880
08-24-99	19	<1	8.9	<1.6	E8.7	2200	262	<.1	<20	47
08-16-99	10	2	33	<1.6	693	10	48	<.1	<20	861
08-19-99	16	<1	150	<4.8	184	77	210	<.1	<60	2300
08-17-99	18	<1	8.0	<1.6	282	E5.7	3.0	<.1	<20	346
08-17-99	19	4	110	<4.8	156	70	142	<.1	<60	1110
08-18-99	15	<1	8.7	<1.6	268	E9.7	13	<.1	<20	384
08-24-99	21	<1	5.9	<1.6	73	<10	E1.4	<.1	<20	88
08-19-99	15	<1	1.3	<1.6	<16	<10	<2.2	<.1	<20	82

COOK COUNTY--Continued

DATE	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	BARIUM, DIS-SOLVED (UG/L AS BA) (01005)	BERYL-LIUM, DIS-SOLVED (UG/L AS BE) (01010)	BORON, DIS-SOLVED (UG/L AS B) (01020)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	SOLIDS, SUM OF ZINC, DIS-SOLVED (UG/L AS ZN) (01090)	CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)
08-19-99	13	<1	4.8	<1.6	E11	380	138	<.1	<20	79
08-24-99	15	<1	15	<1.6	E14	21	<2.2	<.1	<20	138
08-24-99	15	<1	12	<1.6	<16	22	<2.2	<.1	<20	74
08-25-99	15	<1	16	<1.6	E12	61	24	<.1	<20	104
08-17-99	<.10	<1	E.58	<1.6	17	18	2.5	<.1	<20	--
08-24-99	23	3	30	<1.6	212	2900	103	<.1	248	497
08-18-99	.88	<1	59	<1.6	178	380	78	<.1	<20	380
08-17-99	17	<1	8.5	<1.6	E9.1	2500	64	<.1	<20	81

COTTONWOOD COUNTY

STATION NUMBER	DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM) (90095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	PH WATER WHOLE LAB (STAND-ARD UNITS) (00403)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)
435145095051701	07-09-99	1000	571	588	7.5	7.5	13.0	725	.9
435211095063701	07-12-99	1630	940	946	7.1	7.2	11.7	731	3.6
435218095062801	07-08-99	1430	489	478	7.5	7.6	14.8	722	7.8
	09-01-99	1300	491	--	7.5	--	17.6	726	6.1
435239095074801	07-14-99	1030	668	683	7.5	7.5	16.1	724	1.7
435310095082501	07-08-99	1030	652	661	7.5	7.5	10.0	726	6.2
435320095094901	04-27-99	1600	723	--	7.6	--	9.2	724	.5
	07-06-99	1450	723	735	7.4	7.5	9.7	736	.0
	08-31-99	0900	730	--	7.6	--	101	728	--
435500095105701	07-13-99	0930	1020	1020	7.4	7.3	9.6	728	.7
435500095112401	07-13-99	1300	875	877	7.4	7.3	9.4	726	<.0
435515095093601	07-07-99	1430	2490	2480	7.2	7.1	12.3	731	.1
435748095122901	07-07-99	0930	714	722	7.4	7.4	10.7	732	2.6
	09-01-99	0930	726	--	7.4	--	13.0	727	1.2
435934095134701	07-13-99	1500	709	721	7.5	7.4	10.1	731	<.0

DATE	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	ALKA-LINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)	BICAR-BONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)
07-09-99	9	300	284	346	<.020	.032	--	.398	--	<.010
07-12-99	35	480	372	455	<.020	<.010	--	20.7	--	.019
07-08-99	82	270	253	309	<.020	<.010	--	.827	--	<.010
09-01-99	68	--	263	321	<.020	<.010	--	.655	--	<.010
07-14-99	18	370	346	423	.089	.010	--	2.65	--	<.010
07-08-99	57	350	240	293	<.020	<.010	--	3.88	--	<.010
04-27-99	5	--	423	517	<.020	<.010	2.1	.100	.235	.260
07-06-99	0	380	418	510	2.12	<.010	--	<.050	--	.243
08-31-99	--	--	389	475	1.94	<.010	--	<.050	--	.201
07-13-99	6	550	283	345	.022	<.010	--	2.43	--	.012
07-13-99	--	480	389	475	<.020	<.010	--	<.050	--	<.010
07-07-99	0	1700	383	467	3.64	.011	--	<.050	--	.045
07-07-99	24	370	280	341	.209	<.010	--	9.42	--	<.010
09-01-99	12	--	286	349	<.020	<.010	--	<.050	--	<.010
07-13-99	--	380	320	391	<.020	<.010	--	<.050	--	<.010

COTTONWOOD COUNTY--Continued

DATE	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)
07-09-99	73	29	4.7	.1	1.8	5.8	34	.42	321
07-12-99	130	40	14	.3	2.8	9.6	47	.13	555
07-08-99	71	22	2.9	.1	.85	.71	10	.24	262
09-01-99	--	--	--	--	--	.54	8.7	--	--
07-14-99	100	27	3.4	.1	2.0	1.5	24	.18	383
07-08-99	91	29	3.3	.1	1.3	14	69	.19	369
04-27-99	--	--	--	--	--	--	--	--	--
07-06-99	97	32	14	.3	2.0	.88	.88	.27	402
08-31-99	--	--	--	--	--	.80	.35	--	--
07-13-99	140	48	14	.3	1.7	24	240	.16	654
07-13-99	120	42	3.3	.1	4.9	20	80	<.10	508
07-07-99	390	172	61	.6	10	.42	1300	.22	2120
07-07-99	99	31	7.2	.2	1.9	11	66	.29	426
09-01-99	--	--	--	--	--	12	62	--	--
07-13-99	100	31	5.0	.1	1.6	11	68	.26	411

GOODHUE COUNTY

STATION NUMBER	DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM) (90095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	PH WATER WHOLE LAB (STAND-ARD UNITS) (00403)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)
443829092411201	11-23-98	1600	439	457	8.0	8.0	12.2	748	9.5	91	200
443843092404301	11-22-98	1520	622	495	7.6	7.6	--	737	--	--	230
443852092420901	11-22-98	1055	590	601	7.4	7.6	12.0	737	7.4	71	300
443901092410001	11-22-98	1355	762	782	7.3	7.4	11.2	737	6.3	59	400
443905092420201	11-30-98	1520	422	435	7.7	7.7	11.5	747	8.7	82	220
443912092423501	11-19-98	1545	753	554	7.4	7.6	11.9	744	8.4	80	270
443914092422801	11-30-98	1125	545	556	7.4	7.4	10.7	747	8.7	80	280
443920092412701	11-22-98	1225	482	501	7.4	7.5	12.1	737	9.5	91	270
443920092412702	11-23-98	1330	427	448	7.8	8.0	11.3	748	5.1	48	210
443920092412703	11-23-98	1430	500	522	7.8	8.0	11.1	748	.2	2	260
443930092422601	11-30-98	1315	377	394	7.7	7.7	10.1	747	10.1	91	210
443941092421801	11-20-98	1135	232	248	8.1	8.1	8.3	749	.4	4	120
443944092421101	11-23-98	1140	466	486	7.7	7.9	12.3	748	9.2	87	240
	11-23-98	1144	466	--	7.7	--	12.3	748	9.2	87	--
443946092420201	11-20-98	1430	414	420	7.6	7.8	11.4	749	8.0	75	210
444003092425301	11-19-98	1345	332	251	8.1	8.1	10.2	743	9.8	89	120
444008092423201	11-20-98	1325	583	596	7.3	7.5	12.2	750	8.6	82	330
	11-20-98	1327	583	--	7.3	--	12.2	750	8.6	82	--
444026092433501	11-19-98	1200	677	500	7.4	7.6	11.3	745	>2.2	--	240

DATE	ALKA-LINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)	ANC UNFLTRD TIT 4.5 LAB (MG/L AS CACO3) (90410)	BICAR-BONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)
11-23-98	110	118	134	.021	<.010	<.10	17.8	.043	.022	.023	55	17
11-22-98	206	225	251	.030	<.010	<.10	5.39	.051	.066	.050	70	15
11-22-98	210	221	257	<.020	<.010	.10	14.4	<.050	.010	.010	79	24
11-22-98	237	264	289	.020	<.010	.13	27.1	<.050	<.050	<.010	97	38
11-30-98	158	168	193	.033	<.010	<.10	9.90	.024	.012	.023	59	17
11-19-98	206	232	251	.026	<.010	<.10	12.4	.010	.010	.011	69	25
11-30-98	225	235	274	.027	<.010	<.10	4.27	.017	<.050	.018	78	21
11-22-98	202	226	246	.022	<.010	.16	7.45	<.050	.014	.013	69	23
11-23-98	174	180	212	<.020	<.010	.14	3.53	.033	.011	.014	53	20
11-23-98	245	286	299	.021	<.010	.25	<.050	.280	<.050	.010	62	25

GOODHUE COUNTY--Continued

DATE	ALKALINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)	ANC UNFLTRD TIT 4.5 LAB (MG/L AS CACO3) (90410)	BICARBONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN, NITRITE DISSOLVED (MG/L AS N) (00613)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	PHOSPHORUS TOTAL (MG/L AS P) (00665)	PHOSPHORUS DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)
11-30-98	196	203	240	.028	<.010	<.10	.770	<.050	<.050	.012	51	19
11-20-98	92	108	112	<.020	<.010	<.10	2.24	.012	.019	.017	31	11
11-23-98	198	207	241	<.020	<.010	<.10	6.96	.025	.012	.013	57	24
11-23-98	198	--	241	--	--	--	--	--	--	--	--	--
11-20-98	164	171	200	<.020	<.010	<.10	5.42	.011	.013	.014	52	20
11-19-98	87	98	106	.023	.017	<.10	5.72	.016	.019	.020	29	10
11-20-98	253	287	309	<.020	<.010	<.10	5.51	<.050	<.050	<.010	81	31
11-20-98	253	--	309	--	--	--	--	--	--	--	--	--
11-19-98	190	211	232	.020	<.010	.10	3.13	<.050	<.050	.011	59	21

DATE	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	IRON, DISSOLVED (UG/L AS FE) (01046)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)
11-23-98	2.3	.1	1.1	16	18	<.10	20	18	4.9	315	274
11-22-98	11	.3	1.3	6.5	9.2	<.10	25	<10	E2.5	--	285
11-22-98	7.9	.2	.94	11	23	<.10	20	<10	<3.0	364	356
11-22-98	5.4	.1	1.2	18	21	<.10	17	<10	<3.0	464	460
11-30-98	2.2	.1	1.2	8.7	8.9	.14	25	E6.9	16	263	260
11-19-98	2.8	.1	.75	5.5	6.5	<.10	22	<10	<3.0	334	309
11-30-98	4.6	.1	1.5	21	12	<.10	21	<10	E2.1	340	312
11-22-98	3.1	.1	.89	2.8	10	<.10	21	<10	34	--	284
11-23-98	4.3	.1	.95	9.4	27	<.10	18	<10	<3.0	276	253
11-23-98	7.8	.2	1.4	11	8.7	<.10	18	260	258	313	282
11-30-98	2.0	.1	1.0	.60	6.9	.10	18	<10	4.7	227	220
11-20-98	2.1	.1	1.0	2.0	8.0	<.10	14	<10	<3.0	160	134
11-23-98	2.6	.1	1.2	5.2	16	<.10	22	<10	<3.0	296	277
11-20-98	4.7	.1	1.7	3.0	18	<.10	17	<10	<3.0	256	240
11-19-98	2.1	.1	.90	2.0	4.6	<.10	18	<10	E2.5	156	144
11-20-98	2.9	.1	1.0	2.5	14	<.10	19	<10	<3.0	356	327
11-19-98	9.1	.3	.75	12	25	<.10	16	<10	<3.0	296	271

HENNEPIN COUNTY

STATION NUMBER	DATE	TIME	SPECIFIC CONDUCTANCE (US/CM) (00095)	SPECIFIC CONDUCTANCE LAB (US/CM) (90095)	PH WATER WHOLE FIELD (STANDARD UNITS) (00400)	PH WATER WHOLE LAB (STANDARD UNITS) (00403)	TEMPERATURE WATER (DEG C) (00010)	TURBIDITY (NTU) (00076)	BAROMETRIC PRESSURE (MM OF HG) (00025)
450326093175201	06-29-99	1500	1380	1290	7.3	7.2	12.4	2.5	740
	06-29-99	1509	1380	1280	7.3	7.2	12.4	2.5	740
450430093220801	06-28-99	1500	905	887	7.1	7.3	10.5	--	736
	06-28-99	1509	905	889	7.1	7.3	10.5	--	736
450448093205301	06-29-99	1300	1660	1590	7.1	7.0	11.8	2.4	740
	06-29-99	1309	1660	1620	7.1	7.0	11.8	2.4	740

DATE	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	HARDNESS TOTAL (MG/L AS CACO3) (00900)	ALKALINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)	BICARBONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN, NITRITE DISSOLVED (MG/L AS N) (00613)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	PHOSPHORUS DISSOLVED (MG/L AS P) (00666)
06-29-99	1.4	14	400	279	340	.090	.019	.23	2.34	<.004
06-29-99	1.4	14	--	279	340	--	--	--	--	--
06-28-99	4.5	42	330	281	343	.023	<.010	E.10	2.40	.080
06-28-99	4.5	42	--	281	343	--	--	--	--	--
06-29-99	--	--	520	312	381	.037	.021	.31	2.96	<.004
06-29-99	--	--	--	312	381	--	--	--	--	--

QUALITY OF GROUND WATER--Continued

HENNEPIN COUNTY--Continued

DATE	PHOSPHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNESIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	POTASSIUM, DIS-SOLVED (MG/L AS K) (00935)	CHLORIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUORIDE, DIS-SOLVED (MG/L AS SO4) (00945)	SILICA, DIS-SOLVED (MG/L AS F) (00950)	DIS-SOLVED (MG/L AS SIO2) (00955)
06-29-99	<.010	110	30	112	2	4.9	190	81	.13	17
06-29-99	--	--	--	--	--	--	--	--	--	--
06-28-99	.061	99	21	60	1	1.6	100	18	.13	30
06-28-99	--	--	--	--	--	--	--	--	--	--
06-29-99	.013	140	41	106	2	3.5	280	60	.21	20
06-29-99	--	--	--	--	--	--	--	--	--	--

DATE	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	BARIUM, DIS-SOLVED (UG/L AS BA) (01005)	BERYLLIUM, DIS-SOLVED (UG/L AS BE) (01010)	BROMIDE DIS-SOLVED (MG/L AS BR) (71870)	CADMIUM DIS-SOLVED (UG/L AS CD) (01025)	CHROMIUM, DIS-SOLVED (UG/L AS CR) (01030)	COBALT, DIS-SOLVED (UG/L AS CO) (01035)	COPPER, DIS-SOLVED (UG/L AS CU) (01040)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)
06-29-99	--	--	--	.075	--	--	--	--	520	--
06-29-99	<1	98	<1.0	--	<1.0	<1.0	1.1	1.8	--	<1.0
06-28-99	--	--	--	.075	--	--	--	--	<10	--
06-28-99	3	111	<1.0	--	<1.0	1.3	<1.0	1.6	--	<1.0
06-29-99	--	--	--	.082	--	--	--	--	<10	--
06-29-99	2	343	<1.0	--	<1.0	<1.0	4.9	4.1	--	<1.0

DATE	MANGANESE, DIS-SOLVED (UG/L AS MN) (01056)	NICKEL, DIS-SOLVED (UG/L AS NI) (01065)	SILVER, DIS-SOLVED (UG/L AS AG) (01075)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)	ANTIMONY, DIS-SOLVED (UG/L AS SB) (01095)	ALUMINUM, DIS-SOLVED (UG/L AS AL) (01106)	SELENIUM, DIS-SOLVED (UG/L AS SE) (01145)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTITUENTS, DIS-SOLVED (MG/L) (70301)
06-29-99	878	--	--	--	--	--	--	778	729
06-29-99	880	3.4	<1.0	1.2	<1.0	<1.0	1	--	--
06-28-99	<3.0	--	--	--	--	--	--	516	511
06-28-99	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1	--	--
06-29-99	1370	--	--	--	--	--	--	974	859
06-29-99	444	20	<1.0	2.7	1.3	<1.0	2	--	--

JACKSON COUNTY

STATION NUMBER	DATE	TIME	SPECIFIC CONDUCTANCE (US/CM) (00095)	SPECIFIC CONDUCTANCE LAB (US/CM) (90095)	PH WATER WHOLE FIELD (STANDARD UNITS) (00400)	PH WATER WHOLE LAB (STANDARD UNITS) (00403)	TEMPERATURE WATER (DEG C) (00010)	BAROMETRIC PRESSURE (MM OF HG (00025)
435008095060301	08-31-99	1400	626	--	7.4	--	16.1	729
435026095055601	07-14-99	1300	800	803	7.3	7.3	11.4	724

DATE	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PERCENT SATURATION) (00301)	HARDNESS TOTAL (MG/L AS CACO3) (00900)	ALKALINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)	BICARBONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	NITROGEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITROGEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITROGEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	PHOSPHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)
08-31-99	1.7	18	--	272	332	<.020	<.010	2.51	<.010
07-14-99	.1	1	440	329	402	.090	<.010	<.050	.018

JACKSON COUNTY--Continued

DATE	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)
08-31-99	--	--	--	--	--	7.2	29	--	--
07-14-99	120	35	6.3	.1	.82	16	100	.27	474

OTTER TAIL COUNTY

STATION NUMBER	DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
463305095382701	04-22-99	1030	615	7.8	9.4	728	4.5	41
	06-24-99	1420	627	7.5	10.2	724	4.6	43
	08-26-99	1500	609	7.6	11.8	721	4.4	43
463342095315701	04-22-99	1200	847	7.8	9.6	847	8.0	63
	06-25-99	0720	834	7.6	10.1	724	8.5	80
	08-27-99	0740	836	7.8	11.6	725	8.6	83
463632095370001	04-22-99	0930	505	7.8	9.0	728	9.8	88
	06-24-99	1300	606	7.5	11.2	724	10.3	99
	08-26-99	1340	538	7.7	11.2	721	9.5	92
463912095364701	04-21-99	1000	561	7.6	7.1	722	6.1	53
	06-23-99	1530	715	7.2	12.1	720	<.1	--
	08-25-99	1520	640	7.3	14.4	724	--	--
463912095364702	04-21-99	1130	534	7.6	8.6	723	--	--
	06-23-99	1630	546	7.4	11.7	720	--	--
	08-25-99	1600	532	7.5	11.3	724	--	--
463956095355601	04-21-99	1400	442	6.9	7.3	724	4.0	35
	06-24-99	0940	262	6.9	10.9	723	5.4	52
	08-26-99	0940	301	6.9	13.3	720	4.2	42
464113095341901	04-21-99	1540	689	7.4	10.4	723	.6	6
	06-24-99	0800	659	7.3	10.0	721	2.5	23
	08-26-99	0830	639	7.5	10.5	719	2.3	22
464154095375501	04-22-99	0730	1020	7.6	8.7	728	8.9	81
	06-24-99	1110	1050	7.4	10.9	724	9.4	90
	08-26-99	1110	1020	7.5	10.7	721	9.7	92

DATE	ALKA-LINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)	BICAR-BONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)
04-22-99	196	239	<.020	<.010	E.10	18.0	.030	.024
06-24-99	192	234	<.020	<.010	E.10	16.3	.031	.024
08-26-99	195	238	<.020	<.010	E.10	13.8	.032	.025
04-22-99	158	193	.021	<.010	.12	40.0	.012	.011
06-25-99	146	178	<.020	<.010	.13	40.2	.007	.012
08-27-99	144	176	<.020	<.010	.27	35.5	.007	<.010
04-22-99	227	277	<.020	<.010	E.10	10.2	.005	<.010
06-24-99	193	235	<.020	<.010	.12	17.3	.005	.012
08-26-99	190	232	<.020	<.010	E.10	12.7	.006	<.010
04-21-99	285	348	<.020	<.010	.11	.937	.042	.035
06-23-99	292	356	<.020	<.010	.28	7.17	.047	.041
08-25-99	260	318	<.020	<.010	.19	8.09	.041	.036
04-21-99	292	356	.481	<.010	.62	.072	.149	.010
06-23-99	291	355	.451	<.010	.63	<.050	.042	.101
08-25-99	293	357	.480	<.010	.65	<.050	.138	.043
04-21-99	95	348	<.020	<.010	.19	26.4	.109	.086
06-24-99	57	70	<.020	<.010	.14	12.2	.129	.105
08-26-99	49	59	<.020	<.010	.11	17.8	.126	.113
04-21-99	366	446	<.020	<.010	.27	.219	.013	.012
06-24-99	324	395	<.020	<.010	.30	.788	.014	.015
08-26-99	326	398	<.020	<.010	.32	.192	.013	<.010
04-22-99	193	236	<.020	<.010	.14	57.1	.009	.011
06-24-99	182	222	<.020	<.010	.22	54.7	.012	.011
08-26-99	203	248	<.020	<.010	.16	47.2	.011	<.010

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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.

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