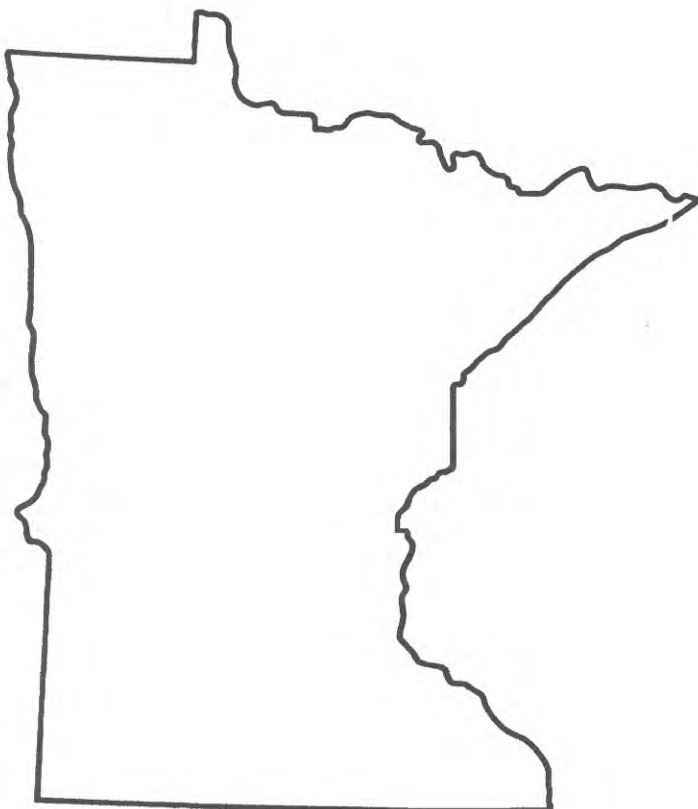




Water Resources Data Minnesota Water Year 1994



U.S. GEOLOGICAL SURVEY WATER-DATA REPORT MN-94-1
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

CALENDAR FOR WATER YEAR 1994

1993

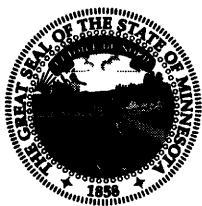
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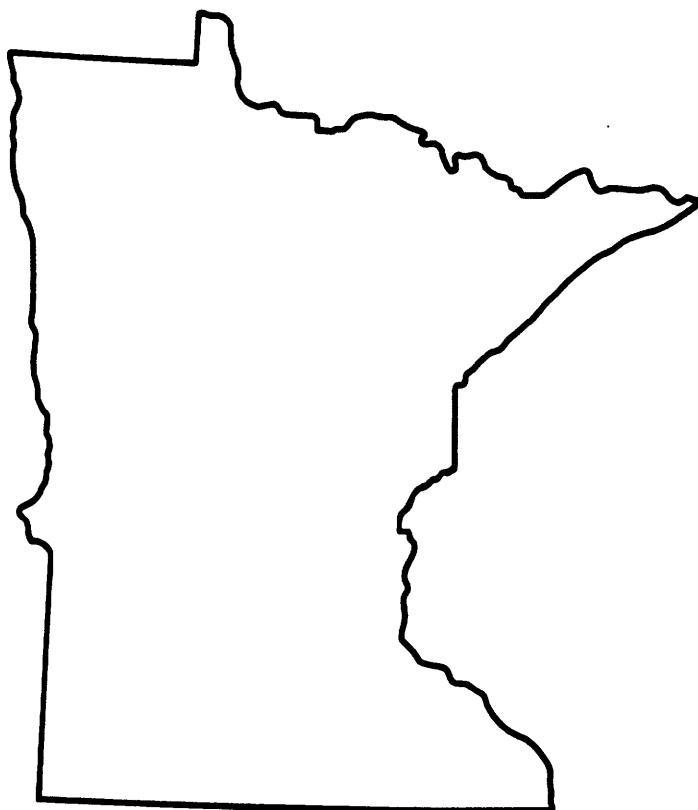
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					1	2	1	2	3	4	5	6	7				1	2	3	4
3	4	5	6	7	8	9	8	9	10	11	12	13	14	5	6	7	8	9	10	11
10	11	12	13	14	15	16	15	16	17	18	19	20	21	12	13	14	15	16	17	18
17	18	19	20	21	22	23	22	23	24	25	26	27	28	19	20	21	22	23	24	25
24	25	26	27	28	29	30	29	30	31					26	27	28	29	30		

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Water Resources Data Minnesota Water Year 1994

by Gregory B. Mitton, Joseph H. Hess, and Kevin G. Guttormson



U.S. GEOLOGICAL SURVEY WATER-DATA REPORT MN-94-1

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

DEPARTMENT OF THE INTERIOR

BRUCE BABBITT, Secretary

GEOLOGICAL SURVEY

Gordon P. Eaton, Director

For additional information write to:

**District Chief, Water Resources Division
U.S. Geological Survey
2280 Woodale Drive
Mounds View, Minnesota 55112**

PREFACE

This volume of the annual hydrologic data report of Minnesota is one of a series of annual reports that document **hydrologic data** gathered from the U.S. Geological Survey's surface- and ground-water data-collection networks in each State, Puerto Rico, and the **Trust Territories**. These records of streamflow, ground-water levels, and 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**.

Most of the data were collected, processed, and tabulated by the following individuals:

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This report was prepared in cooperation with the State of Minnesota and with other agencies under the **general supervision of George Garklavs**, District Chief, Minnesota.

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13. ABSTRACT (Maximum 200 words) Water resources data for the 1994 water year for Minnesota consists of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality in wells and springs. This volume contains discharge records for 99 stream gaging stations; stage and contents for 13 lakes and reservoirs; water quality for 31 stream stations; and water levels for 15 observation wells. Also included are 86 high-flow partial-record stations. 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 and 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				15. NUMBER OF PAGES 496	
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GAGING STATIONS, IN DOWNSTREAM ORDER, FOR WHICH RECORDS ARE PUBLISHED

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

Station Number

STREAMS TRIBUTARY TO LAKE SUPERIOR

Pigeon River at Middle Falls, near Grand Portage.....(d - - -)...	04010500.....	32
Knife River near Two Harbors	(d - - -)...04015330.....	34
St. Louis River at Scanlon	(d - c b p)...04024000.....	36
Nemadji River		
Deer Creek near Holyoke.....(d - - -)...	04024098.....	40

* * * * *

HUDSON BAY BASIN

Lake Winnipeg (head of Nelson River):

RED RIVER OF THE NORTH BASIN

Otter Tail River (head of Red River of the North):

Otter Tail River near Perham.....(d - c - p)	05030150.....	42
Otter Tail River near Elizabeth.....(d - - -)...	05030500.....	46
Orwell Lake (Reservoir) near Fergus Falls	(- e - -)...05045950.....	48
Otter Tail River below Orwell Dam, near Fergus Falls	(d - c - p) ...05046000.....	50
Bois de Sioux River near White Rock, SD	(d - - -) ...05050000.....	54
Bois de Sioux River near Doran	(d - c - p) ...05051300.....	56
Red River of the North at Wahpeton, ND	(d - c - p) ...05051500.....	60
Red River of the North at Hickson, ND	(d - c - p) ...05051522.....	64
Red River of the North at Fargo, ND	(d - c - p) ...05054000.....	68
Buffalo River near Hawley	(d - - -)...05061000.....	72
South Branch Buffalo River at Sabin.....(d - - -)...	05061500.....	74
Buffalo River near Dilworth.....(d - - -)...	05062000.....	76

GAGING STATIONS, IN DOWNSTREAM ORDER, FOR WHICH RECORDS ARE PUBLISHED--Continued

HUDSON BAY BASIN--Continued

	Station Number	
Wild Rice River at Twin Valley	(d - c - p)..05062500	78
Wild Rice River at Hendrum	(d - - -)...05064000	82
Red River of the North at Halstad	(d - c b p)...05064500	86
Marsh River near Shelly	(d - - -)...05067500	92
Sand Hill River at Climax	(d - - -)...05069000	94
Red Lake River:		
Lower Red Lake near Red Lake	(- e - - -)...05074000	96
Red Lake River near Red Lake	(d - - - -)...05074500	98
Red Lake River at Highlanding, near Goodridge	(d - - - -)...05075000	100
Thief River near Thief River Falls	(d - - - -)...05076000	102
Clearwater River at Plummer	(d - - - -)...05078000	104
Lost River at Oklee	(d - - - -)...05078230	106
Clearwater River at Red Lake Falls	(d - - - -)...05078500	108
Red Lake River at Crookston	(d - c b p)...05079000	110
Red River of the North at Grand Forks, ND	(d - c b p)...05082500	114
Snake River:		
Snake River above Alvarado	(d - c - p) .05085900	120
Middle River at Argyle	(d - c - p) 05087500	130
Red River of the North at Drayton, ND	(d - c b p) .05092000	132
Two Rivers:		
South Branch Two Rivers at Lake Bronson	(d - - - -)...05094000	136
Red River of the North at Emerson, Manitoba	(d - c b p) .05102500	138
Roseau River below South Fork near Malung	(d - - - -)...05104500	146
Roseau River below State ditch 51, near Caribou	(d - c b p) .05112000	148

LAKE OF THE WOODS BASIN (head of Winnipeg River)

Namakan River (head of Rainy River):		
Basswood River:		
Kawishiwi River near Ely	((d - c b p) .05124480	152
Kawishiwi River near Winton	(d - - - -)...05127000	156
Basswood River near Winton	(d - - - -)...05127500	158
Namakan River at outlet of Lac la Croix, Ontario	(d - - - -)...05128000	160
Vermilion River:		
Vermilion River near Crane Lake	(d - - - -)...05129115	162
Rainy Lake near Fort Frances, Ontario	(- e - - -)...05129400	164
Rainy River:		
Little Fork River:		
Sturgeon River near Chisholm	(d - - - -)...05130500	166
Little Fork River at Littlefork	(d - - - -)...05131500	168
Rainy River at Manitou Rapids	(d - c b p) 05133500	170
Lake of the Woods at Warroad	(- e - - -) 05140520	174
Lake of the Woods at Springsteel Island near Warroad	(- e - - -) 05140521	176

UPPER MISSISSIPPI RIVER BASIN

Mississippi River near Bemidji	(d - - - -)...05200510	178
Winnibigoshish Lake near Deer River	(- e - - -)...05201000	180
Mississippi River at Winnibigoshish Dam, near Deer River	(d - - - -)...05201500	182
LEECH LAKE RIVER BASIN		
Williams Lake near Akeley	(- e - - -)...05202000	184
Leech Lake at Federal Dam	(- e - - -)...05206000	186
Leech Lake River at Federal Dam	(d - - - -)...05206500	188
Pokegama Lake near Grand Rapids	(- e - - -)...05210500	190
Mississippi River at Grand Rapids	(d - - - -)...05211000	192
SANDY RIVER BASIN		
Sandy Lake at Libby	(- e - - -)...05218500	194
Sandy River at Sandy Lake Dam, at Libby	(d - - - -)...05219000	196
Mississippi River at Aitkin	(d - - - -)...05227500	198

PINE RIVER BASIN

Pine River Reservoir at Cross Lake	(- e - - -)	05230500	200
Pine River at Cross Lake Dam, at Cross Lake	(d - - - -)	05231000	202
Mississippi River at Brainerd	(d - - - -)	05242300	204

CROW WING RIVER BASIN

Shell River:

Straight River near Park Rapids	(d - - - -)	05243725	206
Crow Wing River at Nimrod	(d - - - -)	05244000	208
Long Prairie River at Long Prairie	(d - - - -)	05245100	210

Gull River:

Gull Lake near Brainerd	(- e - - -)	05246500	212
Gull River at Gull Lake Dam, near Brainerd	(d - - - -)	05247000	214
Crow Wing River near Pillager	(d - - - -)	05247500	216
Mississippi River near Fort Ripley	(d - - - -)	05261000	218
Mississippi River near Royalton	(d - c b p)	05267000	220

SAUK RIVER BASIN

Sauk River near St. Cloud	(d - - - -)	05270500	224
Mississippi River at St. Cloud	(d - - - -)	05270700	226

ELK RIVER BASIN

Elk River near Big Lake	(d - - - -)	05275000	228
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CROW RIVER BASIN

Crow River at Rockford	(d - - - -)	05280000	230
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RUM RIVER BASIN

Mille Lacs Lake (head of Rum River) at Cove Bay near Onamia	(- e - - -)	05284000	232
Rum River near St. Francis	(d - - - -)	05286000	234

ELM CREEK BASIN

Elm Creek near Champlin	(d - c b p)	05287890	236
Mississippi River near Anoka	(d - - - p)	05288500	242

MINNESOTA RIVER BASIN

Little Minnesota River (head of Minnesota River) near Peever, SD	(d - - - -)	05290000	248
Whetstone River near Big Stone City, SD	(d - - - -)	05291000	250
Minnesota River at Ortonville	(d - - - -)	05292000	252
North Fork Yellow Bank River near Odessa	(d - - - -)	05292704	254
Yellow Bank River near Odessa	(d - - - -)	05293000	256
Pomme de Terre River at Appleton	(d - - - -)	05294000	258
Lac qui Parle River near Lac qui Parle	(d - - - -)	05300000	260
Minnesota River near Lac qui Parle	(d - c b p)	05301000	262
Chippewa River near Milan	(d - - - -)	05304500	264
Minnesota River at Montevideo	(d - c b p)	05311000	266
Yellow Medicine River near Granite Falls	(d - - - -)	05313500	268
Redwood River near Marshall	(d - - - -)	05315000	270
Redwood River near Redwood Falls	(d - - - -)	05316500	272
Cottonwood River near New Ulm	(d - c b p)	05317000	274
Little Cottonwood River near Courtland	(d - - - -)	05317200	278
Blue Earth River:			
Watonwan River near Garden City	(d - - - -)	05319500	280
Blue Earth River near Rapidan	(d - - - -)	05320000	282
Le Sueur River near Rapidan	(d - c b p)	05320500	284
Minnesota River at Mankato	(d - c - p)	05325000	286
High Island Creek near Henderson	(d - c b p)	05327000	294
Minnesota River near Jordan	(d - c b p)	05330000	296
Mississippi River at St. Paul	(d - - - p)	05331000	300
Mississippi River at Nininger	(- - c b p)	05331570	302

ST CROIX RIVER BASIN

St. Croix River:

Kettle River below Sandstone	(d - - - -)	05336700	304
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Snake River:

Knife River near Mora	(d - - - -)	05337400	306
Snake River near Pine City	(d - - - -)	05338500	310
St. Croix River at St. Croix Falls, WI	(d - - - -)	05340500	314
Mississippi River at Prescott, WI	(d - - - -)	05344500	316

VERMILLION RIVER BASIN

Vermillion River near Empire	(d - c b p)	05345000	318
------------------------------------	-------------	----------	-----

CANNON RIVER BASIN	
Straight River near Faribault	(d - - -)....05353800..... 320
Cannon River at Welch	(d - - -)....05355200..... 322
ZUMBRO RIVER BASIN	
South Fork Zumbro River at Rochester	(d - - -)....05372995..... 324
WHITEWATER RIVER BASIN	
Whitewater River near Beaver	(d - - -)....05376800..... 326
Mississippi River at Winona	(d - - p)....05378500..... 328
ROOT RIVER BASIN	
Root River near Houston.....	(d - - -)....05385000..... 332
IOWA RIVER BASIN	
Iowa River:	
Cedar River near Austin	(d - - -)....05457000..... 334
DES MOINES RIVER BASIN	
Des Moines River at Jackson	(d - - -)....05476000..... 336

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

GROUND-WATER LEVELS

ANOKA	
Well 450927093033802 Local number 031N22W23CBC02	399
BLUE EARTH	
Well 440050094102801 Local number 106N28W03DBA01	400
CLAY	
Well 465237096383901 Local number 139N47W05CDC01	401
DAKOTA	
Well 445330093054301 Local number 028N22W19DCC02	402
Well 444205092500001 Local number 114N17W10AAA01	403
HENNEPIN	
Well 444801093202801 Local number 027N24W30BDA01	404
Well 450116093205301 Local number 029N24W06CCC01	405
Well 445740093333001 Local number 117N23W11BBD01	406
Well 450223093231801 Local number 118N21W07DCB01	407
MORRISON	
Well 460444094212501 Local number 130N29W08DCC01	408
RAMSEY	
Well 445700093051001 Local number 029N22W31DDD01	409
Well 450238093082501 Local number 030N23W35BDC01	410
SCOTT	
Well 444427093353902 Local number 115N23W28BDD02	411
Well 444427093353903 Local number 115N23W28BDD03	412
WATONWAN	
Well 440037194372601 Local number 106N32W01DDB01	413

QUALITY OF GROUND WATER RECORDS

BELTRAMI	415,442
BLUE EARTH	417,444
GOODHUE	429,446
GRANT	431
HUBBARD	464
JACKSON	432,448
MURRAY	432,450
OTTER TAIL	433
REDWOOD	436,452
SHERBURNE	465
SWIFT	439,455
TODD	439
WADENA	440
WATONWAN	441,457
YELLOW MEDICINE	441,459

PRECIPITATION SITES, FOR WHICH CHEMICAL QUALITY RECORDS ARE PUBLISHED

Precipitation Station at Camp Ripley	467
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WATER RESOURCES DATA - MINNESOTA, 1994

DISCONTINUED SURFACE-WATER DISCHARGE OR STAGE-ONLY STATIONS

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 high-flow 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); -, not available]

Station name	Station number	Drainage area (mi ²)	Period of record
STREAMS TRIBUTARY TO LAKE SUPERIOR			
Pigeon River above mouth of Arrow River, MN (d)	04010000	256	1924-27
Grand Portage River at Grand Portage, MN (d)	04010510	-	1991-92
Reservation River near Hovland, MN (d)	04010530	-	1991-92
Brule River at mouth near Hovland, MN (e)	04011000	248	1911
Devil Track River at mouth near Grand Marais, MN (e)	04011500	77	1911
Cascade River at mouth near Grand Marais, MN (e)	04012000	111	1911
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	1927-93
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
Stoney Brook at Brookston, MN (d)	04021530	97.3	1983-84
Cloquet River at Independence, MN (d)	04023000	750	1909-17
Simian Creek near Brookston, MN (d)	04023150	-	1983-84
Squaw Creek near Cloquet, MN (d)	04023600	-	1983-84
Otter Creek near Cloquet, MN (d)	04024015	-	1983-84
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

DISCONTINUED SURFACE-WATER DISCHARGE OR STAGE-ONLY STATIONS.--Continued

Station name	Station number	Drainage area (mi ²)	Period of record
RED RIVER OF THE NORTH BASIN			
Otter Tail River near Detroit Lakes, MN (d)	05030000	270	1937-71
Otter Tail River at German Church, near Fergus Falls, MN (d)	05030500	1,230	1904-17
Pelican River at Detroit Lakes, MN (d)	05033900	-	1968-71, 1974-75
Pelican River at Detroit Lake outlet near Detroit Lakes, MN (d)	05034100	-	1968-71, 1972-75
Long Lake outlet near Detroit Lakes, MN (d)	05035100	-	1968-71
West Branch County Ditch No. 14 near Detroit Lakes, MN (d)	05035200	-	1968-71
East Branch County Ditch No. 14 near Detroit Lakes, MN (d)	05035300	-	1968-71
St. Clair Lake outlet near Detroit Lakes, MN (d)	05035500	-	1968-75
Pelican River at Muskrat Lake outlet near Detroit Lakes, MN (d)	05035600	-	1968-75
Pelican River at Sallie Lake outlet near Detroit Lakes, MN (d)	05037100	-	1968-75
Pelican River at Lake Melissa outlet near 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, 1942-80
Otter Tail River (Red River) near Fergus Falls, MN (e)	05045500	1,690	1909-10
Otter Tail River near Breckenridge, MN (d)	05046500	2,040	1931-32, 1939-46
Mustinka River (head of Bois de Sioux River) near 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 ditch below West Branch Mustinka River (Twelve Mile Creek) near Charlesville, MN (d)	05048000	-	1943-55
West Branch Mustinka River (Twelve Mile Creek) below Mustinka ditch near Charlesville, MN (d)	05048500	-	1943-55
Mustinka River above (near) 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 Cambell, 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
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
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	331,200	1936-37, 1941-43, 1945-60, 1973-78
Snake River at Warren, MN (d)	05085500	175	1945, 1953-56

DISCONTINUED SURFACE-WATER DISCHARGE OR STAGE-ONLY STATIONS.—Continued

Station name	Station number	Drainage area (mi ²)	Period of record
RED RIVER OF THE NORTH BASIN--Continued			
Snake River at Alvarado, MN (d)	05086000	309	1945, 1953-56
Snake River near Argyle, MN (d)	05086500	481	1945
Middle River near Strandquist, MN (d)	05087000	-	1953-56
Tamarac River near Strandquist, MN (d)	05090500	-	1953-56
Tamarac River at Stephen, MN (d)	05091000	-	1945
Tamarac River near Stephen, MN (d)	05091500	320	1945, 1953-55
Two Rivers (Middle Fork Two Rivers) near 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 Fork) Two Rivers near Lancaster, MN (d)	05096000	32	1929-38, 1941-55
State Ditch 85 near Lancaster, MN (d)	05096500	95	1929-38, 1942-55
North Branch Two Rivers at Lancaster, MN (d)	05097000	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 (West Branch) Roseau River near 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 at Ross, MN (d)	05107500	1,220	1928-91
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 outlet of State Ditch 69 near Oak Point, MN (d)	05110000	-	1939-42
Roseau River at head of State Ditch 51 near Oak Point, MN (d)	05110500	-	1933-42
Roseau River at Oak Point, MN (d)	05111000	-	1933-39, 1941-60
Roseau River at international boundary, near Caribou, MN (d)	05112500	1,590	1933-69

DISCONTINUED SURFACE-WATER DISCHARGE OR STAGE-ONLY STATIONS.--Continued

Station name	Station number	Drainage area (mi ²)	Period of record
LAKE OF THE WOODS BASIN			
Isabella River near Isabella, MN (d)	05124500	341	1953-61, 1976-77
Filson Creek near Ely, MN (d)	05124990	9.66	1974-85
South Kawishiwi River near Ely, MN (d)	05125000	-	1953-61, 1976-78
Stony River near Isabella, MN (d)	05125500	180	1953-64
Stony River near Babbitt, MN (d)	05125550	219	1975-80
Dunka River near Babbitt, MN (d)	05126000	53.4	1951-62, 1975-80
South Kawishiwi River above White Iron Lake near Ely, MN (d)	05126210	-	1975-78
Bear Island River near Ely, MN (d)	05126500	68.5	1953-62, 1975-77
Burntside River near Ely, MN (d)	05127205	-	1967-78
Bjorkman's Creek near Ely, MN (d)	05127207	1.36	1972-78
Armstrong Creek near Ely, MN (d)	05127210	5.29	1967-78
Longstorff Creek near Ely, MN (d)	05127215	8.84	1967-78
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
Vermilion River below Vermilion Lake near Tower, MN (d)	05129000	483	1911-17, 1928-81
Gold Portage Outlet from Kabetogama Lake near Ray, MN (d)	05129290	-	1982-93
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
Big Fork River at Big Falls, MN (d)	05132000	1,460	1909-10, 1928-79, 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 near Warroad, MN (d)	05140500*	102	1946-54, 1966-77

DISCONTINUED SURFACE-WATER DISCHARGE OR STAGE-ONLY STATIONS.—Continued

Station name	Station number	Drainage area (mi ²)	Period of record
UPPER MISSISSIPPI RIVER BASIN			
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
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) near Dorset, MN (d)	05242700	74	1930-41
Straight River at County Highway 125 near Osage, MN (d)	05243721	-	1986-91
Straight River at County Highway 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 River near Motley, MN (d)	05245500	973	1909-17, 1930-31
Crow Wing River at Pillager, MN (d)	05246000	3,230	1903 (e), 1909-13, 1925-50
Platte (Platt) River at Royalton, 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
Middle Fork Crow River at New London, MN (d)	05277000	-	1939-42, 1943-47
Middle Fork Crow River (Calhoun Lake Diversion) near(d) Spicer, MN	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

DISCONTINUED SURFACE-WATER DISCHARGE OR STAGE-ONLY STATIONS--Continued

Station name	Station number	Drainage area (mi ²)	Period of record
UPPER MISSISSIPPI RIVER BASIN--Continued			
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 (d) (at Excelsior), MN	05289000	-	1938-64
Minnehaha Creek at Minnetonka Mills, MN (d)	05289500	130	1953-64
MINNESOTA RIVER BASIN			
Big Stone Lake near Big Stone City, SD (e) (formerly Big Stone Lake at Ortonville, MN)	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
Eagle Lake tributary No. 7 near Willmar, MN (d)	05313560	-	1972-73
Eagle Lake tributary No. 8 near Willmar, MN (d)	05313570	-	1972-73
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	1945-57
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
Purgatory Creek at Eden Prairie, MN (d)	05330800	-	1975-80
Nine Mile Creek at Bloomington, MN (d)	05330900	-	1963-73

DISCONTINUED SURFACE-WATER DISCHARGE OR STAGE-ONLY STATIONS--Continued

Station name	Station number	Drainage area (mi ²)	Period of record
ST. CROIX RIVER BASIN			
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
LOWER MISSISSIPPI RIVER BASIN			
Vermillion River at Hastings, MN (d)	05346000	195	1942-47 1990
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
Beaver Creek at Beaver, MN (d)	05377000	15.4	1939-40
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 1911-17, 1940-85, 1987-90
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 near Heron Lake, MN (d)	05475000	-	1930-43
BIG SIOUX RIVER BASIN			
Rock River at Luverne, MN (d)	06483000*	440	1911-14
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

DISCONTINUED SURFACE-WATER-QUALITY STATIONS

[The following stations were discontinued as continuous-record or periodic-record stations prior to the 1993 water year. Daily or periodic records of chemical (C), biological (Bio), sediment (Sed), temperature (Temp), dissolved oxygen (D.O.), pH (pH), or specific conductance (S.C.) were collected and published for the record shown for each station.]

Station name	Station number	Drainage area (sq mi)	Type of record	Period of record (water years)
Baptism River near Beaver Bay, MN	04014500	140	C.,Bio.,Sed.,Temp,D.O.,p.H., 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	Temp, S.C.	1980-83
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
Buffalo River near Dilworth, MN	05062000	1040	Sed.	1971-81
Wild River River at Twin Valley, MN	05062500	888	C, Bio., Temp, D.O., pH, S.C.	1971, 73-79
			Sed.	1976-79
Roseau River below Roseau, MN	05105300		C, Bio., Sed., Temp, D.O., pH, S.C.	1973-83
Roseau River below State Ditch 51 nr Caribou, MN	05112000	1570	Temp, S.C.	1980-83
Kawishiwi River near Ely, MN	05124480	253	Temp	1966-81
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	Temp, S.C.	1980-83
Elk River near Big Lake, MN	05275000	615	Sed., Temp	1976-81
Crow River at Rockford, MN	05280000	2520	Sed., Temp	1975-81
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
Cottonwood River near New Ulm, MN	05317000	1280	Sed.	1968-76
Watonwan River near Garden City, MN	05319500	812	Sed.	1977-80
Minnesota River at Burnsville, MN	05330908		Temp, D.O., pH, S.C.	1980-83
Minnesota River at Fort Snelling State Park, 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 Street 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 Lock and Dam 2 at Hastings, MN	05331578		Temp, D.O., pH, S.C.	1975-90
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.	1974-90
Mississippi River at Lock and Dam 3 near Red Wing, MN	05344980	46,600	Temp, D.O., pH, S.C.	1976-83
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
Whitewater River near Beaver, MN	05376800	271	Sed., Temp	1975-81
Mississippi River at Winona, MN	05378500	59,200	C,Bio., D.O., pH S.C.	1963-66
			Sed., Temp	1980-84
			Sed., Temp	1976-88
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.	1971, 73-75, 78-81
			Temp	1973-75, 79-81
			S.C.	1973-75
Des Moines River at Jackson, MN	05476000	1220	Sed., Temp	1968-81

INTRODUCTION

Water Resources Division of the U.S. Geological Survey, 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 Geological Survey, the data are published annually in this report series entitled "Water Resources Data - Minnesota."

Water resources data for the 1994 water year for Minnesota consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality of ground water. This volume contains discharge records for 99 gaging stations; stage and contents for 13 lakes and reservoirs; water quality for 31 stream stations; and water levels for 15 observation wells. Also included are 86 high-flow partial-record stations. These data represent a part of the National Water Data System collected by the U.S. Geological Survey 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 books and Open-File Reports Section, Federal Center, Box 25425, Denver, Colorado 80225.

Publications similar to this report are published annually by the Geological Survey 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-94-1. For archiving and general distribution, the reports for 1971-1974 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, VA 22161. Beginning with the 1990 water year, all water-data reports are also available on Compact Disc-Read Only Memory (CD-ROM). All data reports published for the current water year for the entire Nation, including Puerto Rico and the Trust Territories, will be reproduced on a single CD-ROM disc.

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 (612) 783-3100. A limited number of CD-ROM discs will be available for sale by the U.S. Geological Survey, Branch of Information Services, Box 25286 Federal Center, Denver, Colorado 80225.

COOPERATION

The U.S. Geological Survey 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 Survey are:

- Minnesota Department of Natural Resources.
- Minnesota Department of Transportation
- Minnesota Pollution Control Agency.
- Red Lake Watershed Management Board.
- Grand Portage Reservation Tribal Council.
- Beltrami Soil and Water Conservation District.
- Elm Creek Conservation Commission.
- Lower Red River Management Board.
- City of Rochester

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

SUMMARY OF HYDROLOGIC CONDITIONS

Precipitation

Except in the central, west central, and southeast, all of Minnesota received greater than normal (based on data from 1961-90; fig. 1) precipitation during the 1994 water year (fig. 2). Departures from normal ranged from -1.00 inches in west-central Minnesota to +1.98 inches in the southwest. Precipitation during the first two quarters of the 1994 water year was below normal in all of Minnesota. Despite below-normal precipitation during the first half of the water year, a significant snow cover existed during much of the winter. As of February 1st, nearly all of Minnesota was covered with a snow depth that ranked in the 80th percentile. In the third quarter, the entire State had above-normal precipitation except for west-central Minnesota, which had 0.56 inches below normal. The rest of Minnesota had departures from normal ranging from +3.09 in the northeast to +0.02 inches in central Minnesota. The third quarter was mild and relatively dry until June. Frequent and sometimes heavy thunderstorms pushed June precipitation totals well above normal in the northern and southern thirds of Minnesota. The most notable event was a storm on June 16-17 when six or more inches of rain fell in less than 24 hours over much of the Iron Range. In the fourth quarter, the entire State had above-normal precipitation except for the northeast. A major rainfall event during late summer occurred August 9-10 as moderate but persistent storms dropped over four inches of rain over a large area of south-central and southeast Minnesota. Another storm system on September 13-14 dropped over five inches of rain over portions of southern and east-central Minnesota.

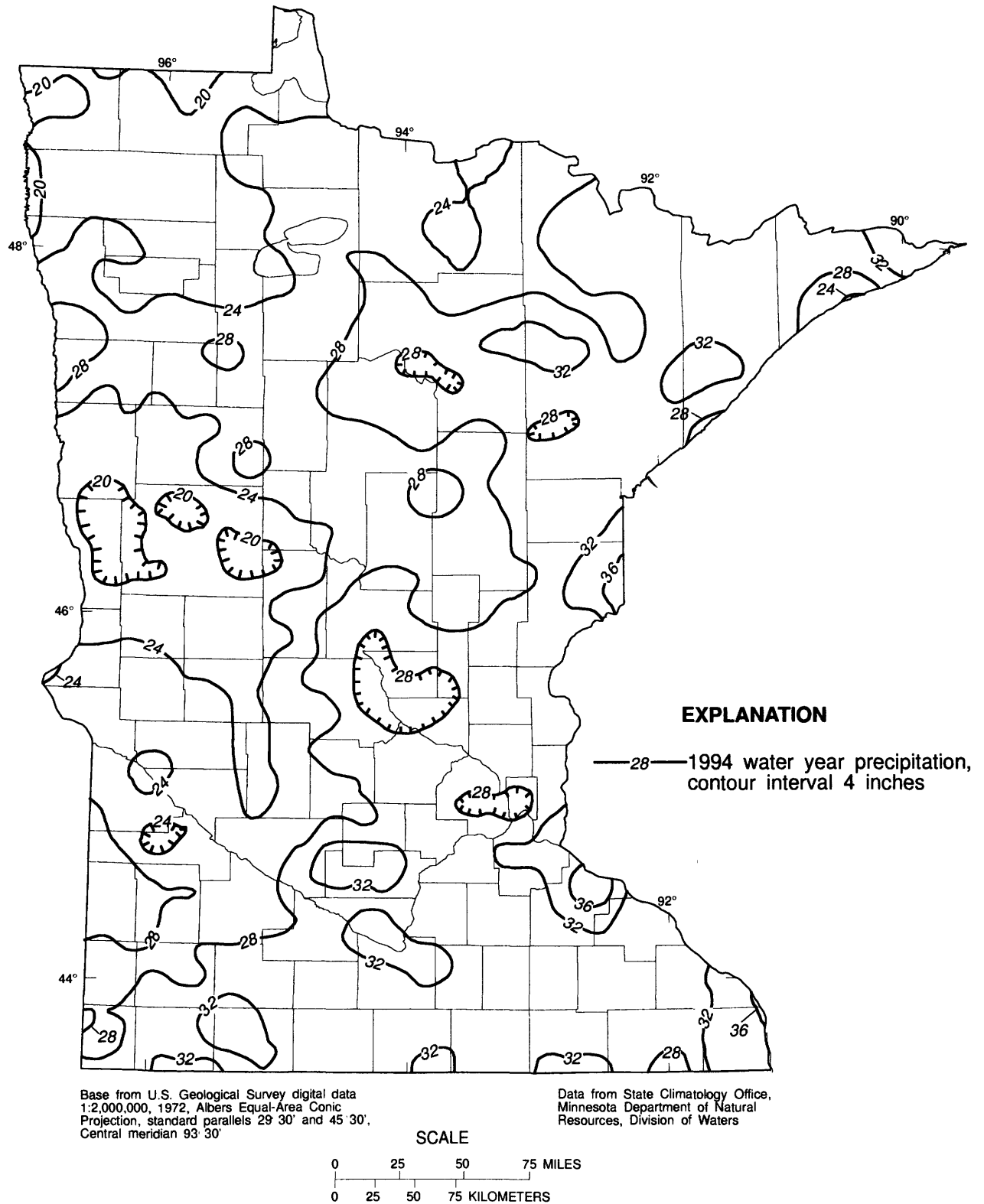
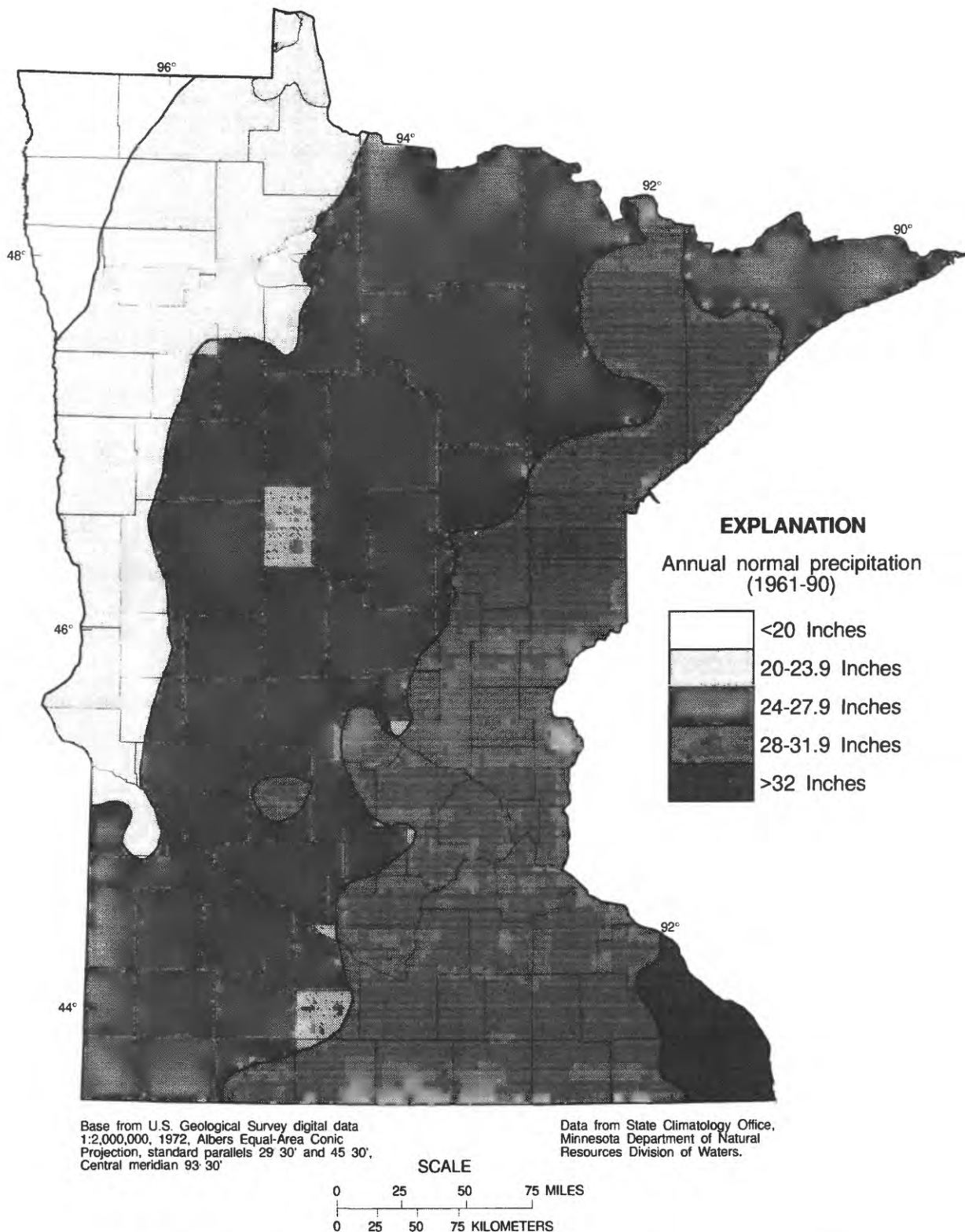


Figure 1.--Precipitation, in inches, during 1994 water year in Minnesota.



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

Surface Water

Figure 3 shows mean monthly and annual discharges for water year 1994 compared to normal (median of mean discharges for the period 1961-90) for seven stations. The stations are located in four major basins - Lake Superior, Red River of the North, Lake of the Woods, and the upper Mississippi River. The 1994 mean-annual discharges were greater than the medians in five of the seven stations.

Monthly-mean discharges in the Pigeon River at Middle Falls near Grand Portage were near normal in 1994. Discharges tended to be slightly below normal in the fall and winter and then increased to slightly above normal for most of the remaining year. The mean discharge for 1994 was 476 ft³/s, which is 90 percent of normal. Annual runoff was 10.78 inches, a decrease of 0.42 inches from the previous year.

Monthly-mean discharges in the Red Lake River at Crookston in the Red River of the North basin were below normal through June. Beginning in June, above-normal amounts of rain fell each month through the remainder of the water year with July having the greatest departure from normal. As a result, the mean discharge for July was 4375 ft³/s, 333 percent of normal. Above-average monthly flows continued through September. Water year 1994 ended with an average discharge of 1366 ft³/s, 95 percent of normal, and runoff of 3.51 inches.

Monthly-mean discharges in the Little Fork River at Littlefork in the Lake of the Woods basin were slightly above normal from October-March. Discharge decreased to 68 percent of normal in April and remained below normal through May. Above-normal rainfall in June and July increased the discharge to above normal for the rest of the water year. The discharge in July was 2505 ft³/s, 302 percent of normal. The annual mean discharge for 1994 was 1188 ft³/s, which is close to normal. Annual runoff for 1994 was 9.32 inches, an increase of 0.32 inches over the previous year.

In the Chippewa River near Milan, monthly flows were greater than normal for the entire year. Like the other three stations in the upper Mississippi River basin, higher than normal discharges in the fall and winter reflected the heavy rains that fell in the spring and summer of 1993. The mean discharge for October was 605 ft³/s compared to a normal discharge of 109 ft³/s. The month with the greatest departure from normal was March with a discharge of 1460 ft³/s, 616 percent of normal. Although the annual mean discharge of 758 ft³/s for 1994 is 249 percent of normal, it is 74 ft³/s less than the flow for the previous year.

Flows in the Des Moines River at Jackson in southwest Minnesota showed the effects from the heavy rains in 1993 and had higher than normal flows the entire year. The month with the greatest departure from normal was August with a discharge of 1104 ft³/s, 1306 percent of normal. The annual mean discharge of 874 ft³/s for 1994 is 363 percent of normal but is 1224 ft³/s less than the flow for the previous year.

Flows in the Crow River at Rockford, located about 30 miles west of the Twin Cities, also, showed the effects from the heavy rains in 1993 and had higher than normal flows the entire year. Flows for the first three months were 1050, 1180, and 1000 ft³/s, respectively, which were equal to or greater than 500 percent of normal. The annual mean discharge of 1420 ft³/s for 1994 is 172 percent of normal but is 817 ft³/s less than the flow for the previous year.

Flows in the Mississippi River at Aitkin were above normal for the entire year. Flows were slightly above normal from October-June. In July, flows began to respond to above-normal rainfall in north-central Minnesota, and July's discharge of 5380 ft³/s was 226 percent of normal. The annual discharge of 3382 ft³/s for 1994 is 123 percent of normal and is 217 ft³/s more than last year's.

The Minnesota River drains approximately 17,000 mi² that cover a large portion of western and southern Minnesota. The heavy rains in 1993 covered a large portion of this basin, and, as a result, base flows in the fall and winter were significantly above normal. In the Minnesota River near Jordan, about 40 miles southwest of the Twin Cities, monthly flows in the fall and winter were greater than 300 percent of normal. High flows continued in the Minnesota River near Jordan throughout 1994, and the year ended with a mean flow of 8665 ft³/s, 231 percent of normal; it was, however, about half as much as the mean flow in 1993.

In the Mississippi River at St. Paul, located 5.5 miles downstream from the mouth of the Minnesota River, monthly flows were above normal the entire year. The annual discharge of 20,120 ft³/s for 1994 is 149 percent of normal but is 8750 ft³/s less than the mean discharge for the previous year.

Flows in the Root River near Houston in southeast Minnesota were above normal during all months except March. Flow in October was 198 percent of normal and stayed well above normal through February. The rain that fell in southeast Minnesota on August 9-10, caused the flow in August to increase significantly where it would have otherwise followed a normal recession. The mean-annual discharge of 912 ft³/s for 1994 is greater than normal but is 678 ft³/s less than last year's mean.

Combined storage in the six Mississippi River Headwater Reservoirs (Winnibigoshish, Leech, Pokegama, Pine, Sandy, and Gull), in north-central Minnesota, was 1,583,068 acre-feet at the close of the 1994 water year. This was a decrease of 27,972 acre-feet from the close of last year.

Water Quality

Boxplots for five U.S. Geological Survey National Stream-Quality Accounting Network (NASQAN) stations are used to depict variability in concentrations of dissolved solids, and boxplots for six NASQAN stations are used to depict variability in concentrations of nitrate as nitrogen (figs. 4 and 5).

Boxplots display the central tendency, variation, and skewness of a data set as well as the presence or absence of extreme values. A boxplot consists of a centerline (the median) dividing a rectangle whose ends are defined by the 75th and 25th percentiles. Whiskers from the ends of the box to the most extreme observation within 1.5 times the interquartile range (the distance from the 25th to the 75th percentile values) beyond the ends of the box. Values more than 1.5 interquartile ranges from the box ends may indicate extreme hydrologic and chemical conditions or sampling and analytical errors. Observations from 1.5 to 3 interquartile ranges from the box in either direction are plotted individually with an open circle.

Dissolved-solids concentrations determined in 1994 were generally less than median for Baptism River near Beaver Bay and St. Louis River at Scanlon in the Lake Superior basin. Red Lake River at Crookston in the Red River of the North basin generally had concentrations of dissolved solids higher than the monthly medians in the fall and spring. Winter and summer concentrations were near the median. Rainy River at Manitou Rapids had concentrations of dissolved solids below the 25th percentile in the fall and winter, but the rest of the samples had concentrations near the median.

Nitrate concentrations reported as nitrogen (analyzed for nitrate plus nitrite, with nitrite concentration assumed to be negligible) were above the 75th percentile in the winter and below the 25th percentile in the spring and summer in the St. Louis River at Scanlon. In the Baptism River near Beaver Bay, nitrate concentrations were near the monthly medians in the fall and winter samples and below the medians in the spring and summer. Samples collected in the Rainy River at Manitou Rapids had concentrations near the median. At Red Lake River at Crookston, samples were collected for the National Water-Quality Assessment (NAWQA) Program as well as NASQAN. Nitrate concentrations fell above and below the monthly medians, but appear to average near the medians. Nitrate concentrations for all the stations shown in figure 5 were below 10 milligrams per liter.

Nine ground water wells were sampled in 6 counties. Nitrate concentrations were above the primary drinking-waters standard of 10 mg/L (Minnesota Pollution Control Agency, 1988) in a sample collected from a shallow well in Marshall County. Two samples were above the iron standard of 300 ug/L, and 1 sample was above the manganese standard of 50 ug/L.

Ground-Water Levels

The current observation-well network includes 15 wells, of which 12 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-Hinkley-Fond du Lac aquifer. Data from these wells are presented in this volume. The location of these wells is shown in figure 10.

Surficial Sand Aquifers

In unconfined surficial aquifers throughout Minnesota, water levels declined from the beginning of the water year until spring recharge began in March 1994; then increased from March through July 1994; followed by a slight decline from July to the end of September 1994. Water levels at well 460444094212501 in Morrison County, in the northern part of the state, declined from 11.68 feet below land-surface datum on October 1, 1993, to 13.17 feet below land-surface datum on March 11, 1994. Water levels rose from 13.17 feet below land-surface datum on March 11, 1994 to 10.69 feet below land-surface datum on July 1, 1994. From July 1, 1994, till the end of the water year water levels fluctuated between 10.28 and 10.70 feet below land-surface datum. Water levels in well 440037094372601 in Watonwan County in the southern part of the state declined from 7.4 feet below land-surface datum in October 1993 to 9.21 feet below the land-surface datum in February 1994, continuing a decline in water levels that started in June 1993. Water levels fluctuated from 8.57 to 9.06 feet below land-surface datum from March through September 1994. The water levels in these two observation wells are unaffected by pumping from nearby wells. Water levels in well 465237096383901 in Clay County, affected by pumping from nearby wells, fluctuated between 30.12 and 30.87 feet below land-surface datum from October 1993 to March 1994. Water levels fluctuated between 31.03 to 32.19 feet below land-surface datum from May 1994 to July 1994, a period when large volumes of water are pumped from the aquifer.

St. Peter Aquifer

Water levels from well 450116093205301 in Hennepin County in the Twin Cities Metropolitan Area ranged from a high of 27.58 feet below the land-surface datum on January 31, 1994, to a low of 41.06 feet below the land surface datum on August 5, 1994. Water levels declined in October 1993 from about 31 to 28 feet below land-surface datum. From November 1993 to March 1994, water levels fluctuated

between 28 and 29 feet below land-surface datum. From April to May 1994, the range of water-level fluctuations increased from 29-31 feet below the land-surface datum to 31-35 feet below the land-surface datum. During June, July, and August 1994, water levels fluctuated between 33 and 41 feet below land-surface datum. In September 1994, water levels rose, fluctuating between 31 and 33 feet below land-surface datum.

Prairie du Chien-Jordan Aquifer

Water levels in the Prairie du Chien-Jordan aquifer were measured in four counties in the Twin Cities Metropolitan Area; Anoka, Dakota, Ramsey, and Hennepin. Water levels in well 450927093033802 in Anoka County, affected by discharge from nearby flowing wells, rose slightly in October and November 1993 from 8.40 to 8.05 feet below land-surface datum, and fluctuated from 7.71 to 8.73 feet below land-surface datum from December 1993 to the beginning of May 1994. Between the beginning of May and the end of June, water levels declined from 7.71 to 10.74 feet below land-surface datum. From July to end of September 1994, water levels rose from 10.74 to 9.27 feet below land-surface datum. Regional pumping for irrigation and municipal supply affected water levels in Dakota County. Water levels in well 445330093054301 rose between 1 and 2 feet from the beginning of October 1993 to the beginning of April 1994, then declined about 8 feet from April to August 1994, and rose about 5 feet from August through September 1994. In Hennepin County, the recorded water levels are affected by regional pumping for municipal use. Water levels rose 1.00 to 3.13 feet between October 1993 and February to April 1994. Water levels declined from 4.64 to 11.43 feet between February-April and August 1994. Water levels rose from 3.16 to 8.74 feet between August and the end of September 1994. In Ramsey County, the recorded water levels are affected by pumping for municipal supply and air conditioning. Water levels in well 450238093082501, affected by pumping for municipal supply, rose from 134.04 to 131.94 below land surface datum from October 1993 to April 1994. Between April and August 1994, water levels declined from 131.94 to 138.54 feet below land-surface datum. Water levels recovered to 137.37 feet below land-surface datum by the end of September 1994. Water levels in well 445700093051001, affected by pumping for air-conditioning use, rose from 45.45 to 26.08 feet below land-surface datum between October 1993 and April 1994. Water levels declined from 26.08 to 65.34 feet below land-surface datum between April and September 1994, and rose to 53.70 feet below land-surface datum by the end of September.

Franconia-Ironton-Galesville Aquifer

Water levels in the Ironton-Galesville part of the Franconia-Ironton-Galesville aquifer were monitored at two wells. At well 444427093353902 in Scott County in the Twin Cities Metropolitan Area, levels ranged from a high of 20.10 feet below land-surface datum on February 5, 1994 to a low of 26.58 feet below land-surface datum on August 25, 1994. During the water year, water levels rose from 24.76 feet below land-surface datum on October 5, 1993 to 20.66 feet below land-surface datum on November 20, 1993. Between November 20, 1993 and February 15, 1994, water levels fluctuated less than one foot - remaining between 20.10 and 20.72 feet below land-surface datum. Water levels at well 44050094102801 in Blue Earth County generally declined during the water year from the record-high water level of 71.25 feet below land-surface datum on July 4, 1993. Water levels over the water year declined from about 72.1 to about 73.4 feet below land surface datum.

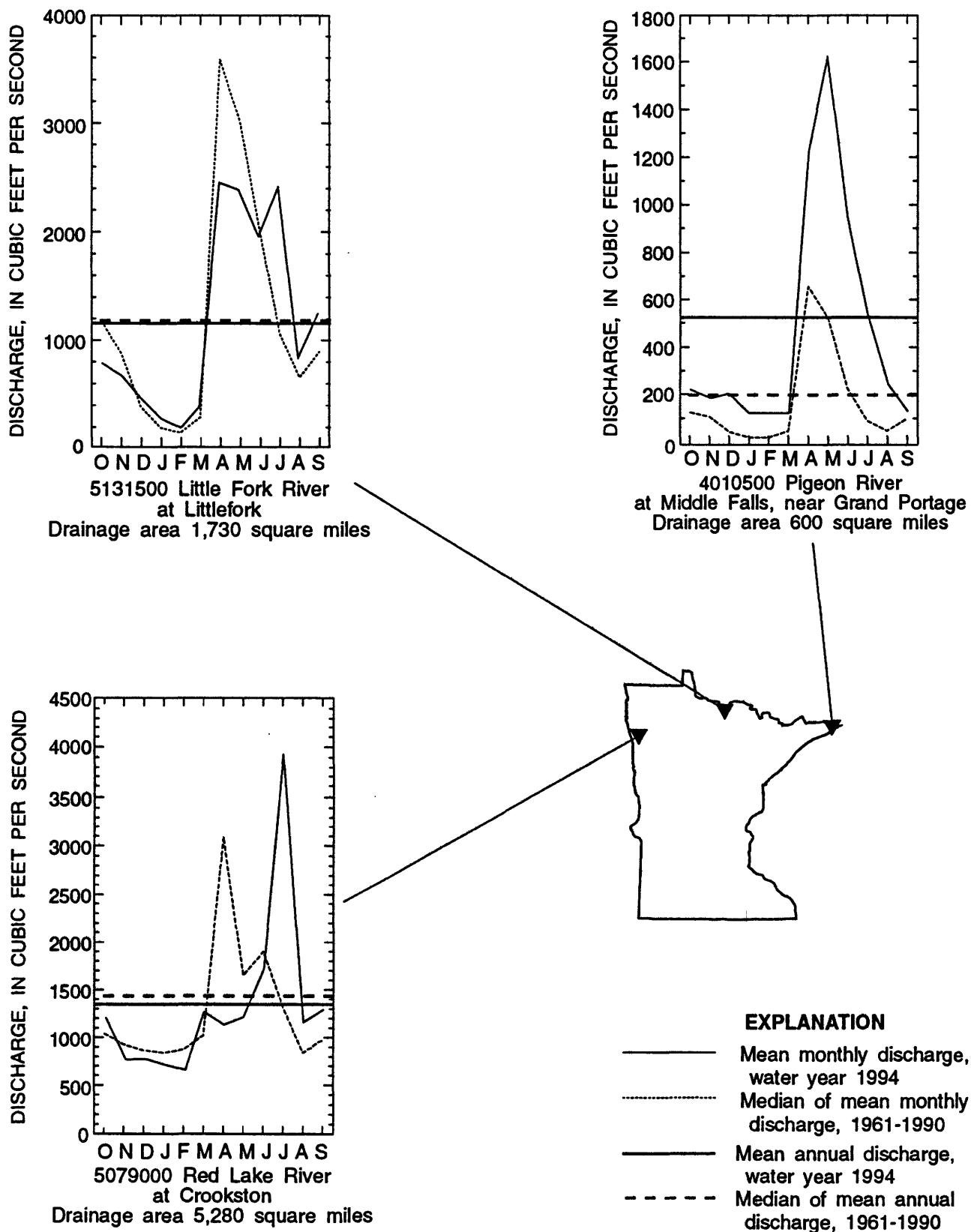
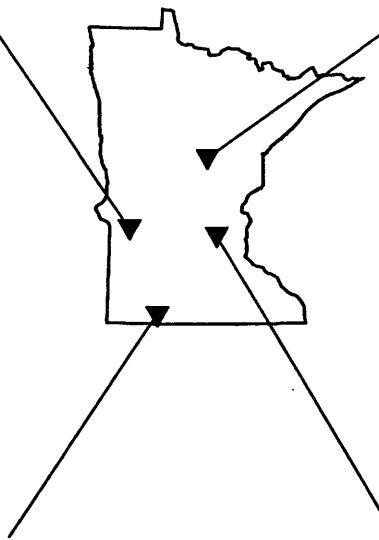
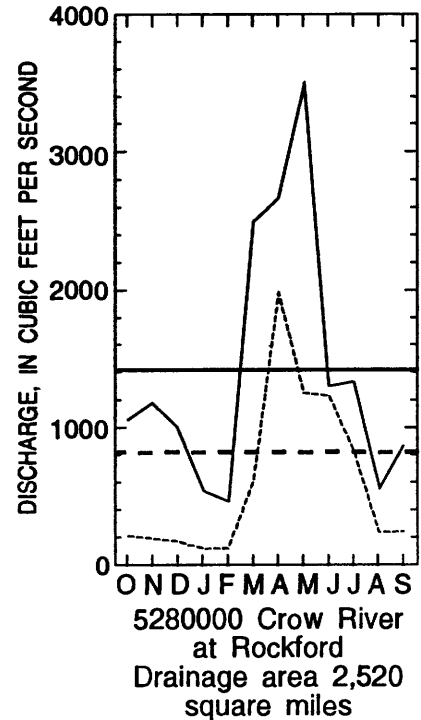
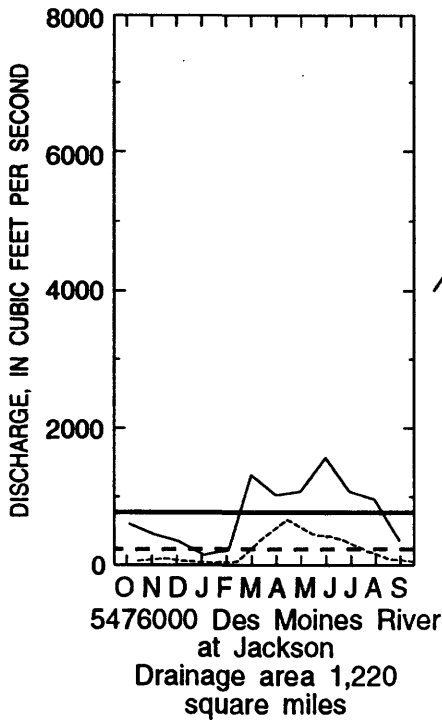
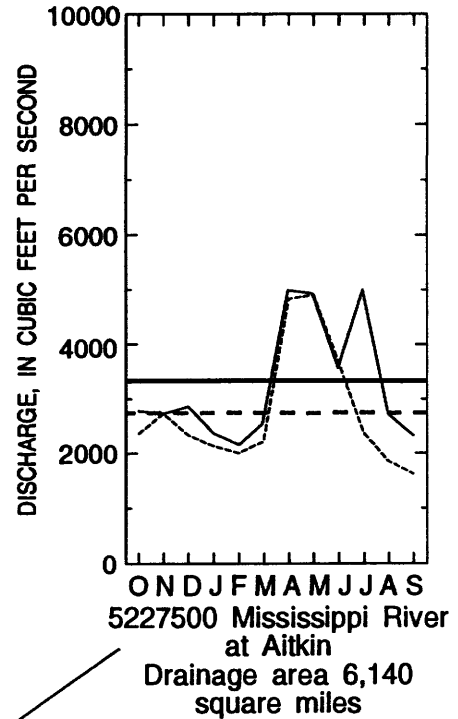
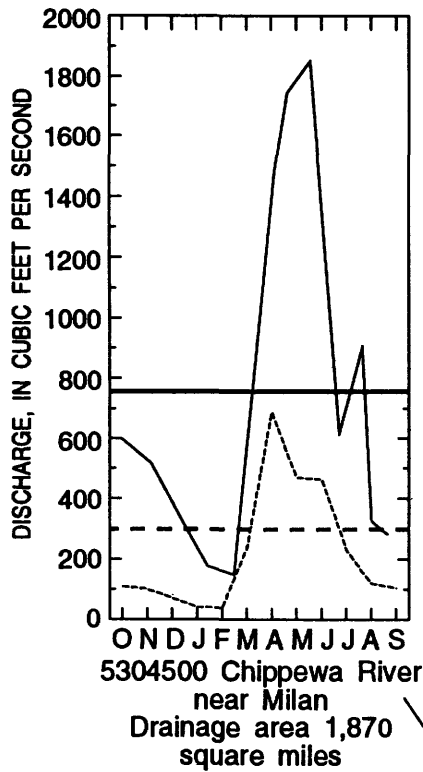


Figure 3.—Comparison of mean discharge for the 1994 water year with the median



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

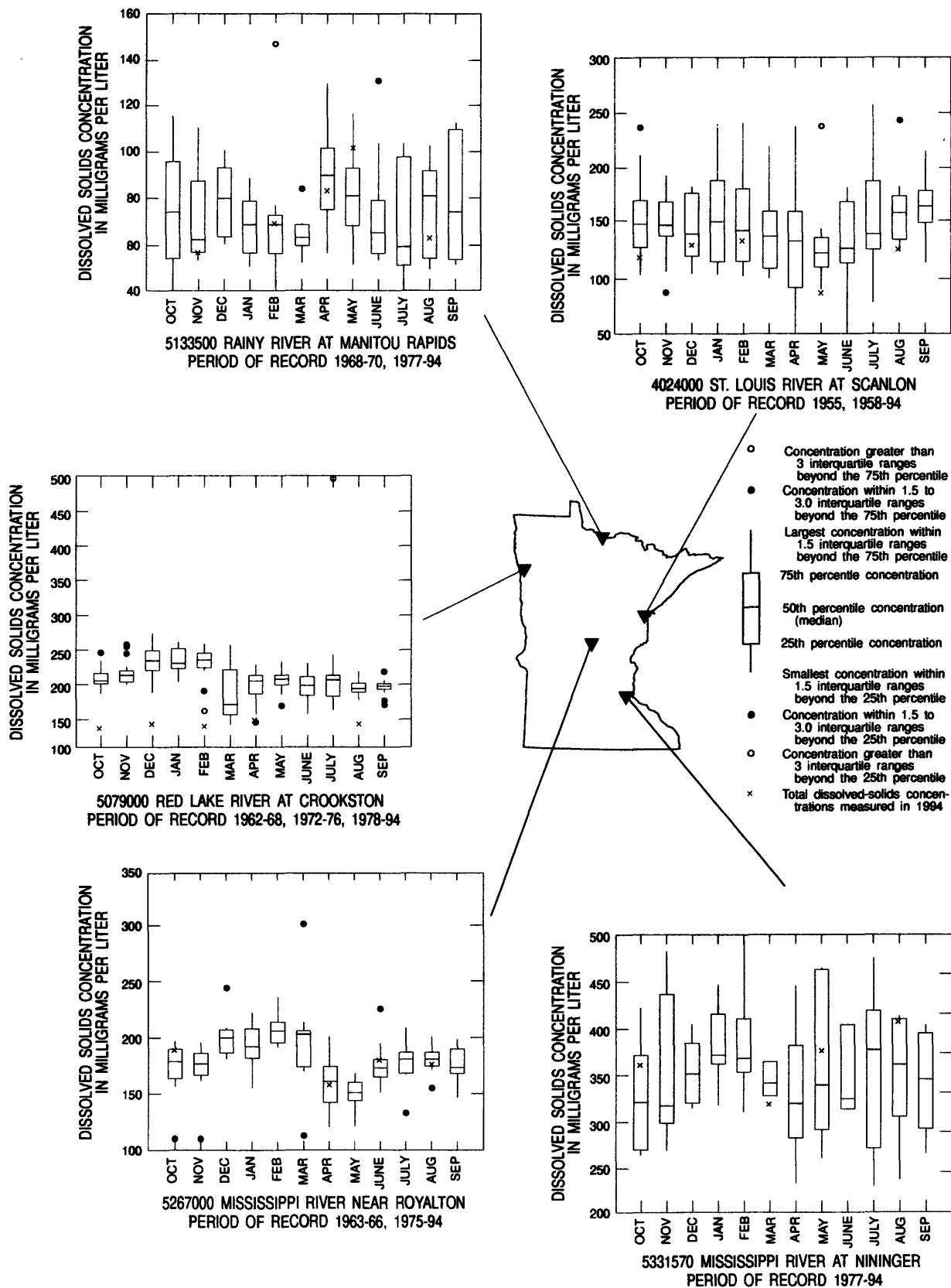


Figure 4--Dissolved-solids concentrations in samples collected during water year 1994 and selected statistics for period of record at five national network stations.

Mount Simon-Hinckley-Fond du Lac Aquifer

Water levels in an observation well in the Mount Simon part of the Mount Simon-Hinckley-Fond du Lac aquifer ranged from a high of 41.87 feet below land-surface datum on March 15, 1994 to a low of 50.90 feet below the land-surface datum on August 10, 1994. During water year 1994, water levels rose from 45.50 feet below land-surface datum on October 5, 1993 to 41.87 feet below land-surface datum on March 15, 1994. Water levels remained between about 42 and 43 feet below land-surface datum from March 15 to May 15, 1994. From May 15 to August 20, 1994, water levels declined from 42.90 to 50.59 feet below land-surface datum. Water levels recovered from August 20 to September 25, 1994, rising from 50.59 to 49.35 feet below land-surface datum.

SPECIAL NETWORKS AND PROGRAMS

Hydrologic Bench-Mark Network is a network of 53 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) is a nation-wide data-collection network designed by the U.S. Geological Survey to meet many of the information needs of government agencies and other groups involved in natural or regional water-quality planning and management. The 500 or so sites in NASQAN are generally located at the downstream ends of the hydrologic accounting units designated by the U.S. Geological Survey Office of Water Data Coordination in consultation with the Water Resources Council.* The objectives of NASQAN are (1) to obtain information on the quality and quantity of water moving within and from the United States through a systematic and uniform process of data collection, summarization, analysis, and reporting such that the data may be used for, (2) description of the areal variability of water quality in the Nation's rivers through analysis of data from this and other programs, (3) detection of changes or trends with time in the pattern of occurrence of water-quality characteristics, and (4) providing a nationally consistent data base useful for water quality assessment and hydrologic research.

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

The National Water-Quality Assessment (NAWQA) Program of the U.S. Geological Survey is a long-term program with goals to describe the status and trends of water-quality conditions for a large, diverse, and geographically distributed part of the Nation's ground- and surface-water resources, and to identify, describe, and explain the major natural and human factors that affect these observed conditions and trends.

Assessment activities have begun in about two-thirds of the study units and ultimately will be conducted in 60 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.

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

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

EXPLANATION OF THE RECORDS

The surface-water and ground-water records published in this report are for the 1994 water year that began October 1, 1993, and ended September 30, 1994. 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 locations of the stations and wells where the data were collected are shown in figures 7, 8, 9 and 10. The following sections of the introductory text are presented to provide users with a more detailed explanation of how the hydrologic data published in this report were collected, analyzed, computed, and arranged for presentation.

STATION IDENTIFICATION NUMBERS

Each data station, whether streamsite or well, in this report is assigned a unique identification number. This number is unique in that it applies specifically to a given station and to no other. The number usually is assigned when a station is first established and is retained for that station indefinitely. The system used by the U.S. Geological Survey to assign identification numbers for surface-water stations and for ground-water well sites differ, but both are based on geographic location. The "downstream order" system is used for regular surface-water stations and the "latitude-longitude" system is used for wells 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 U.S. Geological Survey 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 main-stream sections is listed between them. A similar order is followed by listing stations on first rank, second rank, and other 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 indentation show which stations are on tributaries between any two stations and the rank of the tributary on which each station is situated.

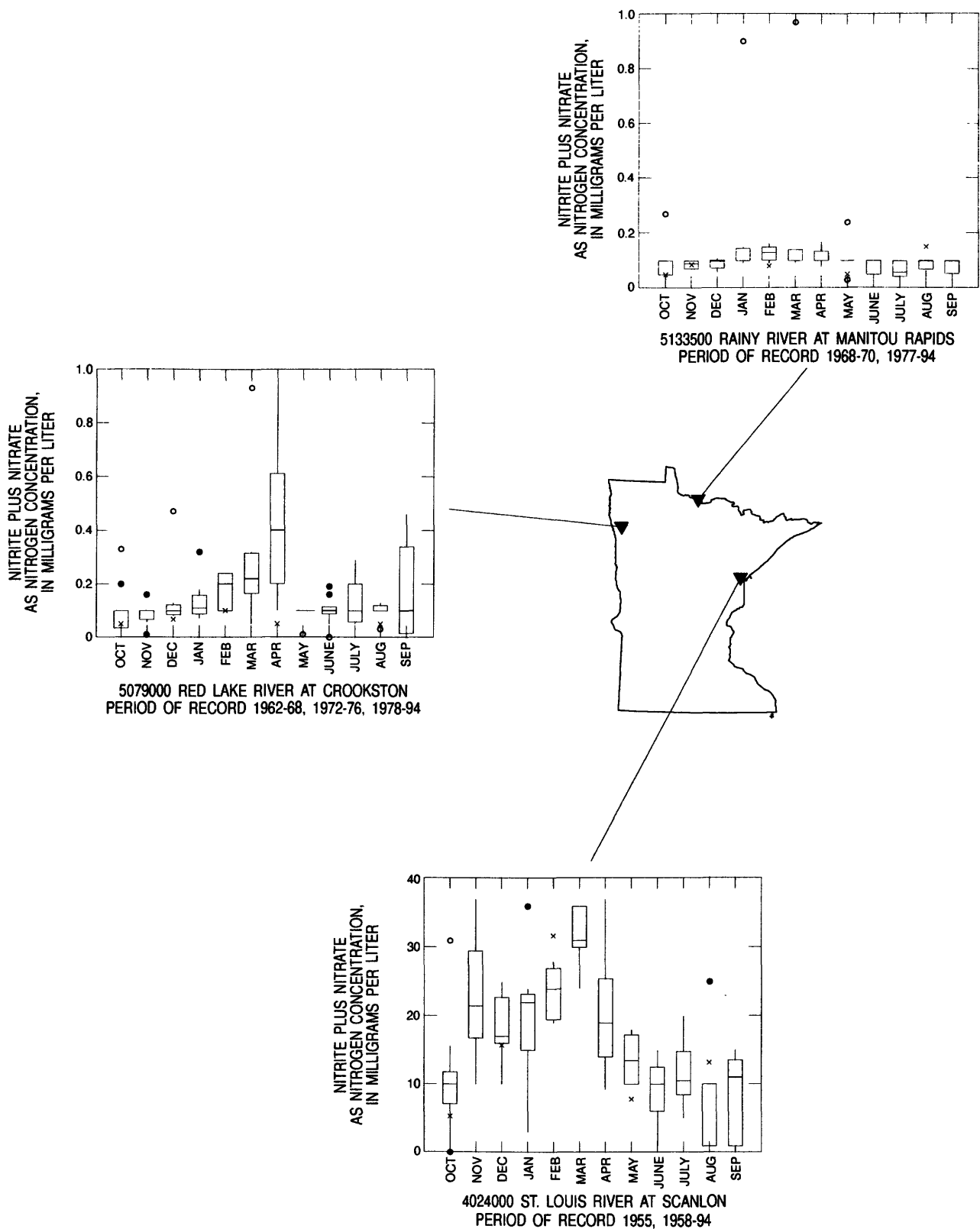
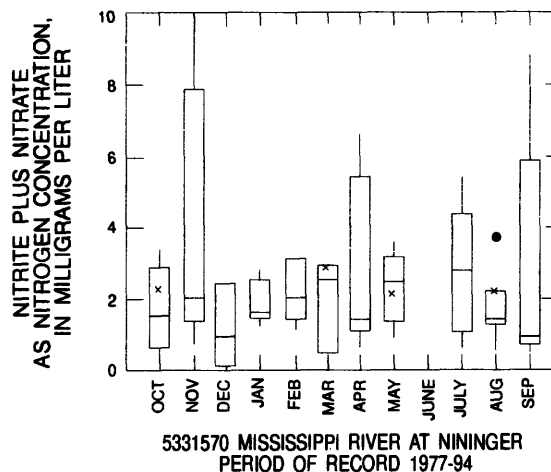
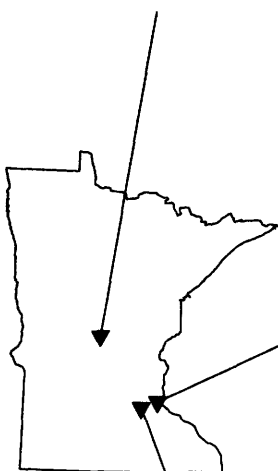
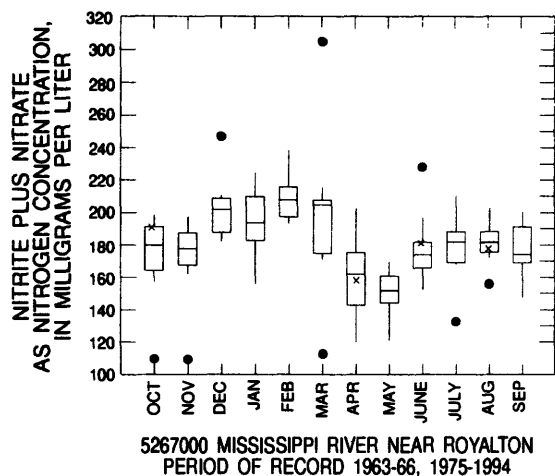
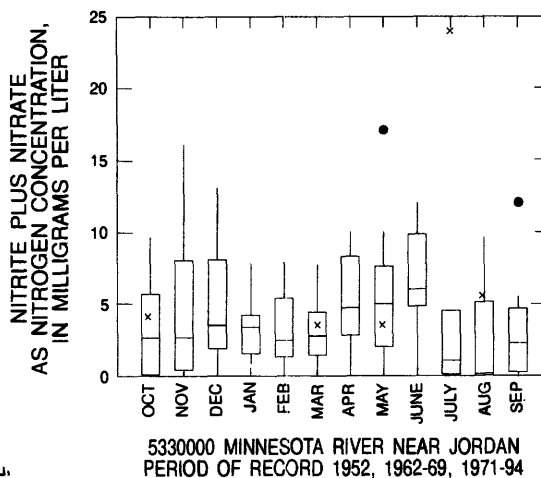


Figure 5—Nitrite plus nitrate concentrations in samples collected during water year



- Concentration greater than 3 interquartile ranges beyond the 75th percentile
- Concentration within 1.5 to 3.0 interquartile ranges beyond the 75th percentile
- Largest concentration within 1.5 interquartile ranges beyond the 75th percentile
- 75th percentile concentration
- 50th percentile concentration (median)
- 25th percentile concentration
- Smallest concentration within 1.5 interquartile ranges beyond the 25th percentile
- Concentration within 1.5 to 3.0 interquartile ranges beyond the 25th percentile
- Concentration greater than 3 interquartile ranges beyond the 25th percentile
- x Total nitrite plus nitrate concentrations as nitrogen measured in 1994



1994 and selected statistics for period of record at six national network stations.

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 U.S. Geological Survey 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 6. 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.

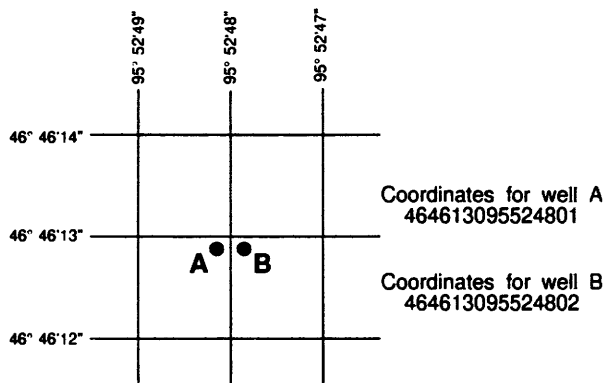


Figure 6. Example of system for numbering wells and miscellaneous sites.

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 any-time, or any period of time, during the period of record. Complete records of lake or reservoir content, similarly, are those for which stage or content may be computed or estimated with reasonable accuracy for any time, or period of time. They may be obtained using a continuous stage-recording device, but need not be. Because daily mean discharges and end-of-day contents commonly are published for such stations, they are referred to as "daily stations".

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 complete-record and high-flow partial-record stations for which data are given in this report are shown in figures 7 and 9.

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 relationships 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 relationship 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 mediums. Measurements of discharge are made with current meters using methods adapted by the U.S. Geological Survey as a result of experience accumulated since 1880. These methods are described in standard textbooks, in Water-Supply Paper 2175, and in U.S. Geological Survey Techniques of Water-Resources Investigations, Book 3, Chapter A6.

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

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

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

In computing records of lake or reservoir contents, it is necessary to have available from surveys, curves, or tables defining the relationship of stage and content. The application of stage to the stage-content curves or tables gives the contents from which daily, monthly, or yearly changes then are determined. If the stage-content relationship changes because of deposition of sediment in a lake or reservoir, periodic resurveys may be necessary to redefine the relationship. 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 relationships 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 U.S. Geological Survey 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 U.S. Geological Survey.

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

Although rare, occasionally the records of a discontinued gaging station may need revision. Because, for these stations, there would be no current or, possibly, future station manuscript published to document the revision in a "Revised Records" entry, users of data for these stations who obtained the record from previously published data reports may wish to contact the 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.

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 figure 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 ft³/s; to the nearest tenth between 1.0 and 10 ft³/s; to whole numbers between 10 and 1000 ft³/s; and to 3 significant figures for more than 1000 ft³/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 U.S. Geological Survey. 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 once 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, because of costs, most data are obtained only monthly or less frequently. Locations of stations for which records on the quality of surface water appear in this report are shown in figure 9.

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 "Techniques of Water-Resources Investigations," Book 1, Chap. D2; Book 3, Chap. C2; Book 5 Chap. A1, A3, and A4. All of these references are listed on p. of this report. Also, detailed information on collecting, treating, and shipping samples may be obtained from the Geological Survey 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 U.S. Geological Survey Minnesota District office whose address is given on the back of the title page of this report.

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, Colo., Doraville, Ga., or Iowa City, Ia. Methods used in analyzing sediment samples and computing sediment records are given in Transactions of Water Resources Investigations (TWRI), Book 5, Chap. C1. Methods used by the U.S. Geological Survey laboratories are given in TWRI, Book 1, Chap. D2; Book 3, Chap. C2; Book 5, Chap. A1, A3, and A4.

Data Presentation

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

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

REVISIONS.--If errors in published water-quality records are discovered after publication, appropriate updates are made to the Water-Quality File in the U.S. Geological Survey's computerized data system, WATSTORE, and subsequently by monthly transfer of update transactions to the U.S. Environmental Protection Agency's STORET system. Because the usual volume of updates makes it impractical to document individual changes in the State data-report series or elsewhere, potential users of U.S. Geological Survey water-quality data are encouraged to obtain all required data from the appropriate computer file to insure the most recent updates.

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

Remark Codes

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

<u>CODE</u>	<u>REMARK</u>
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)
&	Biological organism estimated as dominant

Dissolved Trace-Element Concentrations

Traditionally, dissolved trace-element concentrations have been reported at the microgram per liter ($\mu\text{g/L}$) 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 and 100's of nanograms per liter (ng/L). Present data above the $\mu\text{g/L}$ level should be used with caution. Such data may actually represent elevated environmental concentrations from natural or human causes; however, these data could reflect contamination introduced during sampling, processing, or analysis. To confidently produce dissolved trace-element data with insignificant contamination, the U.S. Geological Survey will begin using new trace-element protocols in water year 1994. Full implementation of the protocols will take place during the 1995 water year.

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 may not be comparable. A summary of differences for data before and after Jan. 11 can be obtained from the NADP/NTN Coordination Office, Colorado State University, Fort Collins, CO 80523 (Telephone: 303-491-5643).

RECORDS OF GROUND-WATER LEVELS

Only water-level data from a national network of observation wells are given in this report. These data are intended to provide a sampling and historical record of water-level changes in the Nation's most important aquifers. Locations of the observation wells in this network in Minnesota are shown in figure 10.

Although, in this report, records of water levels are presented for fewer than 20 wells, records are obtained through cooperative efforts of many Federal, State, and local agencies for several hundred observation wells throughout Minnesota and are placed in computer storage. Each spring, the Minnesota Department of Natural Resources, Division of Waters publishes a report for the previous water year entitled "Observation Well Data Summary, Water Year 19__." This report contains hydrographs of recorder wells, detailed maps showing the location of active observation wells, and other useful items. Information about the availability of the data in the water-level file may be obtained from the District Chief, Minnesota District. (See address on back of front page).

Data Collection and Computation

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

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

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

All water-level measurements are reported to the nearest hundredth of a foot. The error of water-level measurements is normally only a hundredth or a few hundredths of a foot.

Hydrographs showing water-level fluctuations are included for all of the representative wells in both the surficial-sand and bedrock aquifers.

Data Presentation

Each well record consists of two parts, the station description and the data table of water levels observed during the water year. In addition a graph of water levels for the current year or other selected period is included for several representative wells. The description of the well is presented first through use of descriptive headings preceding the tabular data. The comments to follow clarify information presented under the various headings.

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

AQUIFER.-- This entry designates by name (if a name exists) and geologic age the aquifer(s) open to the well.

WELL CHARACTERISTICS.--This entry describes the well in terms of depth, diameter, casing depth and/or screened interval, method of construction, use, and includes additional information such as casing breaks, collapsed screen, and other changes since construction.

INSTRUMENTATION.--This paragraph provides information on both the frequency of measurement and the collection method used, allowing the user to better evaluate the reported water-level extremes by knowing whether they are based on weekly, monthly, or some other frequency of measurement.

DATUM.--This entry describes both the measuring point and the land-surface elevation at the well. The measuring point is described physically (such as top of collar, notch in the top of casing, plug in pump base and so on), and in relation to land surface (such as 1.3 ft above land-surface datum). The elevation of the land-surface datum is described in feet above (or below) sea level; it is reported with a precision depending on the method of determination.

REMARKS.--This entry describes factors that may influence the water level in a well or the measurement of the water level. It should identify wells that are also water-quality observation wells, and may be used to acknowledge the assistance of local (non-U.S. Geological Survey) observers.

PERIOD OF RECORD.--This entry indicates the period for which there are published records for the well. It reports the month and year of the start of the publication of water-level records by the U.S. Geological Survey and the words "to current year" if the records are to be continued into the following year. Periods for which water-level records are available, but are not published by the U.S. Geological Survey, may be noted.

EXTREMES FOR THE PERIOD OF RECORD.--This entry contains the highest and lowest water levels of the period of published record, with respect to land-surface datum, and the dates of their occurrence.

A table of water levels follows the station description for each well. Water levels are reported in feet below land-surface datum and all taped measurements of water level are listed. For wells equipped with recorders, abbreviated tables are published; generally, only water-level lows are listed for every fifth day and at the end of the month (eom). The highest and lowest water levels of the water year and their dates of occurrence are shown on a line below the

abbreviated table. Because all values are not published for wells with recorders, the extremes may be values that are not listed in the table. Missing records are indicated by dashes in place of the water level. A hydrograph for a selected period of record follows the water-level table for several representative wells.

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 a following page. The values reported in this report represent water-quality conditions at the time of sampling as much as possible, consistent with available sampling techniques and methods of analysis. All samples were obtained by trained personnel. The wells sampled were pumped long enough to assure that the water collected came directly from the aquifer and had not stood for a long time in the well casing where it would have been exposed to the atmosphere and to the material, possibly metal, comprising the casings.

Data Presentation

The records of ground-water quality are published in the section titled QUALITY OF GROUND WATER, immediately following the ground-water-level records. 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 WATSTORE DATA

The U.S. Geological Survey is the principal Federal water-data agency and, as such, collects and disseminates about 70 percent of the water data currently being used by numerous State, local, private, and other Federal agencies to develop and manage our water resources. As part of the U.S. Geological Survey's program of releasing water data to the public, a large-scale computerized system has been developed for the storage and retrieval of water data collected through its activities. The National Water Data Storage

and Retrieval System (WATSTORE) was established in 1972 to provide an effective and efficient means for the processing and maintenance of water data collected through the activities of the U.S. Geological Survey and to facilitate release of the data to the public. A variety of useful products, ranging from data tables to complex statistical analyses such as Log Pearson Type III, can be produced using WATSTORE. The system resides on the central computer facilities of the U.S. Geological Survey at its National Center in Reston, Virginia, and consists of related files and data bases.

- Station Header File - Contains descriptive information on more than 440,000 sites throughout the United States and its territories where the U.S. Geological Survey collects or has collected data.
- Daily Values File - Contains more than 220 million daily values of stream flows, stages, reservoir contents, water temperature, specific conductances, sediment concentrations, sediment discharges, and ground-water levels.
- Peak Flow File - Contains approximately 500,000 maximum (peak) streamflow and gage-height values at surface-water sites.
- Water Quality File - Contains approximately 2 million analyses of water samples that describe the chemical, physical, biological, and radio-chemical characteristics of both surface and ground water.
- Ground-Water Site Inventory Data Base - Contains inventory data for more than 900,000 wells, springs, and other sources of ground water. The data includes site location, geohydrologic characteristics, well-construction history, and one-time field measurements such as water temperature.

In 1976, the U.S. Geological Survey opened WATSTORE to the public for direct access. The signing of a Memorandum of Agreement with the Survey is required to obtain direct access to WATSTORE. The system can be accessed either synchronously or asynchronously. The requester will be expected to pay all computer costs incurred. Direct access may be obtained by contacting:

U.S. Geological Survey
National Water Data Exchange
421 USGS National Center
Reston, Virginia 22092

In addition to providing direct access to WATSTORE, data can be provided in various machine-readable formats on magnetic tape or floppy disk; and, as noted in the introduction, on CD-ROM discs. Beginning with the 1990 water year, all water-data reports are also be available on Compact disc - Read Only Memory (CD-ROM). All data reports published for the current water year for the entire Nation, including Puerto Rico and the Trust Territories, will be reproduced on a single CD-ROM disc. 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's District offices. (See address on the back of the title page.) A limited number of CD-ROM discs will be available for sale by the U.S. Geological Survey, Branch of Information Services, Box 25286, Federal Center, Denver, Colorado 80225.

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 inch-pound units to International System of units (SI) on the inside of back cover.

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

Adenosine triphosphate (ATP) is the primary energy donor in cellular life process. Its central role in living cells makes it an excellent indicator of the presence of living material in water. A measure of ATP, therefore, provides a sensitive and rapid estimate of biomass. ATP is reported in micrograms per liter of the original water sample.

Algae are mostly aquatic single-celled, colonial, or multi-celled 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.

Aquifer is a geologic formation, group of formations, or part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs.

Artesian means confined and is used to describe a well in which the water level stands above the top of the aquifer tapped by the well. A flowing artesian well is one in which the water level is above the land surface.

Bacteria are microscopic unicellular organisms, typically spherical, rodlike, or spiral and threadlike in shape, often clumped into colonies. Some bacteria cause disease, 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. They are characterized as aerobic or facultative anaerobic, gram-negative, nonspore-forming, rod-shaped bacteria which ferment lactose with gas formation within 48 hours at 35°C. In the laboratory these bacteria are defined as the organisms which produce colonies with a golden-green metallic sheen within 24 hours when incubated at 35°C \pm 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 warmblooded animals. They are often used as indicators of the sanitary quality of the water. In the laboratory they are defined as all organisms which produce blue colonies within 24 hours when incubated at 44.5°C \pm 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 also found in the intestine of warmblooded animals. Their presence in water is considered to verify fecal pollution. They are characterized as gram-positive, cocci bacteria which are capable of growth in brain-heart infusion broth. In the laboratory they are defined as all the organisms which produce red or pink colonies within 48 hours at 35°C \pm 1.0°C on M-FS medium

(nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

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

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 the 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. The ash mass values of zooplankton and phytoplankton are 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 weight of residue present after drying in an oven at 60°C for zooplankton and 105°C for periphyton, until the mass remains unchanged. This mass represents the total organic matter, ash and sediment, in the sample. Dry mass values are 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 the ash mass, and represents the actual mass of the living matter. The 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.

Bottom material: See Bed Material.

Cells/volume refers to the number of cells or any organism which is counted by using a microscope and grid or counting cell. Many planktonic organisms are multicelled and are counted according to the number of contained cells per sample, usually milliliters (mL) or liters (L).

Cfs-day 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, approximately 1.9835 acre-feet, or about 646,000 gallons or 2,447 cubic meters.

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 natural water color 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 pigments in plants.

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

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.

Control designates a feature downstream from the gage that determines the stage-discharge relation at the gage. This feature may be a natural constriction of the channel, an artificial structure, or a uniform cross section over a long reach of the channel.

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 that the runoff is distributed uniformly in time and area.

Cubic foot per second (FT³/s, ft³/s) is the rate of discharge representing a volume of 1 cubic foot passing a given point during 1 second and is equivalent to approximately 7.48 gallons per second or 448.8 gallons per minute or 0.02832 cubic meters per second.

Discharge is the volume of water (or more broadly, volume of fluid plus suspended sediment), that passes a given point within a given period of time.

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

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

Annual 7-day minimum is 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.)

Dissolved refers to the amount of substance present in true chemical solution. In practice, however, the term includes all forms of substance that will pass through a 0.45-micrometer membrane filter, and thus may include some very small (colloidal) suspended particles. Analyses are performed on filtered samples.

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 the 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 0.492 to reflect the change.

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

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

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 stream at a specified location is that area, measured in a horizontal plane, enclosed by a topographic divide from which direct surface runoff from precipitation normally drains by gravity into the river above the specified point. Figures of drainage area given herein include all closed basins, or noncontributing areas, within the area unless otherwise noted.

Drainage basin is a part of the surface of the earth that is occupied by a drainage system, which consists of a surface stream or a body of impounded surface water together with all tributary surface streams and bodies of impounded surface water.

Gage height (G.H.) is the water-surface elevation referred to some arbitrary 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 particular site on a stream, canal, lake, or reservoir where systematic observations of hydrologic data are obtained.

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 equivalent calcium carbonate (CaCO₃).

Hydrologic unit is a geographic area representing part or all of a surface drainage basin or distinct hydrologic feature as delineated by the Office of Water Data Coordination on the State Hydrologic Unit Maps; each hydrologic unit is identified by an 8-digit number.

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 substance (MBAS) is a measure of apparent detergents. This determination depends on the formation of a blue color when methylene blue dye reacts with synthetic detergent compounds.

Micrograms per gram (UG/G, ug/g) is a unit expressing the concentration of a chemical element as the mass (micrograms) of the element sorbed per unit mass (gram) of sediment.

Micrograms per kilogram (MG/KG, mg/kg) is a unit expressing the concentration of a chemical element as the mass (micrograms) of the element sorbed per unit mass (kilogram) of sediment.

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

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

National Geodetic Vertical Datum of 1929 (NGVD) is a geodetic datum derived from a general adjustment of the first order level nets of both 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.

National Stream Quality Accounting Network (NASQAN) is a nationwide data-collection network designed by the U.S. Geological Survey to meet many of the information needs of government agencies and other groups involved in natural or regional water-quality planning and management. The 500 or so sites in NASQAN are generally located at the downstream ends of hydrologic accounting units designated by the U.S. Geological

Survey Office of Water Data Coordination in consultation with the Water Resources Council. The objectives of NASQAN are (1) to obtain information on the quality and quantity of water moving within and from the United States through a systematic and uniform process of data collection, summarization, analysis, and reporting such that the data may be used for, (2) description of the areal variability of water quality in the Nation's rivers through analysis of data from this and other programs, (3) detection of changes or trends with time in the pattern of occurrence of water-quality characteristics, and (4) providing a nationally consistent data base useful for water-quality assessment and hydrologic research.

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

Organism is any living entity, such as an insect, phytoplankton, or zooplankton.

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 meters (m^2), acres, or hectares. 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 milliliters (mL) or liters (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.

Parameter code numbers are unique five-digit code numbers assigned to each parameter placed into storage. These codes are assigned by the Environmental Protection Agency and are also used to identify data exchanged among agencies.

Partial-record station is a particular site where limited streamflow and (or) water-quality data are collected systematically over a period of years for use in hydrologic analyses.

Particle size is the diameter, in millimeters (mm), of suspended sediment or bed material determined by either sieve or sedimentation methods. Sedimentation methods (pipet, bottom-withdrawal tube, visual-accumulation tube) determine fall diameter of particles in distilled water (chemically dispersed).

Particle-size classification used in this report agrees with recommendations made by the American Geophysical Union Subcommittee on Sediment Terminology.

The classification is as follows:

Classification	Size (mm)	Method of analysis
Clay	00024- 0.004	Sedimentation
Silt	004 - .062	Sedimentation
Sand	.062 - 2.0	Sedimentation or 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 material is removed and the sample is subjected to mechanical and chemical dispersion before analysis in distilled water.

Percent composition 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, mass or volume.

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

Pesticides are chemical compounds used to control undesirable plants and animals. Major categories of pesticides include insecticides, miticides, fungicides, herbicides, and rodenticides. Insecticides and herbicides, which control insects and plants respectively, are the two categories reported.

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.

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 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/mL of sample.

Green algae have chlorophyll pigments similar in color to those of higher green plants. Some forms produce algal mats or floating "moss" in lakes. Their concentrations are expressed as number of 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 (PCBs) are industrial chemicals that are mixtures of chlorinated biphenyl compounds having various percentages of chlorine. They are similar in structure to organo-chlorine insecticides.

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 by the plants (carbon method).

Milligrams of carbon per area or volume per unit time [$mg\ C/(m^2 \cdot time)$ for periphyton and macrophytes and $mg\ C/(m^3 \cdot time)$ for phytoplankton] are units for expressing

primary productivity. They define 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.

Milligrams of oxygen per area or volume per unit time [$\text{mg O}_2/(\text{m}^2 \cdot \text{time})$ for periphyton and macrophytes and $\text{mg O}_2/(\text{m}^3 \cdot \text{time})$ for phytoplankton] are the units for expressing primary productivity. They define 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.

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

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 only 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.

Return period is the average time interval between occurrences of a hydrological event of a given or greater magnitude, usually expressed in years. May also be called recurrence interval.

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

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 of the first-order level nets of both the United States and Canada, formerly called Sea Level Datum of 1929.

Sediment is solid material that originates mostly from disintegrated rocks and is transported by, suspended in, or deposited from water; it 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 precipitation.

Bed load is the sediment that is transported in a stream by rolling, sliding, or skipping along the bed and very close to it. In this report, bed load is considered to consist of particles in transit within 0.25 ft of the streambed.

Bed load discharge (tons per day) is the quantity of bed load measured by dry weight that moves past a section as bed load in a given time.

Suspended sediment is the sediment that at any given time 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).

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

Suspended-sediment discharge (tons/day) is the rate at which dry weight of sediment passes a section of a stream or is the quantity sediment, as measured by dry weight or volume, that passes a section in a given time. It is computed by multiplying discharge times mg/L times 0.0027.

Suspended-sediment load is quantity of suspended sediment passing a section in a specified period.

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, as measured by dry weight or volume, that passes a section during a given time.

Total sediment load or total load is a term which refers to the total sediment (bed load plus suspended-sediment load) that is in transport. It is not synonymous with total-sediment discharge.

7-day 10 year low flow ($7Q_{10}$) is the discharge at the 10-year recurrence interval taken from a frequency curve of annual values of the lowest mean discharge for 7 consecutive days (the 7-day low flow).

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 derived from the atmosphere, vegetation, soil, or rocks 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 micromhos 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 about 65 percent of the specific conductance (in micromhos). This relation is not constant from stream to stream, and it may vary in the same source with changes in the composition of the water.

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

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 a 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 lived.

Natural substrates refers to any naturally occurring emerged or submersed solid surface, such as a rock or tree, upon which an organism lived.

Artificial substrate is a device which 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.

Surface area of a lake is that area outlined on the latest USGS topographic map as the boundary of the lake and measured by a planimeter in acres. In localities not covered by topographic maps, the areas are computed from the best maps available at the time planimeted. All areas shown are those for the stage when the planimeted map was made. All areas shown are those for the stage when the planimeted map was made.

Surficial bed material is that part (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 the total concentration in a water-sediment mixture. The water-sediment mixture is associated with (or sorbed on) that 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 water-suspended sediment sample that is retained on a 0.45 micrometer 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 would be 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 water-suspended sediment sample that is retained on a 0.45 um membrane filter. 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 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.

Taxonomy is the division of biology concerned with the classification and naming of organisms. The classification of organisms is based upon a hierarchical 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.....Insects

Order.....Ephemeroptera

Family.....Ephemeridae

Genus.....**Hexagenia**

Species.....**Hexagenia limbata**

Thermograph is an instrument that continuously records variations of temperature on a chart. The more general term "temperature recorder" is used in the table headings and refers to any instrument that records temperature whether on a chart, a tape, or any other medium.

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

Tons per day is the quantity of substance in solution or suspension that passes a stream section during a 24-hour day.

Total is the total amount of a given constituent in a representative water-suspended sediment sample, regardless of the constituent's physical or chemical form. The 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 water-suspended sediment mixture and that the analytical method determines all of the constituent in the sample.)

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

Total load (tons) is the total quantity of any individual constituent, as measured by dry mass or volume, that is dissolved in a specific amount of water (discharge) during a given time. It is computed by multiplying the total discharge, times the mg/L of the constituent, times the factor 0.0027, times the number of days.

Total recoverable refers to the amount of a given constituent that is in solution after a representative water-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 percent in the dissolved and suspended phases of 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.

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

Water year in 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, 1992 is called the "1992 water year."

WDR is used as an abbreviation for "Water-Data Report" in reference to published reports beginning in 1975.

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.

WRD is used as an abbreviation for "Water-Resources Data" in the REVISED RECORDS paragraph to refer to State annual basic-data reports published before 1975.

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

PUBLICATIONS ON TECHNIQUES OF WATER-RESOURCES INVESTIGATIONS

The U.S. Geological Survey publishes a series of manuals describing procedures for planning and conducting specialized work in water-resource 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 to 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".

- 1-D1. Water temperature--influential factors, field measurement, and data presentation, by H.H. Stevens, Jr., J.F. Ficke, and G.F. Smoot: USGS--TWRI Book 1, Chapter D1. 1975. 65 pages.
- 1-D2. Guidelines for collection and field analysis of ground-water samples for selected unstable constituents, by W.W. Wood: USGS--TWRI Book 1, Chapter D2. 1976. 24 pages.
- 2-D1. Application of surface geophysics to ground-water investigations, by A.A.R. Zohdy, G.P. Eaton, and D.R. Mabey: USGS--TWRI Book 2, Chapter D1. 1974. 116 pages.
- 2-D2. Application of seismic-refraction techniques to hydrologic studies, by F.P. Haeni: USGS--TWRI Book 2, Chapter D2. 1988. 86 pages.
- 2-E1. Application of borehole geophysics to water-resources investigations, by W. S. Keys and L.M. MacCary: USGS--TWRI Book 2, Chapter E1. 1971. 126 pages.
- 2-E2. Borehole geophysics applied to ground-water investigations, by W. S. Keys: USGS--TWRI Book 2, Chapter E2. 1990. 150 pages.
- 2-F1. Application of drilling, coring, and sampling techniques to test holes and wells, by Eugene Shuter and Warren E. Teasdale: USGS--TWRI Book 2, Chapter F1. 1989. 97 pages.
- 3-A1. General field and office procedures for indirect discharge measurements, by M.A. Benson and Tate Dalrymple: USGS--TWRI Book 3, Chapter A1. 1967. 30 pages.
- 3-A2. Measurement of peak discharge by the slope-area method, by Tate Dalrymple and M.A. Benson: USGS--TWRI Book 3, Chapter A2. 1967. 12 pages.
- 3-A3. Measurement of peak discharge at culverts by indirect methods, by G.L. Bodhaine: USGS--TWRI Book 3, Chapter A3. 1968. 60 pages.
- 3-A4. Measurement of peak discharge at width contractions by indirect methods, by H.F. Matthai: USGS--TWRI Book 3, Chapter A4. 1967. 44 pages.
- 3-A5. Measurement of peak discharge at dams by indirect methods, by Harry Hulsing: USGS--TWRI Book 3, Chapter A5. 1967. 29 pages.
- 3-A6. General procedure for gaging streams, by R.W. Carter and Jacob Davidian: USGS--TWRI Book 3, Chapter A6. 1968. 13 pages.
- 3-A7. Stage measurements at gaging stations, by T.J. Buchanan and W.P. Somers: USGS--TWRI Book 3, Chapter A7. 1968. 28 pages.
- 3-A8. Discharge measurements at gaging stations, by T.J. Buchanan and W.P. Somers: USGS--TWRI Book 3, Chapter A8. 1969. 65 pages.
- 3-A9. Measurement of time of travel in streams by dye tracing, by F.A. Kilpatrick and J.F. Wilson, Jr.: USGS--TWRI Book 3, Chapter A9. 1989. 27 pages.
- 3-A10. Discharge ratings at gaging stations, by E.J. Kennedy: USGS--TWRI Book 3, Chapter A10. 1984. 59 pages.
- 3-A11. Measurement of discharge by moving-boat method, by G.F. Smoot and C.E. Novak: USGS--TWRI Book 3, Chapter A11. 1969. 22 pages.
- 3-A12. Fluorometric procedures for dye tracing, Revised, by J.F. Wilson, Jr., E.D. Cobb, and F.A. Kilpatrick: USGS--TWRI Book 3, Chapter A12. 1986. 34 pages.
- 3-A13. Computation of continuous records of streamflow, by E.J. Kennedy: USGS--TWRI Book 3, Chapter A13. 1983. 53 pages.

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- 3-A14. Use of flumes in measuring discharge, by F.A. Kilpatrick and V.R. Schneider: USGS--TWRI Book 3, Chapter A14. 1983. 46 pages.
- 3-A15. Computation of water-surface profiles in open channels, by Jacob Davidian: USGS--TWRI Book 3, Chapter A15. 1984. 48 pages.
- 3-A16. Measurement of discharge using tracers, by F.A. Kilpatrick and E.D. Cobb: USGS--TWRI Book 3, Chapter A16. 1985. 52 pages.
- 3-A17. Acoustic velocity meter systems, by Anonius Laenen: USGS--TWRI Book 3, Chapter A17. 1985. 38 pages.
- 3-A18. Determination of stream reaeration coefficients by use of tracers, by F.A. Kilpatrick, R.E. Rathburn, N. Yotsukura, G.W. Parker, and L.L. DeLong: USGS--TWRI Book 3, Chapter A18. 1989. 52 pages.
- 3-A19. Levels of streamflow gaging stations, by E.J. Kennedy: USGS--TWRI Book 3, Chapter A19. 1990. 27 pages.
- 3-A20. Simulation of soluble waste transport and buildup in surface waters using tracers, by F.A. Kilpatrick: USGS--TWRI Book 3, Chapter A20. 1993. 38 pages.
- 3-B1. Aquifer-test design, observation, and data analysis, by R.W. Stallman: USGS--TWRI Book 3, Chapter B1. 1971. 26 pages.
- 3-B2. Introduction to ground-water hydraulics, a programmed text for self-instruction, by G.D. Bennett: USGS--TWRI Book 3, Chapter B2. 1976. 172 pages.
- 3-B3. Type curves for selected problems of flow to wells in confined aquifers, by J.E. Reed: USGS--TWRI Book 3, Chapter B3. 1980. 106 pages.
- 3-B4. Regression modeling of ground-water flow, by Richard L. Cooley and Richard L. Naff: USGS--TWRI Book 3, Chapter B4. 1990. 232 pages.
- 3-B4. Supplement I. Regression modeling of ground-water flow--modifications to the computer code for nonlinear regression solution of steady-state ground-water flow problems, by R.L. Cooley: USGS--TWRI Book 3, Chapter B4. 1993. 8 pages.
- 3-B5. Definition of boundary and initial conditions in the analysis of saturated ground-water flow systems--An introduction, by O.L. Franke, T.E. Reilly, and G.D. Bennett: USGS--TWRI Book 3, Chapter B5. 1987. 15 pages.
- 3-B6. The principle of superposition and its application in ground-water hydraulics, by T.E. Reilly, O.L. Franke, and G.D. Bennett: USGS--TWRI Book 3, Chapter B6. 1987. 28 pages.
- 3-B7. Analytical solutions for one-, two-, and three-dimensional solute transport in ground-water systems with uniform flow, by Eliezer J. Wexler: USGS--TWRI Book 3, Chapter B7. 1992. 190 pages.
- 3-C1. Fluvial sediment concepts, by H.P. Guy: USGS--TWRI Book 3, Chapter C1. 1970. 55 pages.
- 3-C2. Field methods for measurement of fluvial sediment, by H.P. Guy and V.W. Norman: USGS--TWRI Book 3, Chapter C2. 1970. 59 pages.
- 3-C3. Computation of fluvial-sediment discharge, by George Porterfield: USGS--TWRI Book 3, Chapter C3. 1972. 66 pages.
- 4-A1. Some statistical tools in hydrology, by H.C. Riggs: USGS--TWRI Book 4, Chapter A1. 1968. 39 pages.
- 4-A2. Frequency curves, by H.C. Riggs: USGS--TWRI Book 4, Chapter A2. 1968. 15 pages.
- 4-B1. Low-flow investigations, by H.C. Riggs: USGS--TWRI Book 4, Chapter B1. 1972. 18 pages.
- 4-B2. Storage analyses for water supply, by H.C. Riggs and C.H. Hardison: USGS--TWRI Book 4, Chapter B2. 1973. 20 pages.
- 4-B3. Regional analyses of streamflow characteristics, by H.C. Riggs: USGS--TWRI Book 4, Chapter B3. 1973. 15 pages.
- 4-D1. Computation of rate and volume of stream depletion by wells, by C.T. Jenkins: USGS--TWRI Book 4, Chapter D1. 1970. 17 pages.
- 5-A1. Methods for determination of inorganic substances in water and fluvial sediments, by M.J. Fishman and L.C. Friedman, editors: USGS--TWRI Book 5, Chapter A1. 1989. 545 pages.
- 5-A2. Determination of minor elements in water by emission spectroscopy, by P.R. Barnett and E.C. Mallory, Jr.: USGS--TWRI Book 5, Chapter A2. 1971. 31 pages.

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- 5-A3. Methods for the determination of organic substances in water and fluvial sediments, edited by R.L. Wershaw, M.J. Fishman, R.R. Grabbe, and L.E. Lowe: USGS--TWRI Book 5, Chapter A3. 1987. 80 pages.
- 5-A4. Methods for collection and analysis of aquatic biological and microbiological samples, by L.J. Britton and P.E. Greeson, editors: USGS--TWRI Book 5, Chapter A4. 1989. 363 pages.
- 5-A5. Methods for determination of radioactive substances in water and fluvial sediments, by L.L. Thatcher, V.J. Janzer, and K.W. Edwards: USGS--TWRI Book 5, Chapter A5. 1977. 95 pages.
- 5-A6. Quality assurance practices for the chemical and biological analyses of water and fluvial sediments, by L.C. Friedman and D.E. Erdmann: USGS--TWRI Book 5, Chapter A6. 1982. 181 pages.
- 5-C1. Laboratory theory and methods for sediment analysis, by H.P. Guy: USGS--TWRI Book 5, Chapter C1. 1969. 58 pages.
- 6-A1. A modular three-dimensional finite-difference ground-water flow model, by M.G. McDonald and A.W. Harbaugh: USGS--TWRI Book 6, Chapter A1. 1988. 586 pages.
- 6-A2. Documentation of a computer program to simulate aquifer-system compaction using the modular finite-difference ground-water flow model, by S.A. Leake and D.E. Prudic: USGS--TWRI Book 6, Chapter A2. 1991. 68 pages.
- 6-A3. A modular finite-element model (MODFE) for areal and axisymmetric ground-water-flow problems, Part 1: Model Description and User's Manual, by L.J. Torak: USGS--TWRI Book 6, Chapter A3. 1993. 136 pages.
- 6-A4. A modular finite-element model (MODFE) for areal and axisymmetric ground-water-flow problems, Part 2: Derivation of finite-element equations and comparisons with analytical solutions, by R.L. Cooley: USGS--TWRI Book 6, Chapter A4. 1992. 108 pages.
- 6-A5. A modular finite-element model (MODFE) for areal and axisymmetric ground-water-flow problems, Part 3: Design philosophy and programming details, by L.J. Torak: USGS--TWRI Book 6, Chapter A5, 1993. 243 pages.
- 7-C1. Finite difference model for aquifer simulation in two dimensions with results of numerical experiments, by P.C. Trescott, G.F. Pinder, and S.P. Larson: USGS--TWRI Book 7, Chapter C1. 1976. 116 pages.
- 7-C2. Computer model of two-dimensional solute transport and dispersion in ground water, by L.F. Konikow and J.D. Bredehoeft: USGS--TWRI Book 7, Chapter C2. 1978. 90 pages.
- 7-C3. A model for simulation of flow in singular and interconnected channels, by R.W. Schaffranek, R.A. Baltzer, and D.E. Goldberg: USGS--TWRI Book 7, Chapter C3. 1981. 110 pages.
- 8-A1. Methods of measuring water levels in deep wells, by M.S. Garber and F.C. Koopman: USGS--TWRI Book 8, Chapter A1. 1968. 23 pages.
- 8-A2. Installation and service manual for U.S. Geological Survey manometers, by J.D. Craig: USGS--TWRI Book 8, Chapter A2. 1983. 57 pages.
- 8-B2. Calibration and maintenance of vertical-axis type current meters, by G.F. Smoot and C.E. Novak: USGS--TWRI Book 8, Chapter B2. 1968. 15 pages.

Surface-Water Station Records



Current-meter measurement

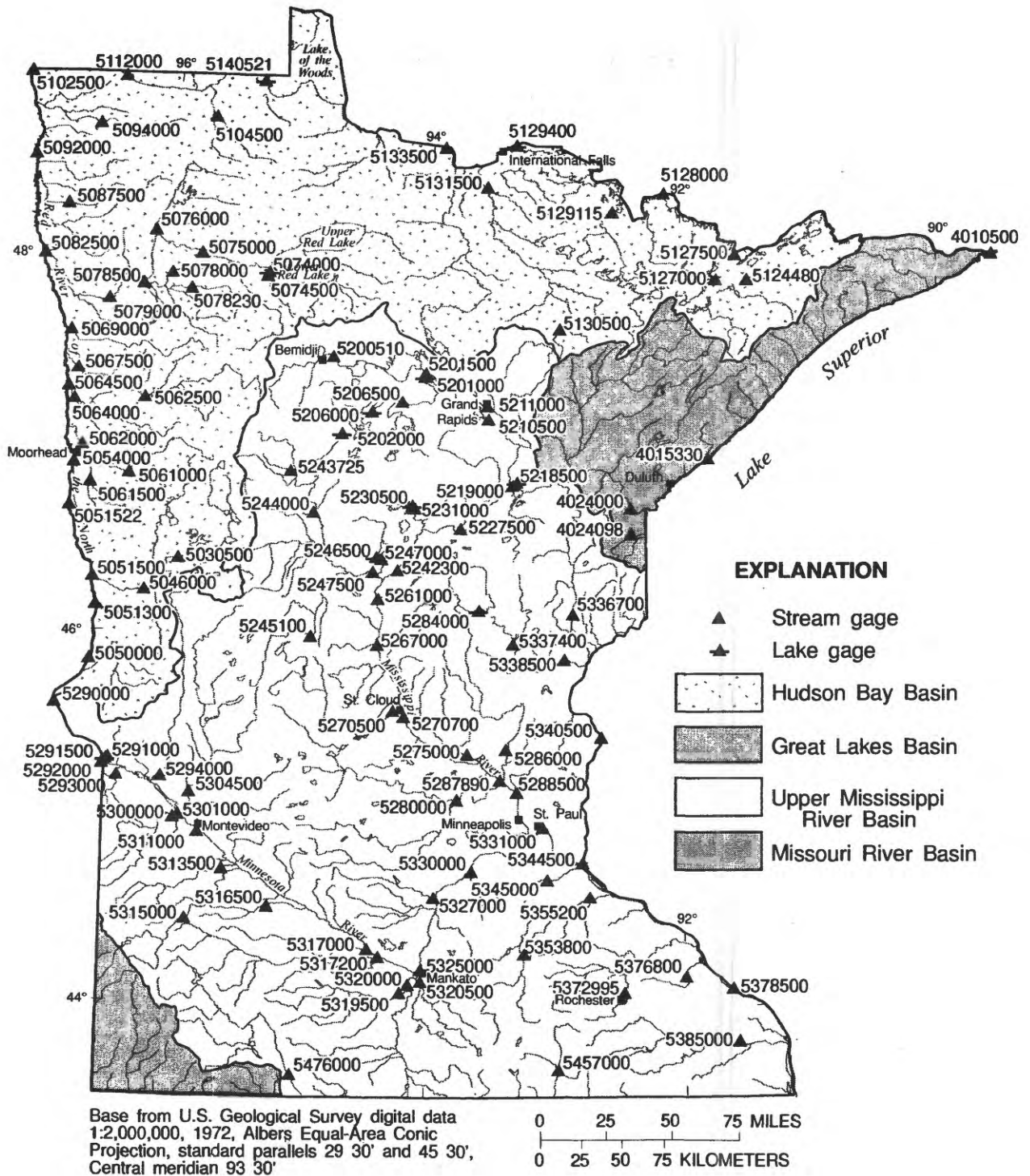


Figure 7.—Location of lake and stream-gaging stations

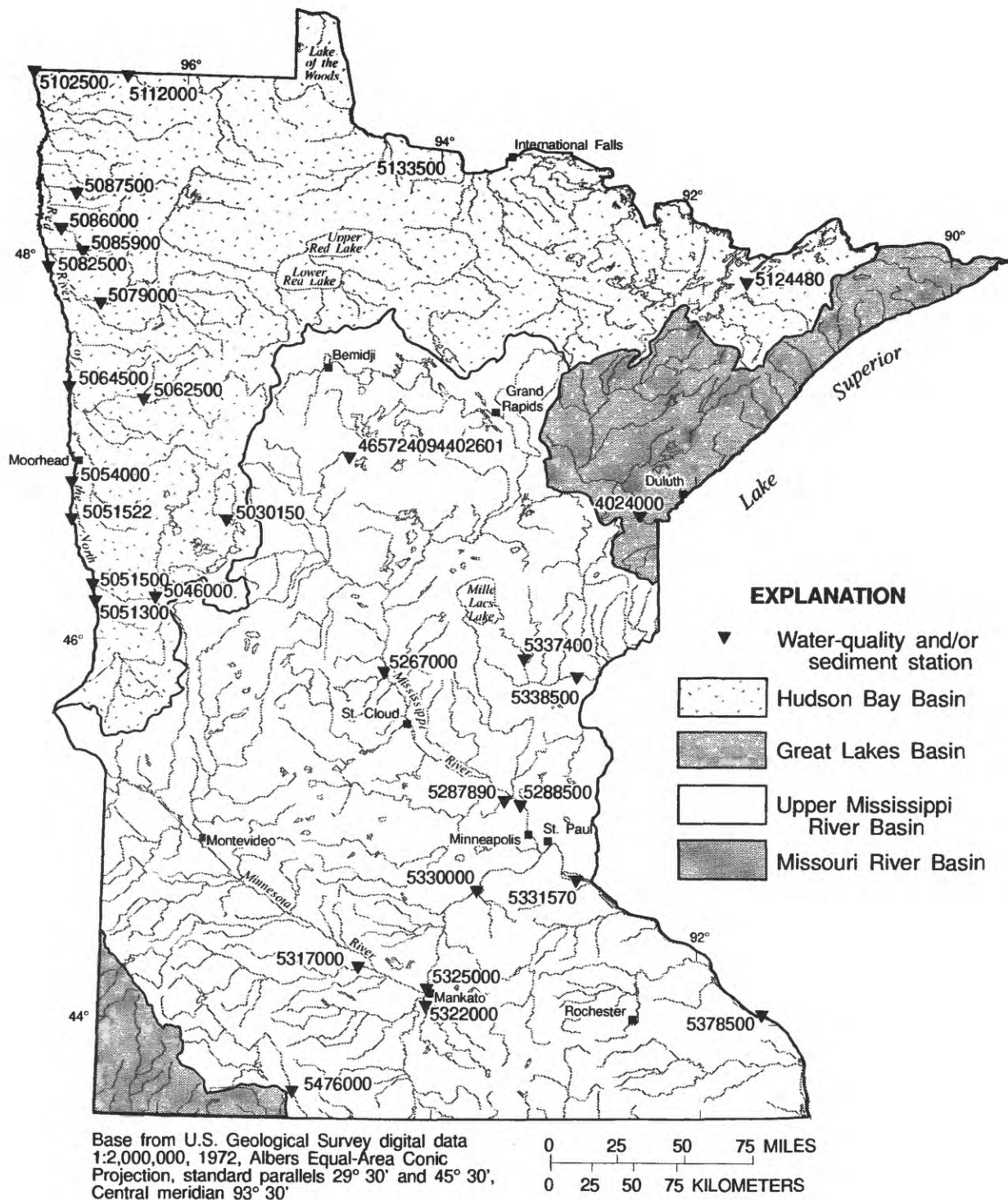


Figure 8.--Location of surface-water quality stations.

STREAMS TRIBUTARY TO LAKE SUPERIOR

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

LOCATION.--Lat 48°00'44", long 89°36'58", in SW¹/₄NE¹/₄ 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.--600 mi².

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 3,000 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	No other peak greater than base discharge.
Apr. 26	1700	*3800	*8.87	

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	205	243	233	e150	e122	e122	e133	2200	1260	766	315	170
2	200	223	231	e147	e122	e122	e135	2260	1150	705	316	161
3	202	213	224	e140	e122	e122	e145	2320	1020	657	319	156
4	203	208	220	e138	e122	e122	e155	2350	933	598	345	147
5	193	223	221	e136	e122	e122	e170	2300	877	557	359	149
6	190	174	216	e133	e122	e122	e185	2120	836	533	341	150
7	185	192	195	e130	e122	e122	e210	1910	798	517	323	147
8	203	206	196	e128	e122	e122	e260	1740	760	521	313	145
9	219	178	216	e125	e122	e122	e340	1650	711	685	310	141
10	217	172	203	e123	e122	e122	e420	1570	668	761	296	133
11	216	185	194	e122	e122	e122	e540	1490	630	651	277	126
12	209	190	216	e122	e122	e122	e640	1460	598	677	260	121
13	202	184	232	e122	e121	e122	e760	1410	594	659	249	120
14	196	179	234	e122	e121	e122	e880	1460	584	590	241	118
15	186	172	230	e122	e120	e122	e1000	2130	609	535	235	127
16	184	176	223	e122	e120	e123	e1150	2130	836	499	225	135
17	181	172	221	e122	e120	e124	e1300	1850	1790	503	209	138
18	178	174	222	e122	e120	e125	e1600	1610	2210	506	198	142
19	174	167	218	e122	e120	e127	e2100	1450	1820	478	193	136
20	174	212	209	e122	e120	e130	2300	1350	1380	461	193	126
21	291	200	198	e122	e121	e130	1790	1280	1140	460	182	122
22	327	161	e190	e122	e121	e129	1490	1260	999	478	175	120
23	312	142	e185	e122	e121	e130	1510	1260	890	499	169	122
24	280	122	e180	e122	e121	e130	1890	1260	807	472	189	123
25	255	155	e175	e122	e121	e130	2050	1440	761	450	168	132
26	240	175	e172	e122	e121	e130	3250	1420	727	429	165	150
27	225	197	e170	e122	e121	e130	3450	1270	676	408	163	146
28	238	196	e167	e122	e121	e130	2760	1160	720	386	172	150
29	249	184	e162	e122	---	e130	2320	1070	820	366	173	145
30	253	203	e158	e122	---	e130	2130	1040	821	345	179	139
31	244	---	e154	e122	---	e130	---	1230	---	326	179	---
TOTAL	6831	5578	6265	3912	3394	3888	37063	50450	28425	16478	7431	4137
MEAN	220	186	202	126	121	125	1235	1627	947	532	240	138
MAX	327	243	234	150	122	130	3450	2350	2210	766	359	170
MIN	174	122	154	122	120	122	133	1040	584	326	163	118
AC-FT	13550	11060	12430	7760	6730	7710	73510	100100	56380	32680	14740	8210
CFSM	.37	.31	.34	.21	.20	.21	2.06	2.71	1.58	.89	.40	.23
IN.	.42	.35	.39	.24	.21	.24	2.30	3.13	1.76	1.02	.46	.2

.STREAMS TRIBUTARY TO LAKE SUPERIOR

04010500 PIGEON RIVER AT MIDDLE FALLS, NEAR GRAND PORTAGE, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1921 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	363	351	204	149	124	173	1201	1621	860	412	242	303
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	57.7	40.2
(WY)	1977	1977	1977	1977	1977	1941	1977	1977	1977	1958	1991	1976

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

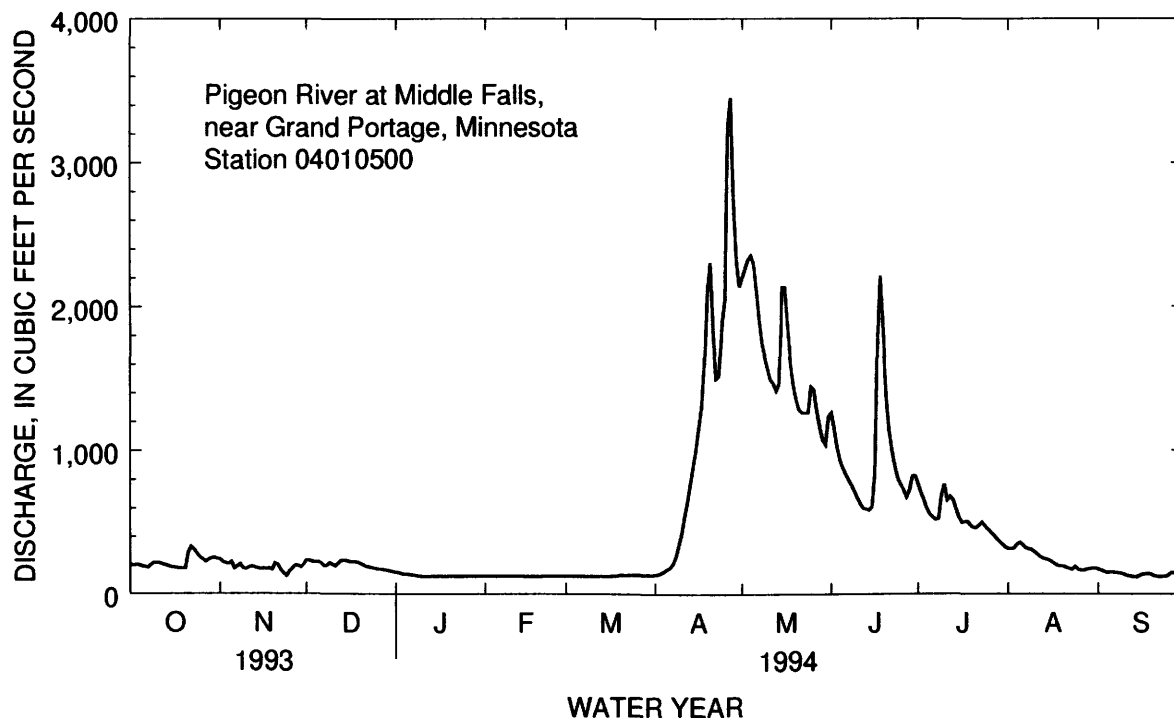
FOR 1994 WATER YEAR

WATER YEARS 1921 - 1994

ANNUAL TOTAL	176413		173852									
ANNUAL MEAN	483		476							503		
HIGHEST ANNUAL MEAN										840		1971
LOWEST ANNUAL MEAN										158		1958
HIGHEST DAILY MEAN	2930	Jul 29				3450	Apr 27		10700	May 5	1934	
LOWEST DAILY MEAN	112	Mar 2				118	Sep 14		1.0 ^a	Jan 15	1977	
ANNUAL SEVEN-DAY MINIMUM	114	Feb 27				120	Feb 14		1.0	Jan 15	1977	
INSTANTANEOUS PEAK FLOW						3800	Apr 26		11000	May 5	1934	
INSTANTANEOUS PEAK STAGE						8.87	Apr 26		7.60 ^b	May 5	1934	
INSTANTANEOUS LOW FLOW						102	Nov 24					
ANNUAL RUNOFF (AC-FT)	349900					344800			364600			
ANNUAL RUNOFF (CFSM)	.81					.79			.84			
ANNUAL RUNOFF (INCHES)	10.94					10.78			11.40			
10 PERCENT EXCEEDS	1090					1410			1300			
50 PERCENT EXCEEDS	250					197			221			
90 PERCENT EXCEEDS	122					122			84			

a Also occurred Jan 16-21, 1977.

b Site and datum then in use.



STREAMS TRIBUTARY TO LAKE SUPERIOR

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.--85.6 mi².

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

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 800 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Apr. 15	1400	*2000	*6.94	Apr. 26	1315	1780	6.68

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	25	22	e24	e11	e6.1	e5.6	e30	315	54	32	7.4	47
2	22	20	e23	e11	e6.0	e5.6	e36	216	37	28	7.4	33
3	21	20	e22	e10	e5.9	e5.6	e52	165	27	24	9.8	25
4	21	20	e21	e10	e5.8	e5.8	e76	131	23	20	21	21
5	20	22	e20	e9.8	e5.8	e6.2	e90	108	20	19	22	29
6	19	e22	e20	e9.6	e5.7	e6.6	e125	90	21	19	16	34
7	19	e24	e19	e9.4	e5.6	e7.0	e150	78	20	19	12	26
8	20	e22	e19	e9.2	5.6	e7.2	e210	69	18	24	11	20
9	20	21	e18	e9.1	e5.6	e7.4	e270	60	16	27	9.3	16
10	20	20	e18	e8.9	e5.6	e7.6	e350	56	14	22	8.2	13
11	19	20	e17	e8.7	e5.6	e7.7	e450	49	13	18	7.8	13
12	18	19	e17	e8.5	e5.6	e7.9	e580	46	15	20	7.8	12
13	18	22	e16	e8.4	e5.6	e8.0	e660	40	15	17	7.1	32
14	18	23	e16	e8.2	e5.6	e8.1	766	98	18	14	6.9	38
15	18	23	e16	e8.0	e5.6	e8.2	1490	279	105	13	6.4	210
16	18	22	e15	e7.9	e5.6	e8.4	1160	167	505	12	5.8	174
17	19	e23	e15	e7.8	e5.6	e9.0	697	107	592	44	6.1	97
18	19	e24	e15	e7.6	e5.6	e9.6	530	77	464	46	5.4	57
19	18	e25	e14	e7.4	e5.6	e10	480	61	204	27	6.2	38
20	18	e26	e14	e7.3	e5.6	e12	319	50	320	24	7.4	28
21	21	e25	e14	e7.2	e5.6	e13	210	41	199	25	7.4	36
22	25	e22	e13	e7.1	e5.6	e13	157	37	97	21	6.9	198
23	25	e24	e13	e7.0	e5.6	e14	129	34	68	19	6.4	216
24	26	e25	e13	e6.9	e5.6	e15	121	30	54	15	8.4	115
25	22	e26	e13	e6.8	e5.6	e16	110	30	43	13	9.0	81
26	21	e27	e13	e6.7	e5.6	e17	1280	43	54	12	34	112
27	20	e27	e12	e6.6	e5.6	e18	948	39	47	11	65	e107
28	19	e27	e12	e6.5	e5.6	e19	462	31	37	10	138	e100
29	20	e26	e12	e6.4	---	e20	370	39	39	9.1	63	e85
30	21	e25	e11	e6.3	---	e21	467	49	37	8.2	77	e70
31	19	---	e11	e6.2	---	e25	---	74	---	7.7	70	---
TOTAL	629	694	496	251.5	158.5	344.5	12775	2709	3176	620.0	676.1	2083
MEAN2	0.3	23.1	16.0	8.11	5.66	11.1	426	87.4	106	20.0	21.8	69.4
MAX	26	27	24	11	6.1	25	1490	315	592	46	138	216
MIN	18	19	11	6.2	5.6	5.6	30	30	13	7.7	5.4	12
AC-FT	1250	1380	984	499	314	683	25340	5370	6300	1230	1340	4130
CFSM	.24	.27	.19	.09	.07	.13	4.97	1.02	1.24	.23	.25	.81
IN.	.27	.30	.22	.11	.07	.15	5.55	1.18	1.38	.27	.29	.91

e Estimated.

STREAMS TRIBUTARY TO LAKE SUPERIOR

04015330 KNIFE RIVER NEAR TWO HARBORS, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1974 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	83.3	69.9	21.0	11.1	8.83	50.9	373	166	92.1	83.0	33.8	85.7
MAX	226	198	60.6	31.4	22.2	136	631	427	240	345	163	314
(WY)	1983	1992	1983	1975	1984	1976	1982	1979	1984	1993	1988	1977
MIN	3.06	1.58	.000	.000	.000	8.65	73.6	16.0	15.5	4.87	2.95	1.43
(WY)	1977	1977	1977	1977	1977	1980	1977	1976	1988	1988	1976	1976

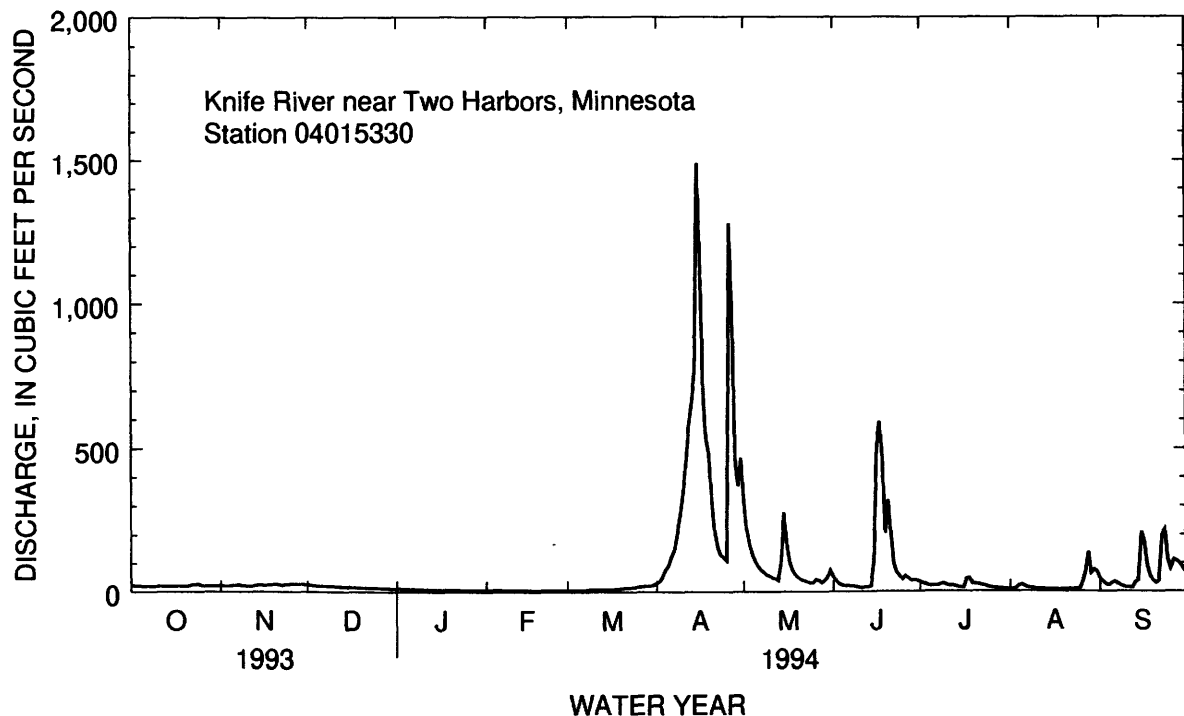
SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1974 - 1994

ANNUAL TOTAL	36611.0	24612.6	
ANNUAL MEAN	100	67.4	90.4
HIGHEST ANNUAL MEAN			147
LOWEST ANNUAL MEAN			44.2
HIGHEST DAILY MEAN	3760	Jul 4	1490
LOWEST DAILY MEAN	8.0	Feb 19	5.4
ANNUAL SEVEN-DAY MINIMUM	8.0	Feb 19	5.6
INSTANTANEOUS PEAK FLOW			2000
INSTANTANEOUS PEAK STAGE			6.94
INSTANTANEOUS LOW FLOW			5.1
ANNUAL RUNOFF (AC-FT)	72620	48820	65460
ANNUAL RUNOFF (CFSM)	1.17	.79	1.06
ANNUAL RUNOFF (INCHES)	15.91	10.70	14.34
10 PERCENT EXCEEDS	274	143	222
50 PERCENT EXCEEDS	22	20	21
90 PERCENT EXCEEDS	9.5	6.2	4.4

a Many days in 1977.



STREAMS TRIBUTARY TO LAKE SUPERIOR

04024000 ST. LOUIS RIVER AT SCANLON, MN

LOCATION.--Lat 46°42'12", long 92°25'07", in NW 1/4 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. powerplant, 3 mi upstream from Thomson Reservoir, and 3.2 mi upstream from Midway River.

DRAINAGE AREA.--3,430 mi², approximately.

WATER-DISCHARGE RECORDS

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 powerplant at datum about 420 ft lower. Sept. 6, 1914, to Aug. 4, 1953, powerplant record at Thomson hydroelectric plant.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Diurnal fluctuation caused by powerplant 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 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1460	1380	1550	e1250	e1060	e1050	2310	10500	3500	8500	1670	e1210
2	1390	1480	1790	e1160	e1050	e1020	3120	10300	3240	8380	1580	e1120
3	1360	1590	1780	e1160	e1050	e1040	3530	9790	2950	7520	1580	e1220
4	1360	1600	1710	e1160	e1040	e1070	3570	9190	2700	6750	1450	e1400
5	1380	1700	1690	e1140	e1030	e1170	3290	8450	2630	6160	1610	e1380
6	1340	1590	1670	e1180	e1040	e1200	3150	7600	2690	6150	1370	e1250
7	1330	1540	1420	e1200	e1020	e1280	3090	6610	3030	6120	1370	e1420
8	1360	1680	1470	e1190	e1000	e1380	3330	5870	2770	5090	1380	e1420
9	1320	1640	1590	e1200	e1000	e1390	4050	5330	2590	4450	1210	e1390
10	1330	1690	e1570	e1200	e990	e1400	4390	4800	2170	3970	1300	e1200
11	1370	1720	e1180	e1190	e990	e1380	5290	4190	1970	3580	1110	e1150
12	1310	1580	e1350	e1180	e980	e1310	5980	3840	1770	3360	1070	e1100
13	1300	1750	1730	e1180	e980	e1280	6660	3570	1610	3230	1070	e1410
14	1280	1710	1670	e1180	e990	e1330	6790	3490	1580	3180	872	e1220
15	1320	1770	1610	e1150	e990	1510	8900	4710	1740	3170	855	e4100
16	1280	1770	1630	e1150	e1000	1700	17800	5420	3350	3120	951	e5000
17	1300	1740	1620	e1160	e1010	1940	17600	5010	5630	2880	793	e4600
18	1290	1700	1580	e1130	e1040	1940	15800	4460	10400	2890	802	e3600
19	1310	1710	1560	e1100	e1150	1660	13900	4090	13000	3020	881	e2900
20	1370	1320	1550	e1070	e1200	1470	12100	3920	15200	3380	949	e2750
21	1380	1790	1490	e1060	e1220	1450	10500	3570	16500	4170	743	e2750
22	1400	1490	1480	e1080	e1260	1740	9040	3320	16000	4560	857	e3450
23	1610	1400	e1230	e1060	e1250	2300	7900	3370	14400	4530	785	e3900
24	1480	1230	e1120	e1090	e1210	2590	7110	3400	13700	4350	775	e3900
25	1480	1320	e1180	e1100	e1190	2590	6440	3370	13200	4130	e920	e3300
26	1470	1260	e1040	e1070	e1140	2430	7250	3230	12600	3620	e1000	e3000
27	1410	1440	e1050	e1070	e1100	2260	10400	3380	11900	2820	e1030	2840
28	1440	1480	e1040	e1050	e1070	2220	10900	3230	9990	2430	e1060	2750
29	1380	1520	e1030	e1070	---	2080	10200	2920	9490	2130	e920	2610
30	1380	1560	e1090	e1070	---	1990	10200	3550	8940	1890	e1280	2550
31	1440	---	e1210	e1080	---	2040	---	3780	---	1820	e1200	---
TOTAL	42630	47150	44680	35130	30050	51210	234590	158260	211240	131350	34443	71890
MEAN	1375	1572	1441	1133	1073	1652	7820	5105	7041	4237	1111	2396
MAX	1610	1790	1790	1250	1260	2590	17800	10500	16500	8500	1670	5000
MIN	1280	1230	1030	1050	980	1020	2310	2920	1580	1820	743	110
+	-380	-424	-456	-423	-446	-172	2050	750	-34.4	-96.8	-89.5	124
MEAN‡	995	148	985	710	627	1480	9870	5855	7007	4140	1022	2520
CFSM‡	.29	.33	.29	.21	.18	.43	2.88	1.71	2.04	1.21	.30	.73
IN‡	.33	.37	.33	.24	.19	.50	3.21	1.97	2.28	1.40	.35	.81

CAL YR 93 TOTAL 1111840 MEAN 3046 MAX 20800 MIN 1030 MEAN 2976 CFSM‡ .87 IN‡ 11.78

WTR YR 94 TOTAL 1092623 MEAN 2993 MAX 17800 MIN 743 MEAN 3027 CFSM‡ .88 IN‡ 11.98

+ 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.

e Estimated.

STREAMS TRIBUTARY TO LAKE SUPERIOR

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

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1908 - 1994, BY WATER YEAR (WY)

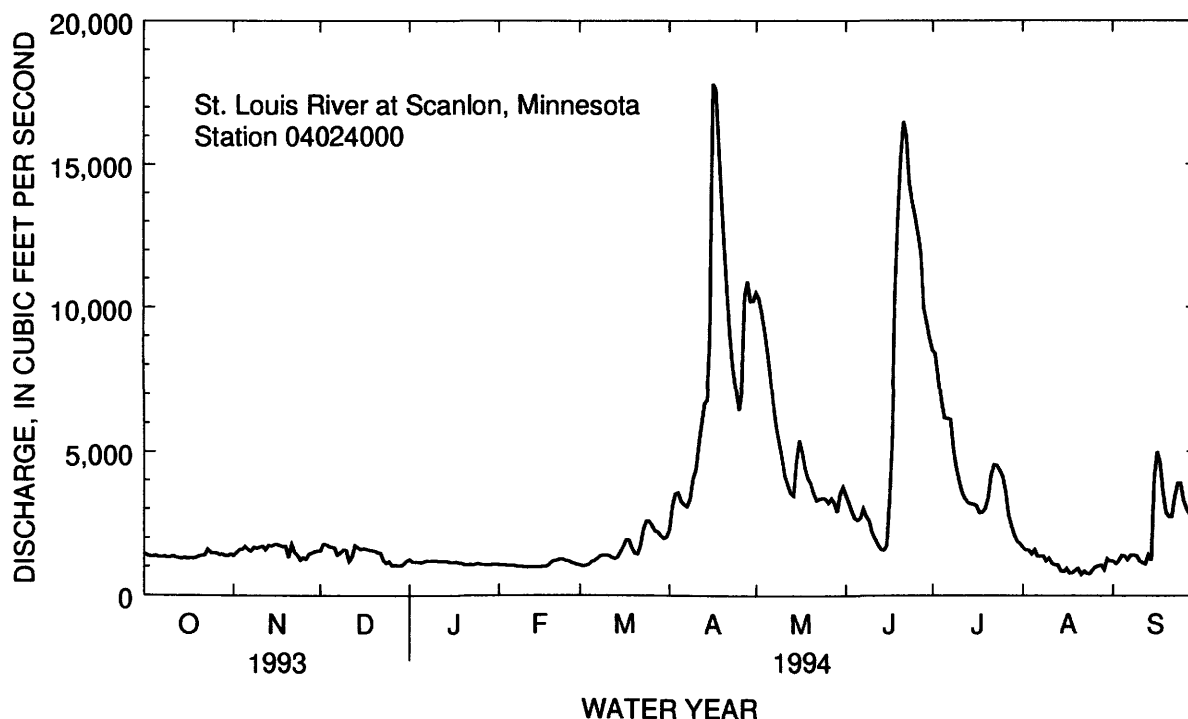
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	1961	1654	1249	1058	1041	1417	5569	5126	3620	2356	1662	1779
MAX	7508	8518	2993	2272	2200	6026	15230	22210	16480	9492	9197	7594
(WY)	1974	1972	1972	1966	1966	1945	1948	1950	1908	1993	1953	1928
MIN	407	473	282	265	249	301	667	593	458	199	377	402
(WY)	1935	1935	1911	1911	1924	1924	1977	1977	1988	1988	1977	1934

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1908 - 1994

ANNUAL TOTAL	1111840		1092623									
ANNUAL MEAN	3046		2993							2361		
HIGHEST ANNUAL MEAN										4276		1972
LOWEST ANNUAL MEAN										945		1924
HIGHEST DAILY MEAN			20800	Jul 10		17800	Apr 16		37900	May 9 1950		
LOWEST DAILY MEAN			1030	Dec 29		743	Aug 21		88	Aug 24 1977		
ANNUAL SEVEN-DAY MINIMUM			1080	Dec 24		827	Aug 18		134	Jul 26 1988		
INSTANTANEOUS PEAK FLOW						21700	Apr 16		37900	May 9 1950		
INSTANTANEOUS PEAK STAGE						10.88	Apr 16		15.80	May 9 1950		
ANNUAL RUNOFF (AC-FT)	2205000					2167000			1710000			
ANNUAL RUNOFF (CFSM)	.89					.87			.69			
ANNUAL RUNOFF (INCHES)	12.06					11.85			9.35			
10 PERCENT EXCEEDS	5920					7170			5260			
50 PERCENT EXCEEDS	1710					1580			1370			
90 PERCENT EXCEEDS	1200					1050			638			



STREAMS TRIBUTARY TO LAKE SUPERIOR

04024000 ST. LOUIS RIVER AT SCANLON, MN--Continued
(National stream-quality accounting network station)

WATER QUALITY RECORDS

PERIOD OF RECORD.--Water years 1958-66, 1968 to current year.

REMARKS.--Letter K indicates non-ideal colony count. Samples collected at cableway 0.75 mi downstream from gage.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

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)	TUR-BID-ITY (NTU) (00076)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML) (31625)	STREP-TOCOCCI, FECAL, KF AGAR (COLS. PER 100 ML) (31673)	
OCT													
12...	1300	1330	190	173	7.0	7.4	7.5	2.7	770	10.2	K4	K4	
DEC													
01...	1200	1470	172	175	7.7	7.7	0.0	1.9	732	11.6	K14	21	
FEB													
16...	1445	1250	177	188	7.3	7.5	0.0	1.8	763	9.3	K15	K14	
MAY													
11...	1200	4350	116	120	7.7	7.2	12.0	3.3	725	9.2	K3	97	
AUG													
01...	1400	1630	145	149	7.5	7.3	23.0	2.9	734	6.1	K21	280	
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)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY WAT DIS TOT IT (MG/L AS CACO3) (39086)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)	CAR-BONATE WATER DIS IT FIELD (MG/L AS CO3) (00452)	BICAR-BONATE WATER DIS IT FIELD (MG/L AS HCO3) (00453)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)
OCT													
12...	17	8.9	4.9	1.2	60	67	0	73	11	3.9	0.20	7.7	
DEC													
01...	17	9.0	4.8	1.0	67	68	0	82	11	4.0	0.20	9.9	
FEB													
16...	19	9.2	5.1	1.1	75	81	0	92	12	4.2	0.10	11	
MAY													
11...	11	5.6	3.7	1.1	43	42	0	52	9.4	3.4	0.10	5.2	
AUG													
01...	15	7.6	4.0	1.0	59	59	0	72	8.6	2.8	0.20	8.6	
DATE		SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN,AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	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)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)	ALUM-INUM, DIS-SOLVED (UG/L AS AL) (01106)	
OCT													
12...	119	<0.010	<0.010	<0.050	0.070	0.60	<0.010	<0.010	<0.010	7	73	30	
DEC													
01...	131	<0.010	<0.010	0.160	0.030	0.40	0.010	<0.010	0.010	7	95	--	
FEB													
16...	134	0.010	0.010	0.320	0.050	0.60	0.030	0.020	0.010	4	100	40	
MAY													
11...	87	<0.010	<0.010	0.076	0.010	0.60	0.030	<0.010	<0.010	11	90	50	
AUG													
01...	127	<0.010	<0.010	0.130	0.030	0.70	0.020	0.040	0.010	8	99	60	

STREAMS TRIBUTARY TO LAKE SUPERIOR

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DATE	BARIUM, DIS- SOLVED (UG/L AS BA) (01005)	COBALT, DIS- SOLVED (UG/L AS CO) (01035)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	LITHIUM DIS- SOLVED (UG/L AS LI) (01130)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, DIS- SOLVED (UG/L AS AG) (01075)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)	VANA- DIUM, DIS- SOLVED (UG/L AS V) (01085)
OCT 12...	10	<3	650	<4	48	<10	2	<1	<1.0	50	<6
DEC 01...	--	--	--	--	--	--	--	--	--	--	--
FEB 16...	10	<3	920	<4	46	<10	<1	<1	<1.0	53	<6
MAY 11...	10	<3	440	<4	30	<10	<1	<1	<1.0	31	<6
AUG 01...	13	5	1400	4	81	<10	<1	<1	<1.0	50	<6

STREAMS TRIBUTARY TO LAKE SUPERIOR

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.--7.77 mi².

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

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

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

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.6	e1.8	e2.3	e1.8	e1.5	e2.0	27	34	4.1	2.0	1.7	1.5
2	1.6	e1.7	e2.3	e1.8	e1.5	e2.0	15	17	3.9	1.9	1.4	1.4
3	1.7	e1.6	e2.2	e1.8	e1.5	e2.1	8.3	13	4.0	1.8	3.9	1.7
4	1.7	e1.7	e2.2	e1.8	e1.5	e2.5	7.2	9.8	4.1	1.9	5.6	2.1
5	1.7	e1.9	e2.1	e1.8	e1.5	e3.0	7.3	8.0	4.6	2.0	1.8	2.3
6	1.6	e1.8	e2.1	e1.8	e1.5	e2.9	7.9	6.5	4.3	2.7	1.5	2.0
7	1.6	e1.8	e2.1	e1.8	e1.5	e2.8	13	5.9	4.0	2.0	1.5	1.6
8	1.9	e1.7	e2.1	e1.7	e1.5	e2.6	16	5.3	3.7	2.8	1.5	1.9
9	1.9	e1.8	e2.1	e1.7	e1.5	e2.5	19	4.7	3.3	2.4	1.3	1.8
10	1.6	e1.9	e2.1	e1.7	e1.5	e2.3	16	4.3	3.2	2.0	1.4	1.8
11	1.8	e2.0	e2.0	e1.7	e1.5	e2.2	14	4.1	3.1	1.9	1.4	1.7
12	1.8	e2.1	e2.0	e1.7	e1.5	e2.4	12	3.7	2.8	1.8	1.4	1.8
13	1.6	e2.2	e2.0	e1.7	e1.6	e2.8	11	3.3	2.5	1.9	1.8	2.0
14	1.6	e2.2	e2.0	e1.7	e1.8	e3.5	12	7.4	2.4	1.8	1.6	3.2
15	1.7	e2.2	e2.0	e1.7	e2.0	e3.3	115	12	3.0	1.9	1.4	46
16	1.6	e2.3	e2.0	e1.7	e2.1	e3.2	33	6.2	4.1	1.8	1.5	10
17	1.7	e2.3	e2.0	e1.7	e2.3	e3.0	11	4.5	4.8	1.7	1.5	5.6
18	1.7	e2.3	e2.0	e1.7	e2.5	e2.9	6.0	4.0	4.2	1.7	1.6	3.6
19	1.7	e2.3	e1.9	e1.6	e2.8	e2.7	4.6	3.6	2.9	1.9	1.7	2.7
20	1.7	e2.3	e1.9	e1.6	e2.9	e3.1	3.8	3.2	5.3	2.7	1.9	2.2
21	2.0	e2.3	e1.9	e1.6	e2.7	e3.6	3.0	2.9	3.5	1.9	1.5	5.2
22	2.0	e2.3	e1.9	e1.6	e2.6	e4.5	2.3	2.8	2.5	2.2	1.6	30
23	1.8	e2.3	e1.9	e1.6	e2.5	e5.2	2.2	2.7	2.4	1.8	1.6	13
24	1.7	e2.3	e1.9	e1.6	e2.4	5.5	2.2	3.0	2.2	1.6	1.8	8.1
25	1.8	e2.3	e1.9	e1.6	e2.3	5.0	4.7	3.8	2.6	1.7	1.7	6.1
26	1.7	e2.3	e1.9	e1.6	e2.2	5.2	249	3.6	2.5	1.7	2.5	6.6
27	19	e2.3	e1.9	e1.6	e2.1	7.2	83	3.1	2.1	1.7	1.8	5.7
28	11	e2.3	e1.9	e1.6	e2.0	8.5	27	3.1	2.3	1.6	1.6	5.2
29	1.7	e2.3	e1.8	e1.5	---	8.4	20	4.9	2.2	1.7	1.5	3.7
30	1.7	e2.3	e1.8	e1.5	---	8.6	47	4.7	2.0	1.7	1.5	2.9
31	1.7	---	e1.8	e1.5	---	20	---	5.3	---	1.9	1.7	---
TOTAL	79.9	62.9	62.0	51.8	54.8	135.5	799.5	200.4	98.6	60.1	56.2	183.4
MEAN	2.58	2.10	2.00	1.67	1.96	4.37	26.6	6.46	3.29	1.94	1.81	6.11
MAX	19	2.3	2.3	1.8	2.9	20	249	34	5.3	2.8	5.6	46
MIN	1.6	1.6	1.8	1.5	1.5	2.0	2.2	2.7	2.0	1.6	1.3	1.4
AC-FT	158	125	123	103	109	269	1590	397	196	119	111	364
CFSM	.33	.27	.26	.22	.25	.56	3.43	.83	.42	.25	.23	.79
IN.	.38	.30	.30	.25	.26	.65	3.83	.96	.47	.29	.27	.88

e Estimated.

TRIBUTARY TO LAKE SUPERIOR

04024098 DEER CREEK NEAR HOLYOKE, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1976 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	6.57	4.46	2.46	1.89	2.33	8.23	23.4	10.8	8.24	7.03	4.92	8.61
MAX	21.8	12.2	3.86	2.92	5.87	19.2	90.8	24.3	31.4	22.3	36.9	30.4
(WY)	1983	1983	1983	1992	1981	1985	1986	1991	1993	1991	1986	1986
MIN	1.69	1.59	1.31	.97	1.06	2.34	4.11	2.15	1.65	1.50	.89	1.24
(WY)	1988	1977	1977	1979	1979	1986	1977	1980	1982	1988	1982	1993

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

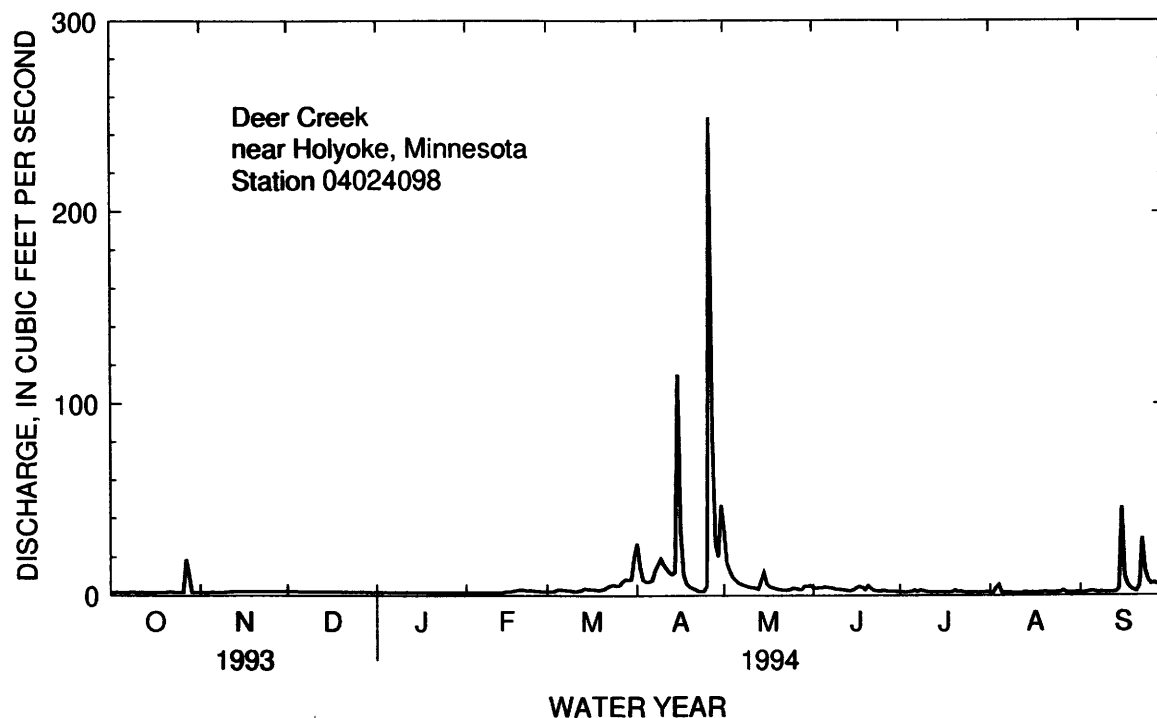
WATER YEARS 1976 - 1994

ANNUAL TOTAL	3163.62	1845.1	
ANNUAL MEAN	8.67	5.06	7.44
HIGHEST ANNUAL MEAN			19.3
LOWEST ANNUAL MEAN			3.65
HIGHEST DAILY MEAN	155	Jul 8	249
LOWEST DAILY MEAN	.72	Sep 18	1.3
ANNUAL SEVEN-DAY MINIMUM	1.1	Sep 13	1.4
INSTANTANEOUS PEAK FLOW			392
INSTANTANEOUS PEAK STAGE			16.70
INSTANTANEOUS LOW FLOW			.81
ANNUAL RUNOFF (AC-FT)	6280	3660	5390
ANNUAL RUNOFF (CFSM)	1.12	.65	.96
ANNUAL RUNOFF (INCHES)	15.15	8.83	13.01
10 PERCENT EXCEEDS	19	7.9	15
50 PERCENT EXCEEDS	2.4	2.1	2.5
90 PERCENT EXCEEDS	1.6	1.6	1.4

a From rating curve extended above 1000 ft³/s on basis of flow through culvert computations.

b From floodmark.

c Occurred Aug 13,16,1982, July 12,1989.



RED RIVER OF THE NORTH BASIN

05030150 OTTERTAIL RIVER NEAR PERHAM, MN

LOCATION.--Lat 46°58'34", long 95°53'15", in NW¼NW¼NW¼ sec. 34, T. 137 N., R. 39 W., Ottertail County, Hydrologic Unit 09020103, on left bank at bridge 3.3 mi northwest of Perham.

DRAINAGE AREA.--

PERIOD OF RECORD.--February 1933 to current year.

GAGE.--Water stage recorder. Elevation of gage is 1,335 ft above sea level, from topographic map. Prior to Aug. 4, 1933 nonrecording gage at same location.

REMARKS.--Records poor.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	319	e260	e148	e100	e96	e124	241	267	226	187	e175	e101
2	312	e240	e148	e100	e95	e123	239	267	216	183	e180	e100
3	316	e220	e148	e98	e94	e122	245	270	205	180	e180	e104
4	310	e210	e148	e97	e93	e121	245	264	198	176	e185	e106
5	301	e200	e147	e96	e92	e120	243	263	194	172	e185	e108
6	289	e195	e143	e96	e90	e119	241	260	189	168	e180	e110
7	301	e190	e140	e95	e90	e118	247	258	185	174	e175	e116
8	303	e185	e138	e94	e90	e117	249	249	178	175	e170	e118
9	298	e180	e134	e94	e90	e118	240	244	174	170	e165	e115
10	312	e175	e130	e93	e92	e118	244	244	172	169	e165	e110
11	316	e170	e128	e93	e94	e120	245	231	171	167	e165	e105
12	320	e168	e124	e93	e96	e125	246	232	172	170	e165	e100
13	309	e166	e121	e93	e98	e130	247	236	174	174	e170	e100
14	317	e164	e120	e93	e100	e135	249	237	177	175	e170	e100
15	316	e162	e120	e92	e110	e140	252	234	175	175	e175	e100
16	321	e160	e120	e90	e105	e155	254	242	183	173	e160	e98
17	338	e157	e118	e88	e110	e175	262	244	193	171	e155	e96
18	345	e152	e116	e86	e115	e190	257	235	191	170	e150	e100
19	357	e150	e114	e84	e120	e210	255	228	192	173	e144	e103
20	365	e149	e112	e83	e115	e230	256	229	201	178	e130	e102
21	370	e149	e110	e82	e100	e240	250	222	199	180	180	e101
22	412	e149	e110	e83	e112	238	247	219	198	e175	e115	e100
23	408	e149	e110	e84	e113	248	242	219	197	e174	e114	e100
24	392	e149	e110	e85	e115	250	234	224	197	e180	e110	e100
25	381	e149	e110	e86	e118	248	238	227	197	e180	e109	e96
26	e370	e148	e110	e87	e119	247	260	233	197	e175	e105	e94
27	e350	e148	e109	e88	e121	243	254	239	197	e175	e110	e92
28	e330	e148	e108	e91	e125	240	259	244	195	e175	e115	e96
29	e310	e148	e107	e94	---	239	265	241	193	e175	e110	e98
30	e290	e148	e106	e96	---	240	268	242	191	e170	e108	e100
31	e270	---	e104	e96	---	238	---	233	---	e170	e106	---
TOTAL	10248	5138	3811	2830	2908	5481	7474	7477	5727	5409	4626	3069
MEAN	331	171	123	91.3	104	177	249	241	191	174	149	102
MAX	412	260	148	100	125	250	268	270	226	187	185	118
MIN	270	148	104	82	90	117	234	219	171	167	105	92
AC-FT	20330	10190	7560	5610	5770	10870	14820	14830	11360	10730	9180	6090

e Estimated.

RED RIVER OF THE NORTH BASIN

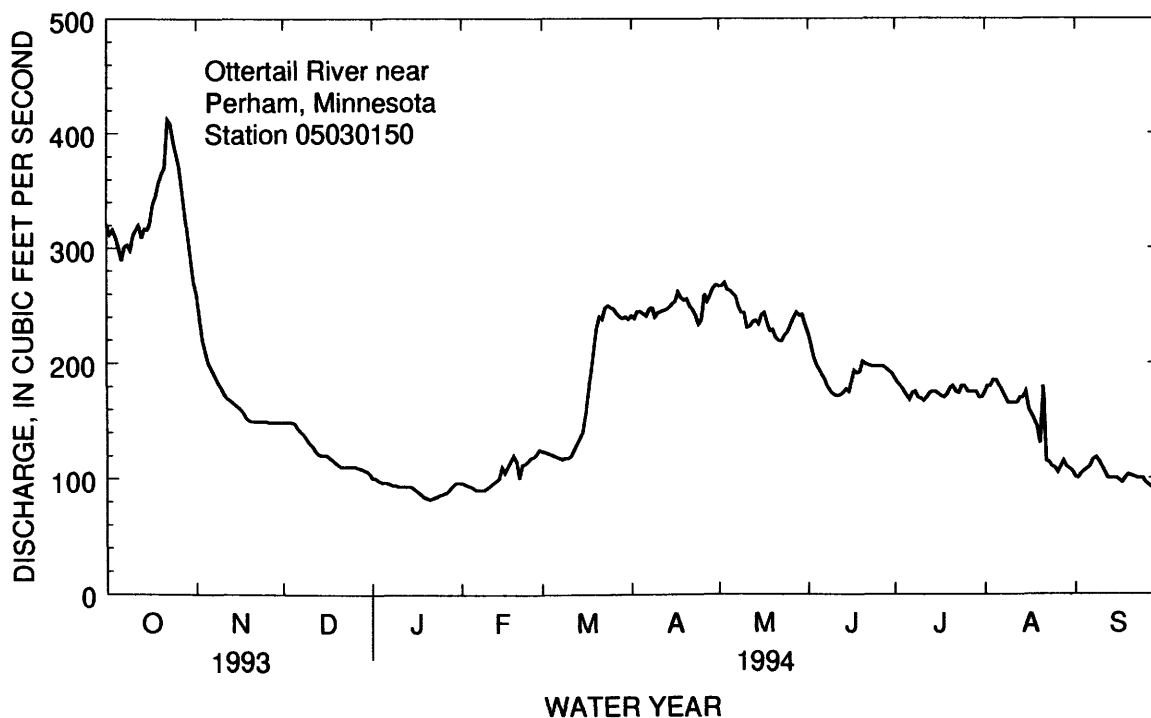
05030150 OTTERTAIL RIVER NEAR PERHAM, MN

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1993 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	331	171	123	91.3	100	152	240	245	200	234	376	291
MAX	331	171	123	91.3	104	177	249	249	208	293	603	481
(WY)	1994	1994	1994	1994	1994	1994	1994	1993	1993	1993	1993	1993
MIN	331	171	123	91.3	96.5	128	231	241	191	174	149	102
(WY)	1994	1994	1994	1994	1993	1993	1993	1994	1994	1994	1994	1994

SUMMARY STATISTICS FOR 1994 WATER YEAR WATER YEARS 1993 - 1994

ANNUAL TOTAL	64198	
ANNUAL MEAN	176	176
HIGHEST ANNUAL MEAN		176 1994
LOWEST ANNUAL MEAN		176 1994
HIGHEST DAILY MEAN	412 Oct 22	649 Aug 19 1993
LOWEST DAILY MEAN	82 Jan 21	82 Jan 21 1994
ANNUAL SEVEN-DAY MINIMUM	84 Jan 18	84 Jan 18 1994
INSTANTANEOUS PEAK FLOW	449 Oct 22	649 Aug 19 1993
INSTANTANEOUS PEAK STAGE	2.89 Oct 22	3.57 Aug 19 1993
ANNUAL RUNOFF (AC-FT)	127300	127400
10 PERCENT EXCEEDS	264	409
50 PERCENT EXCEEDS	170	191
90 PERCENT EXCEEDS	96	96



05030150- OTTER TAIL RIVER NEAR PERHAM, MINN--(Continued)
(National Water Quality Assessment Station)

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND	SPE-CIFIC CON-DUCT-ANCE (US/CM)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM)	PH WATER WHOLE FIELD (STAND-ARD UNITS)	PH WATER WHOLE LAB (STAND-ARD UNITS)	TEMPER-ATURE WATER (DEG C)	TEMPER-ATURE AIR (DEG C)	BARO-METRIC PRES-SURE (MM OF HG)	OXYGEN, DIS-SOLVED (MG/L)
		(00061)	(00095)	(90095)	(00400)	(00403)	(00010)	(00020)	(00025)	(00300)
OCT 04...	0830	293	340	380	8.1	7.9	7.5	7.5	731	9.6
NOV 17...	1000	157	397	414	8.2	7.8	2.5	0.0	732	10.1
FEB 07...	1030	92	488	472	7.3	8.1	0.0	-19.5	--	--
MAR 08...	1015	117	472	486	7.4	7.7	0.0	-11.5	735	11.8
28...	1100	249	439	441	7.7	7.9	1.5	1.0	726	10.3
APR 18...	0800	260	362	361	8.0	7.6	11.0	10.0	718	9.0
MAY 31...	0745	232	367	383	8.2	8.1	18.0	19.5	729	6.9
JUL 21...	0810	180	346	347	7.9	7.6	20.5	20.0	720	4.0
AUG 31...	1245	106	377	369	7.8	8.0	17.0	16.5	735	7.2
DATE	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY WAT DIS TOT IT FIELD MG/L AS CACO3	ALKA-LINITY LAB (MG/L AS CACO3)	CAR-BONATE WATER DIS IT FIELD MG/L AS CO3	BICAR-BONATE WATER DIS IT FIELD MG/L AS HCO3	SULFATE DIS-SOLVED (MG/L AS SO4)	
	(00915)	(00925)	(00930)	(00935)	(39086)	(90410)	(00452)	(00453)	(00945)	
OCT 04...	42	20	4.5	2.1	184	203	0	224	2.3	
NOV 17...	48	22	4.9	2.4	202	219	0	246	3.3	
FEB 07...	52	25	5.1	2.8	222	250	0	270	4.3	
MAR 08...	53	26	5.7	3.1	236	252	0	288	3.6	
28...	52	23	4.6	3.0	224	233	0	273	3.3	
APR 18...	42	18	3.7	2.4	179	185	0	219	2.9	
MAY 31...	43	21	4.4	1.9	187	206	0	228	2.2	
JUL 21...	39	21	4.0	1.2	165	184	0	202	1.5	
AUG 31...	44	22	4.9	1.7	184	195	0	224	2.4	

05030150 OTTERTAIL RIVER NEAR PERHAM, MINN--Continued
 WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DATE	CHLORIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUORIDE, DIS- SOLVED (MG/L AS F) (00950)	SILICA, DIS- SOLVED (MG/L AS SiO ₂) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO ₂ +NO ₃ DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N) (00625)
OCT 04...	2.9	0.10	11	216	<0.010	0.051	0.020	0.50	0.50
NOV 17...	3.5	<0.10	9.8	226	<0.010	0.160	0.020	0.50	0.50
FEB 07...	4.6	<0.10	16	277	0.020	0.650	0.210	0.60	0.90
MAR 08...	4.5	0.10	17	284	0.010	0.290	0.210	0.80	0.70
28...	4.1	<0.10	15	254	0.010	0.270	0.120	0.70	0.90
APR 18...	3.1	<0.10	9.7	207	<0.010	0.067	0.030	0.40	0.60
MAY 31...	2.8	0.30	7.5	223	<0.010	<0.050	0.030	0.50	0.60
JUL 21...	2.2	--	14	--	<0.010	<0.050	0.020	0.50	0.60
AUG 31...	3.4	0.10	17	221	<0.010	0.072	0.020	0.50	0.50
DATE	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)	SEDI- MENT, SUS- PENDE D (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS- PENDE D TOTAL (MG/L AS C) (00689)
OCT 04...	0.020	<0.010	<0.010	11	54	51	16	8.9	0.3
NOV 17...	0.010	<0.010	<0.010	2	90	18	33	8.3	0.3
FEB 07...	0.050	<0.010	<0.010	5	94	48	110	--	--
MAR 08...	0.040	0.020	<0.010	7	95	180	130	9.5	0.3
28...	0.040	<0.010	0.010	7	84	100	71	--	--
APR 18...	0.030	<0.010	<0.010	10	85	73	35	7.3	0.9
MAY 31...	0.020	0.010	0.020	5	70	110	47	--	--
JUL 21...	0.030	0.020	0.010	2	100	120	35	--	--
AUG 31...	0.030	0.010	<0.010	11	16	120	24	7.5	0.2

RED RIVER OF THE NORTH BASIN

05030500 OTTER TAIL RIVER NEAR ELIZABETH, MN

LOCATION.--Lat 46°22'10", long 96°01'02", in SW¹/₄SE¹/₄ sec.31, T.134 N., R.42 W., Ottertail County, Hydrologic Unit 09020103, on right bank, 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 mi², 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 plants upstream.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	757	662	e340	e400	e400	e445	456	691	694	474	355	188
2	831	656	e400	e400	e400	e445	462	695	690	472	299	194
3	836	651	e480	e400	e420	e445	467	743	672	455	400	199
4	829	654	e500	e400	e420	e450	477	752	656	485	470	203
5	821	648	e510	e400	e420	e460	482	702	675	478	370	204
6	812	639	e520	e400	e420	e450	493	721	662	461	371	230
7	806	638	e520	e400	e420	e445	498	728	652	465	381	248
8	759	630	e540	e400	e420	e440	503	728	623	482	376	229
9	766	624	e550	e400	e420	e440	504	727	586	489	371	213
10	762	620	e530	e400	e420	e435	510	702	583	491	366	216
11	763	618	e525	e400	e420	e435	516	712	584	489	348	218
12	761	576	526	e400	e420	e435	524	722	580	504	345	205
13	754	595	519	e400	e420	e430	528	739	574	484	392	163
14	754	607	515	e400	e420	e430	534	764	544	464	376	172
15	749	608	509	e400	e420	430	545	771	535	464	331	194
16	743	608	506	e400	e420	429	543	773	528	460	307	203
17	737	607	508	e400	e450	430	548	788	559	454	305	202
18	735	604	514	e400	e500	429	555	776	553	450	303	209
19	732	597	513	e400	e495	431	552	762	548	446	303	213
20	701	592	e510	e400	e485	443	557	756	577	444	299	212
21	700	594	e510	e400	e480	448	562	747	538	443	295	211
22	709	e590	e510	e400	e475	453	587	751	518	440	291	196
23	711	585	e510	e400	e470	449	582	748	518	436	251	231
24	733	e550	e510	e400	e465	464	578	756	497	432	161	254
25	704	e510	e510	e400	e460	454	601	757	489	426	157	260
26	632	e450	e510	e400	e450	451	640	756	491	418	190	293
27	667	e405	e450	e400	e445	450	656	755	491	405	237	302
28	675	e370	e420	e400	e445	446	656	753	485	402	265	308
29	671	e330	e400	e400	---	446	674	742	478	403	264	314
30	669	e325	e400	e400	---	446	684	731	475	400	212	317
31	665	---	e400	e400	---	451	---	718	---	395	183	---
TOTAL	22944	17143	15165	12400	12300	13735	16474	22966	17055	14011	9574	6801
MEAN	740	571	489	400	439	443	549	741	568	452	309	227
MAX	836	662	550	400	500	464	684	788	694	504	470	317
MIN	632	325	340	400	400	429	456	691	475	395	157	163
AC-FT	45510	34000	30080	24600	24400	27240	32680	45550	33830	27790	18990	13490
CFSM	.60	.46	.40	.33	.36	.36	.45	.60	.46	.37	.25	.18
IN.	.69	.52	.46	.38	.37	.42	.50	.69	.52	.42	.29	.21

e Estimated.

RED RIVER OF THE NORTH BASIN

05030500 OTTER TAIL RIVER NEAR ELIZABETH, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1992 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	439	357	315	290	324	378	453	597	635	599	434	417
MAX	740	571	489	400	439	443	549	741	702	745	759	817
(WY)	1994	1994	1994	1994	1994	1994	1994	1994	1993	1993	1993	1993
MIN	139	143	141	181	209	314	357	453	568	453	233	208
(WY)	1993	1993	1993	1993	1993	1993	1993	1993	1994	1994	1992	1992

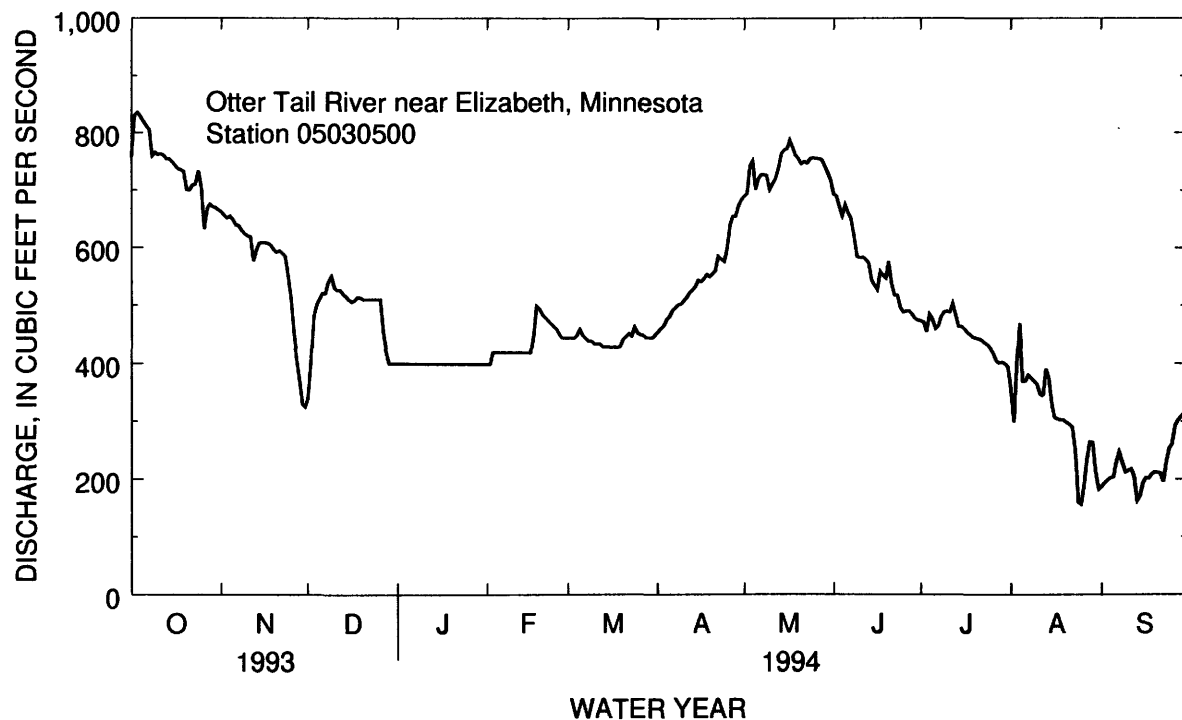
SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1992 - 1994

ANNUAL TOTAL	193403	180568		
ANNUAL MEAN	530	495		
HIGHEST ANNUAL MEAN			495	1994
LOWEST ANNUAL MEAN			414	1993
HIGHEST DAILY MEAN	837	Sep 20	837	Sep 20 1993
LOWEST DAILY MEAN	128	Jan 4	122	Oct 27 1992
ANNUAL SEVEN-DAY MINIMUM	137	Jan 1	124	Oct 26 1992
INSTANTANEOUS PEAK FLOW			840	Oct 3
INSTANTANEOUS PEAK STAGE			8.52 _a	Sep 20 1993
INSTANTANEOUS LOW FLOW			69	Feb 18 1994
ANNUAL RUNOFF (AC-FT)	383600	358200	69	Sep 13 1994
ANNUAL RUNOFF (CFSM)	.43	.40		
ANNUAL RUNOFF (INCHES)	5.85	5.46		
10 PERCENT EXCEEDS	804	736		
50 PERCENT EXCEEDS	534	472		
90 PERCENT EXCEEDS	203	294		

a Highwater mark, backwater from ice.



RED RIVER OF THE NORTH BASIN

05045950 ORWELL LAKE NEAR FERGUS FALLS, MN

LOCATION.--Lat 46°12'55", long 96°10'40", in SW 1/4 sec.26, T.132 N., R.44 W., Otter Tail County, Hydrologic Unit 09020103, at dam on Otter Tail River at outlet of Orwell Lake, 7 mi southwest of Fergus Falls.

DRAINAGE AREA.--1,830 mi², approximately.

PERIOD OF RECORD.--March 1953 to current year. Prior to October 1971, published as Orwell Reservoir.

GAGE.--Water-stage recorder. Datum of gage is in mean sea level, adjustment of 1912.

REMARKS.--Reservoir is formed by earth dam with concrete spillway with one taintor gate; storage began in March 1953. Capacity to elevation 1,070 ft (maximum operating stage) is 14,100 acre-ft of which 13,100 acre-ft is controlled storage above elevation 1,048 ft (minimum operating stage). Dead storage is 210 acre-ft. Figures given herein represent total contents. Reservoir is used for flood control and to increase low flow for water supply and pollution abatement.

COOPERATION.--Records were provided by U.S. Army Corps of Engineers.

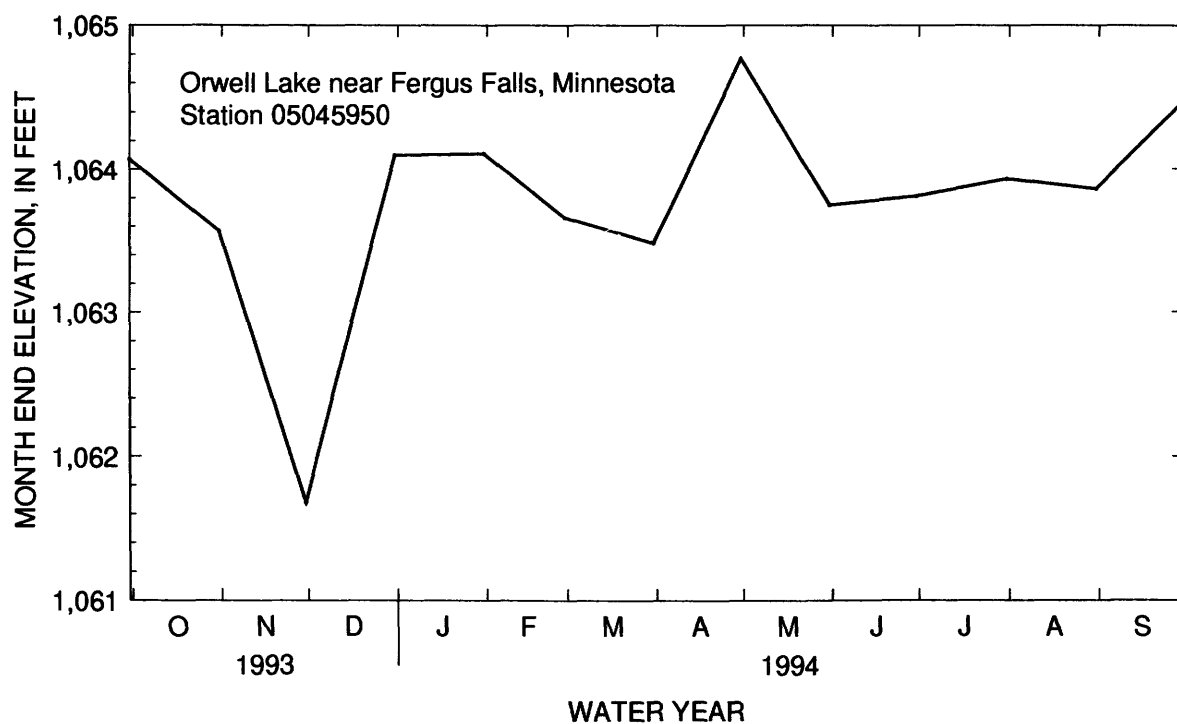
EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 16,920 acre-ft, June 17, 1962, May 23, 1966, elevation, 1,072.38 ft; minimum (after initial filling), 844 acre-ft, Aug. 26, 27, 1953, elevation, 1,046.96 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 9490 acre-ft, Mar. 25 elevation, 1065.40 ft; minimum, 6030 acre-ft, Mar. 15, elevation, 1060.81 ft.

MONTHEND ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30	1064.07	8360	
Oct. 31	1063.57	7980	-380
Nov. 30	1061.68	6590	-1390
Dec. 31	1064.10	8380	+1800
CAL YR 1993			+360
Jan. 31	1064.11	8390	+10
Feb. 28	1063.66	8040	-350
Mar. 31	1063.48	7910	-130
Apr. 30	1064.77	8960	+1050
May 31	1063.75	8110	-850
June 30	1063.81	8160	+50
July 31	1063.93	8250	+90
Aug. 31	1063.86	8200	-50
Sept. 30	1064.48	8710	510
WTR YR 1994			+350

RED RIVER OF THE NORTH BASIN
05045950 ORWELL LAKE NEAR FERGUS FALLS, MN



RED RIVER OF THE NORTH BASIN

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, 6.1 mi downstream from Dayton Hollow Dam, 8 mi southwest of Fergus Falls, and 11.1 mi downstream from Pelican River.

DRAINAGE AREA.--1,830 mi², approximately.

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 except those for estimated daily discharges, which are fair. Flow regulated by Orwell Lake (station 05045950) beginning Mar. 21, 1953 and powerplant upstream.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1050	877	502	e580	e560	610	759	1030	884	580	489	339
2	1050	846	502	e580	e560	600	759	1020	884	612	492	316
3	1050	846	502	e580	e600	595	759	1020	854	612	493	294
4	1020	846	502	e580	e625	595	759	1020	836	612	442	289
5	995	855	506	e580	e625	595	759	1020	840	595	405	287
6	995	865	661	e580	e630	595	759	1150	840	584	405	274
7	995	865	784	e580	e630	645	759	1230	840	590	405	265
8	998	814	716	e580	e630	687	754	1210	800	589	435	253
9	1000	771	675	e580	e625	738	753	1040	748	589	458	244
10	1000	771	697	e580	e750	819	753	936	672	589	485	244
11	1000	771	711	e525	e780	804	781	939	641	589	502	244
12	1000	771	711	e525	782	790	802	862	641	589	484	244
13	1000	771	695	e550	758	776	802	839	687	589	471	249
14	1000	771	681	e550	691	721	802	880	711	589	471	251
15	1000	774	681	e550	621	655	808	890	683	603	457	257
16	1000	777	681	e550	597	663	808	1080	664	612	446	283
17	1000	815	681	e550	584	690	808	1160	728	612	446	301
18	962	840	681	e550	574	722	810	1130	771	596	446	301
19	923	840	681	e550	566	747	814	1130	769	529	440	301
20	923	840	720	e550	577	754	814	1040	685	496	429	301
21	923	840	736	e550	578	779	811	975	635	500	426	279
22	923	840	717	e550	633	786	808	975	635	533	381	263
23	923	806	699	e550	676	617	808	974	638	567	354	258
24	923	780	686	e550	675	354	808	975	641	567	332	258
25	925	780	e510	550	697	642	850	975	641	567	341	258
26	929	771	e510	545	717	876	884	975	641	567	354	258
27	929	765	e510	540	716	1010	881	975	585	518	354	258
28	929	756	e425	540	657	1050	974	972	534	489	350	258
29	929	637	e425	e540	---	956	1030	968	534	489	233	338
30	929	e650	e425	e540	---	822	1030	968	538	489	164	417
31	929	---	e580	e540	---	759	---	932	---	489	270	---
TOTAL	30152	23951	19193	17245	18114	22452	24506	31290	21200	17531	12660	8382
MEAN	973	798	619	556	647	724	817	1009	707	566	408	279
MAX	1050	877	784	580	782	1050	1030	1230	884	612	502	417
MIN	923	637	425	525	560	354	753	839	534	489	164	244
AC-FT	59810	47510	38070	34210	35930	44530	48610	62060	42050	34770	25110	16630
CFSM	.53	.44	.34	.30	.35	.40	.45	.55	.39	.31	.22	.15

e Estimated.

RED RIVER OF THE NORTH BASIN

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

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	235	242	228	219	223	304	458	560	553	406	275	234
MAX	973	831	706	603	647	724	1051	1427	1425	1246	1080	1026
(WY)	1994	1986	1987	1986	1994	1994	1986	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 1993 CALENDAR YEAR

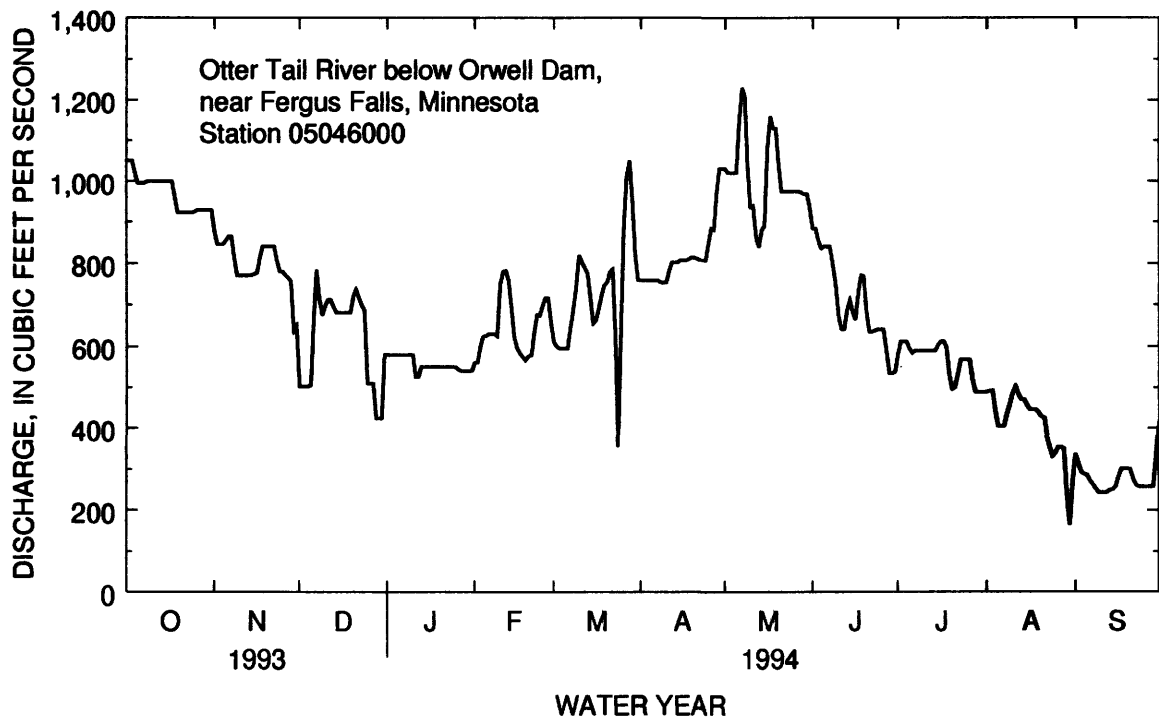
FOR 1994 WATER YEAR

WATER YEARS 1931 - 1994

ANNUAL TOTAL	262393	246676	328	
ANNUAL MEAN	719	676	842	1986
HIGHEST ANNUAL MEAN			20.4	1934
LOWEST ANNUAL MEAN			1670	Jun 20 1953
HIGHEST DAILY MEAN	1260	Jul 24	1230	May 7
LOWEST DAILY MEAN	137	Jan 1	164	Aug 30
ANNUAL SEVEN-DAY MINIMUM	163	Jan 1	247	Sep 8
INSTANTANEOUS PEAK FLOW			1280	May 6
INSTANTANEOUS PEAK STAGE			4.30	May 6
INSTANTANEOUS LOW FLOW			143	Aug 29
ANNUAL RUNOFF (AC-FT)	520500	489300	237900	
ANNUAL RUNOFF (CFSM)	.39	.37	.18	
10 PERCENT EXCEEDS	1050	975	722	
50 PERCENT EXCEEDS	747	675	255	
90 PERCENT EXCEEDS	265	354	31	

a Backwater from aquatic vegetation.

b Result of regulation.



RED RIVER OF THE NORTH BASIN

05046000 OTTER TAIL RIVER BELOW ORWELL DAM, NEAR FERGUS FALLS, MN--Continued
(National Water Quality Assessment Section)

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

PERIOD OF RECORD.--April 1993 to current year.

DATE	TIME	SAM- PLING DEPTH (M) (00098)	DIS- CHARGE, IN CUBIC FEET PER SECOND (00060)	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)	TEMPER- ATURE AIR (DEG C) (00020)
OCT 04...	1300	--	--	995	--	412	8.4	8.1	9.0	11.5
NOV 16...	1300	--	--	777	396	432	8.3	7.9	1.5	1.0
FEB 08...	0730	--	e630	--	476	479	8.0	7.8	0.0	-30.0
MAR 08...	1215	--	--	687	475	482	8.1	7.9	1.0	-7.5
28...	1300	--	--	1050	480	478	7.8	7.9	2.0	1.0
APR 18...	1100	--	--	808	443	446	8.4	7.9	10.5	10.0
MAY 31...	1100	--	--	968	413	427	8.3	7.9	21.5	20.5
JUN 13...	1630	--	--	722	418	--	8.5	--	20.0	--
JUL 06...	1145	--	--	584	471	412	8.4	8.0	22.0	23.0
25...	1545	--	--	562	399	--	8.5	--	22.0	--
AUG 19...	0800	--	--	452	412	413	8.3	7.7	19.5	17.5
30...	1145	0.0	--	164	410	--	8.6	--	20.0	--
SEP 27...	1130	--	--	255	439	--	8.6	--	15.5	--

BARO- METRIC PRES- SURE (MM DATE HG) (00025)	ALKA- MAGNE- CALCIUM OXYGEN, DIS- OF (MG/L) (00300)	CAR- POTAS- SIUM, DIS- SOLVED SOLVED AS CA) (00915)	BICAR- LINITY SODIUM, DIS- SOLVED (MG/L AS MG) (00925)	ALKA- SIUM, DIS- SOLVED (MG/L AS NA) (00930)	BONATE WAT DIS DIS- SOLVED (MG/L AS K) (00935)	BONATE LINITY TOT IT FIELD (MG/L CACO3 (39086)	WATER LAB (MG/L MG/L AS CACO3) (90410)	WATER DIS IT FIELD AS CO3 (00452)	DIS IT FIELD MG/L AS HCO3 (00453)	MG/L AS
OCT 04...	738	8.8	33	27	9.3	3.9	177	201	5	206
NOV 16...	737	11.6	36	27	8.6	4.2	191	209	13	220
FEB 08...	--	--	39	30	9.7	4.6	204	232	0	249
MAR 08...	735	12.2	41	30	10	4.8	214	229	0	261
28...	730	14.1	42	28	8.6	4.7	208	217	0	254
APR 18...	720	9.1	41	27	8.1	4.1	199	208	8	227
MAY 31...	739	9.0	39	27	7.8	3.8	198	210	0	243
JUN 13...	--	8.2	--	--	--	--	--	--	--	--
JUL 06...	735	7.6	38	27	8.3	3.4	--	206	--	--
25...	--	8.3	--	--	--	--	--	--	--	--
AUG 19...	735	7.2	35	26	8.7	3.6	181	198	0	221
30...	733	8.3	--	--	--	--	--	--	--	--
SEP 27...	727	8.9	--	--	--	--	--	--	--	--

e Estimated.

05046000- OTTER TAIL RIVER BL ORWELL D NR FERGUS FALLS, MN--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DATE	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN,AM- ORGANIC DIS. (MG/L AS N) (00623)	NITRO- GEN,AM- MONIA + MONIA + TOTAL (MG/L AS N) (00625)
OCT 04...	11	9.2	0.10	15	229	<0.010	<0.050	0.020	0.40	0.60
NOV 16...	11	10	0.10	14	239	0.030	<0.050	0.020	0.40	0.50
FEB 08...	12	11	0.10	17	270	0.020	0.160	0.110	0.60	0.70
MAR 08...	13	12	0.10	17	279	0.010	0.230	0.100	0.70	0.60
28...	24	11	0.10	15	276	0.020	0.430	0.110	0.70	0.90
APR 18...	18	9.3	0.10	13	259	<0.010	0.060	0.020	0.60	0.70
MAY 31...	12	7.5	0.30	12	257	<0.010	<0.050	0.040	0.60	0.70
JUN 13...	--	--	--	--	--	<0.010	0.150	<0.010	--	--
JUL 06...	12	9.0	0.20	16	252	<0.010	<0.050	0.030	0.60	0.60
25...	--	--	--	--	--	<0.010	<0.050	0.020	--	--
AUG 19...	9.3	9.3	0.10	18	243	<0.010	<0.050	0.020	0.50	1.0
30...	--	--	--	--	--	<0.010	<0.050	0.020	--	--
SEP 27...	--	--	--	--	--	<0.010	<0.050	0.020	--	--

DATE	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)	SEDI- MENT, SUS- PENDED (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)	BORON, TOTAL RECOVER- ABLE (UG/L) (00999)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS- PENDED TOTAL (MG/L AS C) (00689)
OCT 04...	0.020	<0.010	<0.010	4	100	--	5	1	7.6	0.5
NOV 16...	0.030	<0.010	<0.010	2	95	--	6	7	7.8	0.4
FEB 08...	0.040	0.010	0.010	1	100	--	21	32	--	--
MAR 08...	0.030	0.020	0.010	2	100	--	42	35	8.3	0.3
28...	0.050	0.020	0.020	--	--	--	57	46	--	--
APR 18...	0.030	<0.010	0.010	12	87	--	27	7	7.4	0.7
MAY 31...	0.040	0.040	0.010	15	99	--	7	3	8.7	0.9
JUN 13...	0.040	--	<0.010	9	92	--	--	--	--	--
JUL 06...	0.060	0.030	0.020	--	--	--	10	8	7.9	0.7
25...	0.030	--	0.010	14	85	--	--	--	--	--
AUG 19...	0.070	<0.010	<0.010	8	100	--	10	18	--	--
30...	0.050	--	<0.010	11	98	0	--	--	--	--
SEP 27...	0.060	--	<0.010	9	86	--	--	--	--	--

RED RIVER OF THE NORTH BASIN

05050000 BOIS DE SIOUX RIVER NEAR WHITE ROCK, SD

LOCATION.--Lat 45°51'45", long 96°34'25", in SW¹/₄SW¹/₄ sec.27, T.128 N., R.47 W., Roberts County, Hydrologic Unit 09020101, on Sisseton Indian Reservation, on left bank just downstream from 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 mi², 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 period which are poor. Flow regulated by Lake Traverse-Boise de Sioux Flood Control and Water Conservation project (available capacity for flood control, 137,000 acre-ft).

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	983	79	e5.8	e6.8	e6.6	e7.7	516	1180	1070	45	592	10
2	972	55	e5.6	e6.7	e6.6	e7.7	540	1170	1050	4.4	522	11
3	960	54	e5.5	e6.7	e6.7	e7.7	467	1160	1030	4.2	473	14
4	938	55	e5.4	e6.6	e6.8	e7.7	604	1170	1000	4.3	362	15
5	929	54	e5.4	e6.6	e6.8	e7.7	921	1160	980	4.6	356	14
6	916	54	e5.4	e6.6	e6.8	e7.7	1190	1110	956	5.4	304	13
7	889	47	e5.4	e6.6	e6.8	e7.7	1370	1120	929	192	269	12
8	866	45	e5.8	e6.6	e7.0	e7.9	1400	1120	831	422	262	11
9	846	44	e6.6	e6.6	e7.0	e8.2	1420	1110	742	474	256	11
10	830	30	e6.8	e6.6	e7.0	e9.0	1390	1100	717	584	204	11
11	794	5.9	e7.0	e6.6	e7.0	e100	1380	1110	693	738	152	10
12	706	4.7	e7.1	e6.6	e7.1	e200	1290	1090	668	858	124	7.7
13	646	4.7	e7.2	e6.6	e7.2	e210	1170	1090	564	891	100	7.8
14	617	4.7	e7.2	e6.6	e7.4	e240	1150	1100	477	890	97	7.9
15	523	4.3	e7.1	e6.6	e7.4	e270	1170	1090	371	853	94	8.6
16	409	4.4	e7.1	e6.6	e7.5	e320	1140	1080	290	804	59	5.7
17	406	4.5	e7.1	e6.6	e7.6	e360	1120	1070	326	701	6.9	6.0
18	404	5.0	e7.0	e6.6	e7.6	e410	1120	1080	365	768	5.5	5.5
19	399	4.9	e7.0	e6.6	e7.6	e480	1110	1080	354	1040	5.0	5.3
20	399	5.4	e7.0	e6.6	e7.6	e550	1100	1070	266	1170	4.5	4.1
21	393	e5.8	e6.9	e6.6	e7.6	e410	1090	1080	135	1170	4.1	2.5
22	295	e6.1	e6.9	e6.6	e7.6	e300	1080	1080	121	1130	3.5	2.8
23	184	e5.5	e6.9	e6.6	e7.6	e220	1070	1090	119	1090	3.9	3.7
24	182	e6.0	e6.8	e6.6	e7.6	e190	1070	1100	120	1060	3.6	3.9
25	184	e6.6	e6.8	e6.6	e7.6	e170	1080	1100	121	1040	4.1	3.2
26	185	e6.8	e6.8	e6.6	e7.6	e160	1110	1100	120	1010	11	3.2
27	181	e6.8	e6.8	e6.6	e7.6	e150	1120	1100	91	978	8.3	2.3
28	185	e6.6	e6.8	e6.6	e7.6	e150	1120	1100	63	952	7.5	1.6
29	142	e6.4	e6.8	e6.6	---	e250	1140	1090	62	917	10	1.3
30	107	e6.2	e6.8	e6.6	---	465	1180	1090	61	838	11	1.6
31	103	---	e6.8	e6.6	---	484	---	1080	---	721	10	---
TOTAL	16573	628.3	203.6	205.0	202.9	6168.0	32628	34270	14692	21358.9	4324.9	216.7
MEAN	535	20.9	6.57	6.61	7.25	199	1088	1105	490	689	140	7.22
MAX	983	79	7.2	6.8	7.6	550	1420	1180	1070	1170	592	15
MIN	103	4.3	5.4	6.6	6.6	7.7	467	1070	61	4.2	3.5	1.3
AC-FT	32870	1250	404	407	402	12230	64720	67970	29140	42370	8580	430
CFSM	.46	.02	.01	.01	.01	.17	.94	.95	.42	.59	.12	.01
IN.	.53	.02	.01	.01	.01	.20	1.05	1.10	.47	.68	.14	.01

e Estimated.

RED RIVER OF THE NORTH BASIN

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

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1942 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	25.8	11.8	4.87	2.59	3.32	28.8	216	260	235	167	74.9	37.0
MAX	535	258	57.5	36.0	53.0	227	1322	1310	1103	1035	1182	1062
(WY)	1994	1985	1985	1987	1966	1985	1969	1969	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 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

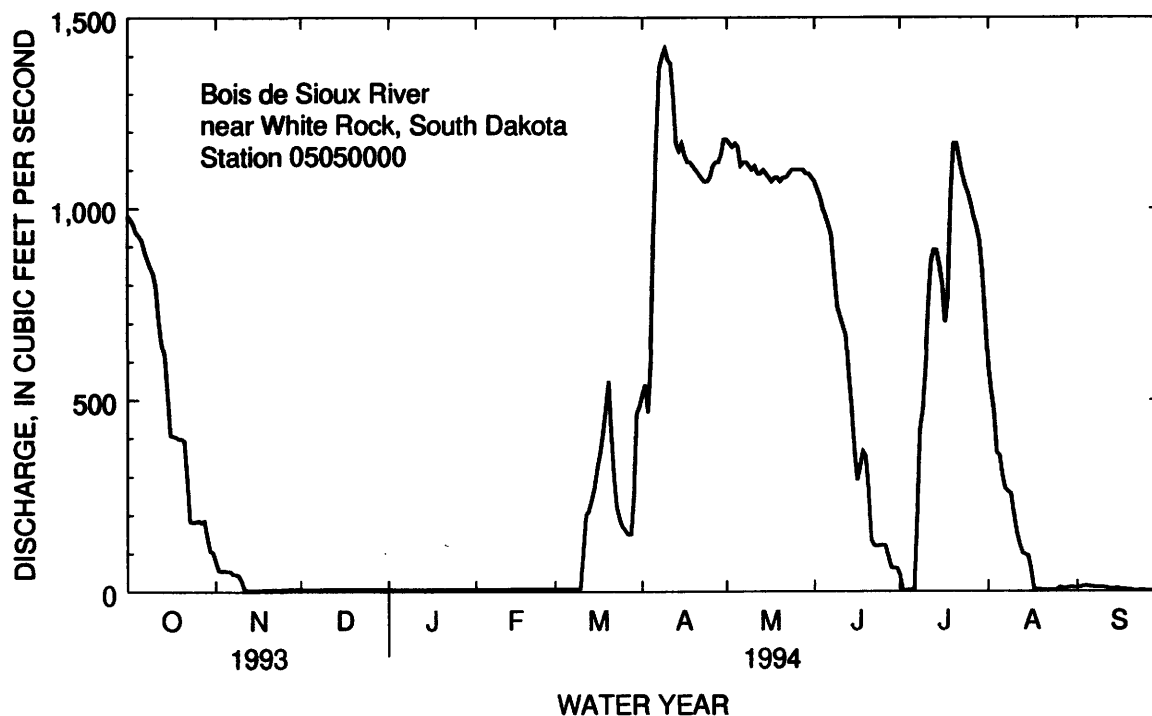
WATER YEARS 1942 - 1994

ANNUAL TOTAL	143443.9	131471.3	
ANNUAL MEAN	393	360	89.2 ^a
HIGHEST ANNUAL MEAN			360 1994
LOWEST ANNUAL MEAN			.38 1977
HIGHEST DAILY MEAN	1290 Aug 4	1420 Apr 9	3380 Apr 20 1969
LOWEST DAILY MEAN	4.1 Feb 14	1.3 Sep 29	.00 Oct 1 1941
ANNUAL SEVEN-DAY MINIMUM	4.1 Feb 14	2.4 Sep 24	.00 Oct 1 1941
INSTANTANEOUS PEAK FLOW		1550 Apr 8	3770 ^b Apr 19 1969
INSTANTANEOUS PEAK STAGE		11.88 Apr 8	15.07 ^{b,c} Apr 19 1969
ANNUAL RUNOFF (AC-FT)	284500	260800	64610
ANNUAL RUNOFF (CFSM)	.34	.31	.077
ANNUAL RUNOFF (INCHES)	4.60	4.22	1.04
10 PERCENT EXCEEDS	1110	1100	273
50 PERCENT EXCEEDS	159	62	2.0
90 PERCENT EXCEEDS	4.4	5.4	.00

a Median of annual mean discharges is 54 ft³/s.

b Occurred during period Apr. 19-21, 1969.

c From floodmark.



RED RIVER OF THE NORTH BASIN

05051300 BOIS DE SIOUX RIVER NEAR DORAN, MN

LOCATION.--Lat 46°09'08", long 96°34'44", in NE 1/4 NE 1/4 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, MN.

DRAINAGE AREA.--1,880 mi² 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 Wilken County Highway Engineer).

REMARKS.--Records good except for estimated daily discharges which are fair. 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 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1060	108	e9.0	e7.6	e6.8	e9.7	3080	1970	1100	45	812	13
2	1050	78	e9.0	e7.6	e6.8	e9.8	2900	1750	1090	40	673	13
3	1050	45	e9.0	e7.4	e6.8	e10	2430	1580	1070	15	616	14
4	1030	41	e9.0	e7.4	e7.0	e10	1690	1470	1050	6.8	523	16
5	1010	32	e9.0	e7.4	e7.0	e10	1360	1420	1030	6.1	407	19
6	999	e35	e9.0	e7.4	e7.0	e10	1380	1380	1000	119	419	15
7	972	e33	e9.0	e7.2	e7.0	e11	1500	1330	978	276	336	12
8	940	e28	e9.0	e7.2	e7.0	e11	1610	1310	947	1270	307	12
9	913	e24	e8.8	e7.2	e7.2	e11	1650	1290	840	1870	300	12
10	905	e21	e8.8	e7.2	e7.2	e12	1650	1280	774	1810	291	10
11	885	e17	e8.8	e7.2	e7.4	e12	1620	1250	740	1580	220	8.8
12	841	e14	e8.6	e7.2	e7.4	e13	1570	1240	710	1350	189	7.8
13	754	e11	e8.6	e7.0	e7.6	e26	1480	1230	677	1210	150	10
14	697	e8.2	e8.6	e7.0	e7.8	e50	1380	1240	547	1120	130	7.6
15	662	e6.4	e8.4	e7.0	e7.8	e170	1330	1240	479	1030	127	7.1
16	524	e5.6	e8.4	e7.0	e8.0	e325	1350	1250	333	956	124	6.1
17	440	e5.2	e8.4	e7.0	e8.0	e400	1350	1240	290	876	88	6.1
18	429	e5.0	e8.4	e7.0	e8.2	e480	1310	1220	347	849	30	5.2
19	426	e5.0	e8.2	e6.8	e8.2	e580	1280	1210	365	1430	17	4.3
20	418	e5.0	e8.2	e6.8	e8.4	e640	1280	1200	349	1780	12	4.2
21	410	e5.2	e8.2	e6.8	e8.4	e760	1270	1190	217	1860	10	4.8
22	402	e5.6	e8.0	e6.8	e8.6	e840	1260	1180	146	1740	9.1	5.3
23	263	e6.4	e8.0	e6.8	e8.6	e840	1250	1160	121	1540	9.4	4.9
24	181	e7.2	e8.0	e6.8	e8.8	e780	1220	1150	112	1380	7.5	4.6
25	175	e8.0	e7.8	e6.8	e9.0	e700	1220	1140	112	1270	6.9	4.3
26	173	e9.4	e7.8	e6.8	e9.2	e620	1290	1120	110	1200	9.1	3.7
27	178	e9.4	e7.8	e6.8	e9.4	e560	1570	1120	109	1150	13	3.4
28	170	e9.4	e7.8	e6.8	e9.6	e500	1710	1120	82	1110	15	3.4
29	168	e9.2	e7.6	e6.8	---	e450	1600	1110	56	1070	11	3.6
30	126	e9.0	e7.6	e6.8	---	e560	1800	1110	50	1030	9.8	3.8
31	102	---	e7.6	e6.8	---	e2580	---	1100	---	936	13	---
TOTAL	18353	606.2	260.4	218.4	220.2	11990.5	47390	39600	15831	31924.9	5884.8	245.0
MEAN	592	20.2	8.40	7.05	7.86	387	1580	1277	528	1030	190	8.17
MAX	1060	108	9.0	7.6	9.6	2580	3080	1970	1100	1870	812	19
MIN	102	5.0	7.6	6.8	6.8	9.7	1220	1100	50	6.1	6.9	3.4
AC-FT	36400	1200	517	433	437	23780	94000	78550	31400	63320	11670	486
CFSM	.31	.01	.00	.00	.00	.21	.84	.68	.28	.55	.10	.00
IN.	.36	.01	.01	.00	.00	.24	.94	.78	.31	.63	.12	.00

e Estimated.

RED RIVER OF THE NORTH BASIN

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

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1990 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	137	8.27	4.64	2.25	3.14	178	575	351	293	701	376	335
MAX	592	20.2	8.48	7.05	7.86	387	1580	1277	528	1477	1486	1244
(WY)	1994	1994	1990	1994	1994	1994	1994	1994	1994	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 1993 CALENDAR YEAR

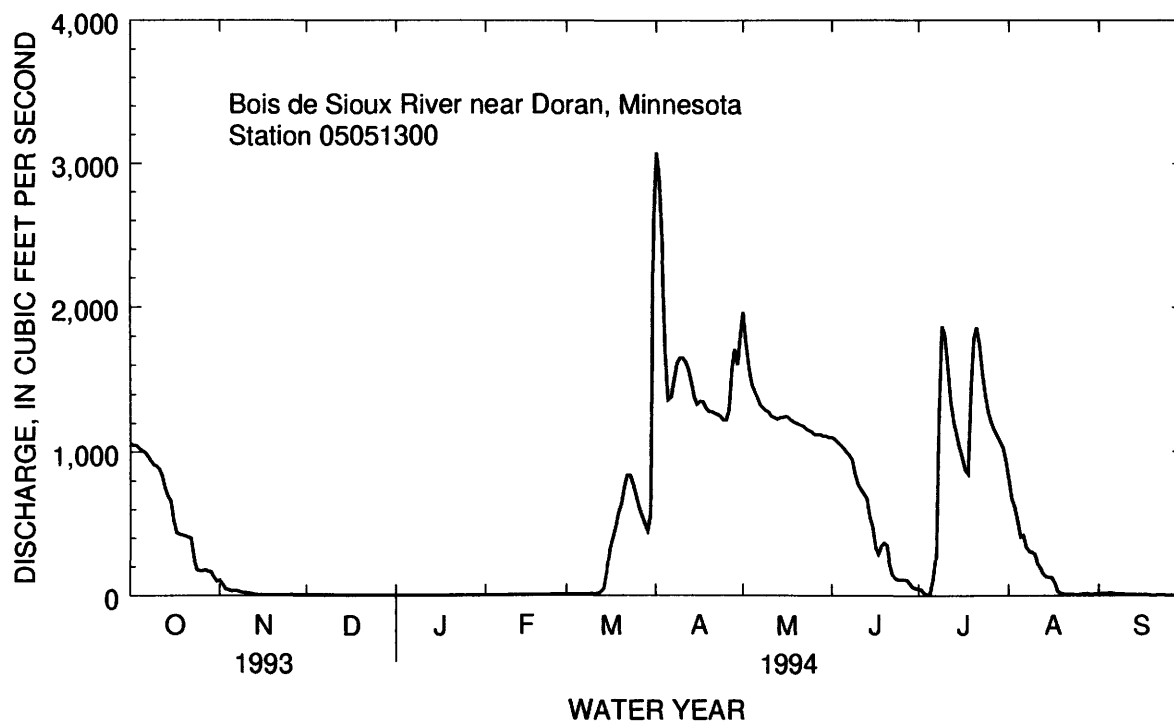
FOR 1994 WATER YEAR

WATER YEARS 1990 - 1994

ANNUAL TOTAL	220799.8	172524.4	
ANNUAL MEAN	605	473	248
HIGHEST ANNUAL MEAN			553
LOWEST ANNUAL MEAN			8.77
HIGHEST DAILY MEAN	3600	3080	3600
LOWEST DAILY MEAN	2.1	3.4	.00 ^a
ANNUAL SEVEN-DAY MINIMUM	2.1	3.8	.00
INSTANTANEOUS PEAK FLOW		3100	3660
INSTANTANEOUS PEAK STAGE		20.82 ^b	21.39 ^b
ANNUAL RUNOFF (AC-FT)	438000	342200	179900
ANNUAL RUNOFF (CFSM)	.32	.25	.13
ANNUAL RUNOFF (INCHES)	4.37	3.41	1.79
10 PERCENT EXCEEDS	1450	1350	1100
50 PERCENT EXCEEDS	363	56	9.5
90 PERCENT EXCEEDS	3.1	6.8	.06

a Many days.

b Backwater from ice.



RED RIVER OF THE NORTH BASIN

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

WATER-QUALITY RECORDS

PERIOD OF RECORD.--October 1993 to September 1994.

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	DIS-CHARGE, IN CUBIC FEET PER SECOND (00060)	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH WATER FIELD (STANDARD UNITS) (00400)	BAROMETRIC PRESSURE (MM OF HG) (00025)	TEMPERATURE AIR (DEG C) (00020)	TEMPERATURE WATER (DEG C) (00010)	OXYGEN, DIS-SOLVED, (PER CENT SATURATION) (00300)	OXYGEN, DIS-SOLVED (PER CENT SATURATION) (00301)	HARDNESS TOTAL (MG/L AS CaCO3) (00900)	ALKALINITY WAT DIS TOT IT FIELD MG/L AS CaCO3 (39086)
OCT 05...	0730	1010	--	1040	8.0	731	8.0	7.5	8.4	73	510	279
NOV 16...	0900	--	5.6	1700	8.2	737	1.0	0.5	10.6	77	830	326
FEB 08...	0930	--	7.0	2270	7.6	--	--	0.0	--	--	1100	546
MAR 14...	1300	--	50	1910	7.6	730	1.0	1.0	12.8	95	940	418
28...	1440	--	500	665	7.9	--	3.5	1.5	--	--	280	99
APR 18...	1300	1310	--	743	9.1	722	16.0	9.0	10.2	93	340	135
MAY 31...	1400	1100	--	963	7.9	740	20.0	21.0	5.8	67	460	178
JUL 06...	1500	157	--	--	8.4	740	20.0	22.0	8.8	--	710	--
AUG 19...	0615	19	--	923	8.3	735	18.5	20.0	4.7	54	420	185

DATE	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 PERCENT (00932)	SODIUM ADSORPTION RATIO (00931)	POTASSIUM, DIS-SOLVED (MG/L AS K) (00935)	BICARBONATE WATER DIS IT FIELD (MG/L AS HCO3) (00453)	CARBONATE WATER DIS IT FIELD (MG/L AS CO3) (00452)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLORIDE, DIS-SOLVED (MG/L AS Cl) (00940)	FLUORIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SiO2) (00955)
OCT 05...	100	63	42	15	0.8	14	340	0	370	19	0.20	16
NOV 16...	150	110	66	14	1	16	398	0	620	24	0.20	9.1
FEB 08...	220	140	98	16	1	20	666	0	790	40	0.30	37
MAR 14...	180	120	84	16	1	19	510	0	660	39	0.30	28
28...	65	28	18	12	0.5	7.6	120	0	190	10	0.20	16
APR 18...	69	41	25	13	0.6	8.3	110	27	240	12	0.20	0.52
MAY 31...	95	55	31	12	0.6	10	217	0	320	17	0.50	9.9
JUL 06...	130	93	54	14	0.9	10	--	--	580	17	0.30	11
AUG 19...	84	51	31	14	0.7	9.5	225	0	270	11	0.20	15

RED RIVER OF THE NORTH BASIN

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DATE	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NITRATE DIS- SOLVED (MG/L AS N) (00618)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITRO- GEN, ORGANIC DIS- SOLVED (MG/L AS N) (00607)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N) (00625)
OCT 05...	793	792	1.08	2160	0.030	0.200	0.230	0.230	0.080	1.0	1.0	1.1
NOV 16...	1190	1320	1.80	20.0	0.030	--	--	<0.050	0.030	1.2	1.1	1.2
FEB 08...	1680	1860	2.53	35.2	0.020	--	--	<0.050	1.60	1.7	1.4	3.3
MAR 14...	1390	1520	2.07	205	0.020	0.041	0.061	0.061	1.30	1.8	1.8	3.1
28...	419	447	0.61	603	0.310	4.89	5.20	5.20	0.370	1.3	1.0	1.7
APR 18...	481	536	0.73	1900	0.050	0.890	0.940	0.940	<0.010	1.9	--	1.9
MAY 31...	645	716	0.97	2130	<0.010	--	--	<0.050	0.030	0.97	0.57	1.0
JUL 06...	1030	1130	1.54	479	<0.010	--	--	<0.050	0.030	1.7	1.4	1.7
AUG 19...	583	643	0.87	33.0	<0.010	--	--	<0.050	0.020	2.3	1.1	2.3
DATE	NITRO- GEN,AM- MONIA + ORGANIC DIS- SOLVED (MG/L AS N) (00623)	NITRO- GEN, TOTAL (MG/L AS N) (00600)	PHOS- PHOS- PHORUS TOTAL (MG/L AS P) (00665)	PHOS- PHORUS DIS- SOLVED (MG/L AS P) (00666)	ORTHO, DIS- SOLVED (MG/L AS P) (00671)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS- PENDE TOTAL (MG/L AS C) (00689)	SEDI- MENT, SUS- PENDE (MG/L) (80154)	SEDI- MENT, DIS- CHARGE, SUS- PENDE (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
OCT 05...	1.1	1.3	0.250	0.200	0.180	17	30	13	0.4	7	19	92
NOV 16...	1.1	1.2	0.120	0.050	0.040	14	280	15	1.2	12	0.18	96
FEB 08...	3.0	3.3	1.30	0.720	0.740	870	4700	--	--	71	1.3	100
MAR 14...	3.1	3.2	0.960	0.810	0.740	84	2000	18	0.4	19	2.6	99
28...	1.4	6.9	0.570	0.490	0.440	21	40	--	--	39	53	100
APR 18...	0.90	2.8	0.170	0.040	0.010	130	13	11	>5.0	38	134	97
MAY 31...	0.60	1.0	0.170	0.050	0.050	21	130	13	0.8	22	65	100
JUL 06...	1.4	1.7	0.350	0.270	0.240	8	170	15	1.9	27	11	96
AUG 19...	1.1	2.3	0.400	0.140	0.110	7	29	--	--	35	1.8	93

RED RIVER OF THE NORTH BASIN

05051500 RED RIVER OF THE NORTH AT WAHPETON, N.D.

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 mi², approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--April 1942 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 nonrecording gage 800 ft upstream, converted to present datum. Aug. 6, 1943, to Oct. 27, 1950, nonrecording gage at present site and datum.

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 elevation 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 powerplants.

EXTREMES OUTSIDE PERIOD OF RECORD.--A stage of 17.0 ft, discharge, 10,500 ft³/s, occurred in the spring of 1897. The discharge has not been exceeded since.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2060	1080	563	e450	e510	e600	4350	2980	2100	613	1400	234
2	2040	1070	456	e600	e520	e600	4320	2910	2050	647	1260	346
3	2040	974	422	e590	e520	e610	3960	2750	2030	678	1180	357
4	2030	954	396	e580	e520	e620	3300	2640	2000	698	1100	322
5	2010	950	387	e570	e520	e620	2660	2560	1960	674	930	315
6	1970	942	e350	e570	e530	e640	2430	2510	1920	711	849	315
7	1940	971	e320	e560	e540	e660	2450	2490	1890	918	812	306
8	1920	969	e310	e560	e540	e670	2540	2540	1880	1630	764	288
9	1900	930	e310	e560	e540	e700	2600	2540	1770	2330	758	280
10	1890	880	e300	e560	e550	e750	2620	2480	1640	2490	788	268
11	1870	875	e300	e560	e560	e800	2570	2330	1540	2340	774	262
12	1850	858	e300	e560	e570	e850	2520	2270	1470	2100	736	259
13	1790	871	e360	e550	e580	e950	2470	2240	1450	1910	729	277
14	1720	856	e410	e550	e600	e1000	2360	2240	1390	1780	638	286
15	1690	843	e420	e550	e600	e1100	2310	2240	1320	1690	615	275
16	1610	839	e410	e540	e600	e1050	2300	2230	1190	1620	600	265
17	1500	839	e400	e540	e600	e1000	2300	2270	1060	1570	569	280
18	1470	856	e390	e540	e600	e1100	2260	2380	1130	1510	502	312
19	1460	890	e380	e540	e600	e1300	2210	2380	1230	1870	486	315
20	1410	896	e370	e560	e600	e1500	2200	2360	1230	2220	461	315
21	1390	893	e350	e560	e610	e2000	2190	2330	1090	2360	437	316
22	1380	878	e340	e580	e620	e3000	2170	2250	877	2350	430	310
23	1300	880	e330	e590	e625	e4900	2150	2210	819	2210	409	289
24	1180	824	e320	e600	e620	e4700	2140	2220	824	2060	379	282
25	1170	703	e310	e590	e610	e4500	2140	2200	817	1930	351	276
26	1230	495	e300	e580	e600	e4300	2220	2160	822	1840	348	274
27	1190	546	e290	e570	e600	e4200	2440	2150	814	1780	356	274
28	1170	559	e290	e560	e590	e4100	2660	2140	759	1700	356	274
29	1170	566	e285	e540	---	4020	2670	2130	636	1620	355	279
30	1140	576	e280	e540	---	3970	2760	2120	592	1580	304	319
31	1070	---	e350	e520	---	4170	---	2110	---	1520	205	---
TOTAL	49560	25263	10999	17320	16075	60980	78270	73360	40300	50949	19881	8770
MEAN	1599	842	355	559	574	1967	2609	2366	1343	1644	641	292
MAX	2060	1080	563	600	625	4900	4350	2980	2100	2490	1400	357
MIN	1070	495	280	450	510	600	2140	2110	592	613	205	234
AC-FT	98300	50110	21820	34350	31880	121000	155200	145500	79940	101100	39430	17400

e Estimated.

RED RIVER OF THE NORTH BASIN

05051500 RED RIVER OF THE NORTH AT WAHPETON, N.D.--Continued

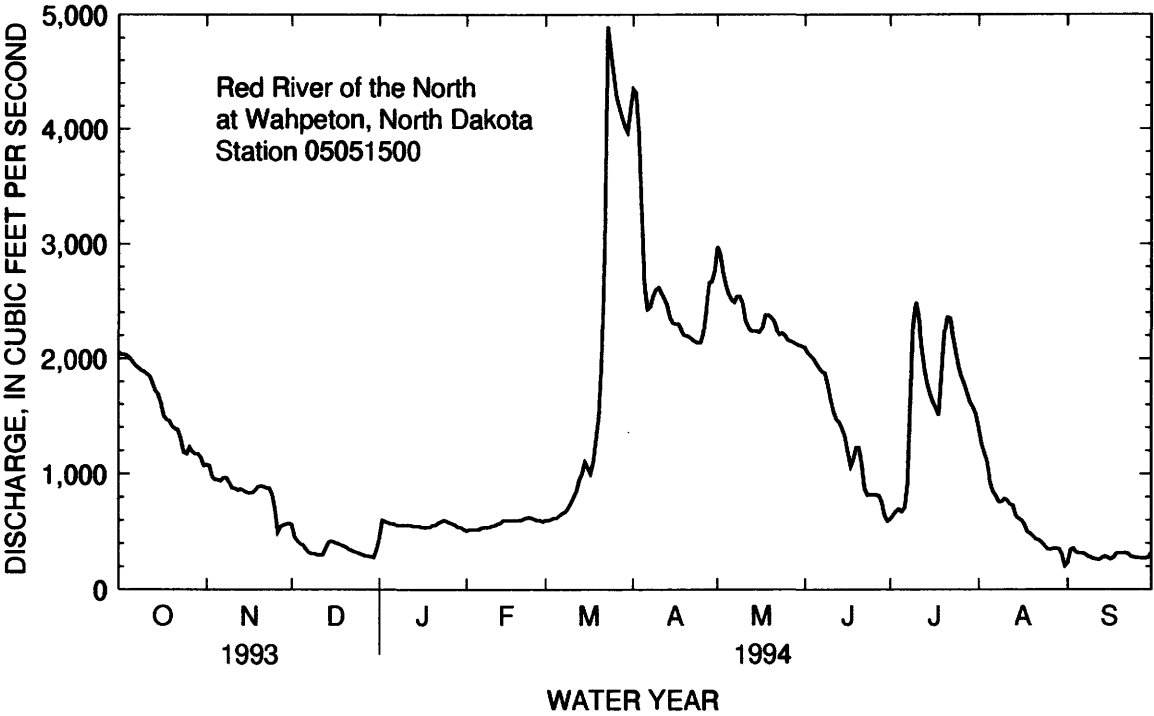
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1942 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	320	296	266	258	268	604	1233	1024	1027	777	419	332
MAX	1599	952	820	678	687	1967	4436	3085	2675	2787	2496	2148
(WY)	1994	1987	1987	1986	1987	1994	1969	1986	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 1993 CALENDAR YEAR FOR 1994 WATER YEAR WATER YEARS 1942 - 1994

ANNUAL TOTAL	499212	451727	564
ANNUAL MEAN	1368	1238	1477
HIGHEST ANNUAL MEAN			1986
LOWEST ANNUAL MEAN			54.0
HIGHEST DAILY MEAN	5930	Mar 31	4900
LOWEST DAILY MEAN	105	Jan 2	205
ANNUAL SEVEN-DAY MINIMUM	129	Jan 1	270
INSTANTANEOUS PEAK FLOW			5000 ^a
INSTANTANEOUS PEAK STAGE			13.59 ^b
INSTANTANEOUS LOW FLOW			1.7
ANNUAL RUNOFF (AC-FT)	990200	896000	408600
10 PERCENT EXCEEDS	2510	2440	1350
50 PERCENT EXCEEDS	1220	856	355
90 PERCENT EXCEEDS	240	315	102

a Approximately.
b Backwater.



RED RIVER OF THE NORTH BASIN

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

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

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)	PH WATER WHOLE LAB (STAND- ARD UNITS) (00403)	TEMPER- ATURE AIR (DEG C) (00020)	TEMPER- ATURE WATER (DEG C) (00010)	HARD- NESS TOTAL (MG/L AS CACO3) (00900)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)
OCT 13...	0930	1750	762	--	--	9.0	8.0	--	--	--	--
JAN 12...	1735	560	540	--	--	-12.0	0.5	--	--	--	--
FEB 23...	1020	626	520	--	--	-12.0	0.0	--	--	--	--
MAR 26...	0925	4310	586	--	--	-3.0	0.0	--	--	--	--
MAR 30...	1315	3930	631	--	7.3	6.5	1.0	290	136	66	31
APR 14...	0930	2360	647	--	--	15.5	9.0	--	--	--	--
MAY 17...	0900	2260	684	--	--	21.0	16.0	--	--	--	--
JUN 09...	0930	1780	764	--	--	19.5	18.5	--	--	--	--
JUL 12...	0710	2150	684	--	--	18.5	20.0	--	--	--	--
AUG 18...	1300	503	471	8.1	--	23.5	22.0	230	205	41	30

DATE	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	SODIUM PERCENT (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR 30...	16	10	0.4	6.3	150	13	0.20	17	381	419	0.57
AUG 18...	12	10	0.3	4.2	36	12	0.10	18	277	293	0.40

DATE	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BORON, DIS- SOLVED (UG/L AS B) (01020)	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)
MAR 30...	4450	5	30	30	<1	30	40	<0.1	<1	<1	300
AUG 18...	398	3	50	20	<1	20	20	0.1	<1	<1	190

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RED RIVER OF THE NORTH BASIN

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 mi² , approximately.

WATER-DISCHARGE RECORDS

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 powerplants.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2010	990	e430	e270	e540	e750	6250	2620	2040	694	e1200	310
2	2000	966	e450	e300	e560	e720	5960	2690	2030	684	e1150	242
3	2010	965	e460	e370	e570	e700	5680	2750	2000	692	e1200	294
4	2000	919	e460	e420	e580	e680	5260	2740	1970	747	e1100	358
5	2000	877	e470	e440	e590	e660	4610	2670	1940	765	e1000	362
6	2000	859	e480	e465	e600	e640	3830	2600	1910	760	e950	346
7	1960	794	e480	e470	e600	e640	3200	2520	1870	778	e840	334
8	1920	802	e480	e470	e620	e640	2870	2470	1830	1050	e780	322
9	1900	953	e480	e470	e640	e620	2700	2450	1810	1400	e730	312
10	1870	999	e480	e470	e650	e640	2640	2450	1780	2000	e700	299
11	1840	943	e480	e470	e680	e720	2610	2430	1680	2300	758	285
12	1820	953	e480	e460	e690	e770	2580	2380	1580	2380	762	274
13	1790	869	e480	e450	e720	e790	2540	2310	1490	2310	738	270
14	1750	817	e480	e430	e740	e840	2500	2290	1440	2310	719	270
15	1670	792	e480	e430	e750	e890	2450	2260	1390	2140	676	281
16	1610	754	e480	e440	e740	e950	2400	2240	1330	1940	628	279
17	1540	814	e480	e450	e730	e1200	2370	2210	1260	1770	617	269
18	1430	827	e480	e460	e700	e1250	2360	2210	1130	1640	595	260
19	1370	778	e480	e460	e690	e1400	2340	2250	1110	1570	548	278
20	1340	793	e480	e470	e680	e1800	2290	2290	1190	1680	520	301
21	1290	810	e460	e480	e650	e2000	2250	2290	1210	2040	497	319
22	1250	787	e430	e500	e620	e2500	2230	2270	1170	2270	474	322
23	1240	726	e400	e520	e615	e3000	2210	2240	1020	2380	469	322
24	1220	682	e370	e540	e600	e3200	2200	2200	896	2390	460	306
25	1110	e600	e350	e550	e640	e3800	2190	2170	873	e2250	437	287
26	1060	e500	e330	e560	e680	4490	2200	2150	877	e1860	429	279
27	1090	e460	e300	e570	e720	5020	2240	2130	865	e1700	383	261
28	1080	e430	e320	e570	e740	5430	2340	2110	856	e1500	370	260
29	1060	e410	e350	e540	---	5720	2490	2080	848	e1400	374	262
30	1040	e420	e330	e520	---	5900	2580	2070	781	e1350	379	262
31	1030	---	e280	e520	---	6060	---	2050	---	e1250	322	---
TOTAL	48300	23289	13390	14535	18335	64420	90370	72590	42176	50000	20805	8826
MEAN	1558	776	432	469	655	2078	3012	2342	1406	1613	671	294
MAX	2010	999	480	570	750	6060	6250	2750	2040	2390	1200	362
MIN	1030	410	280	270	540	620	2190	2050	781	684	322	242
AC-FT	95800	46190	26560	28830	36370	127800	179200	144000	83660	99170	41270	17510

e Estimated.

RED RIVER OF THE NORTH BASIN

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

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1975 - 1994, BY WATER YEAR (WY)

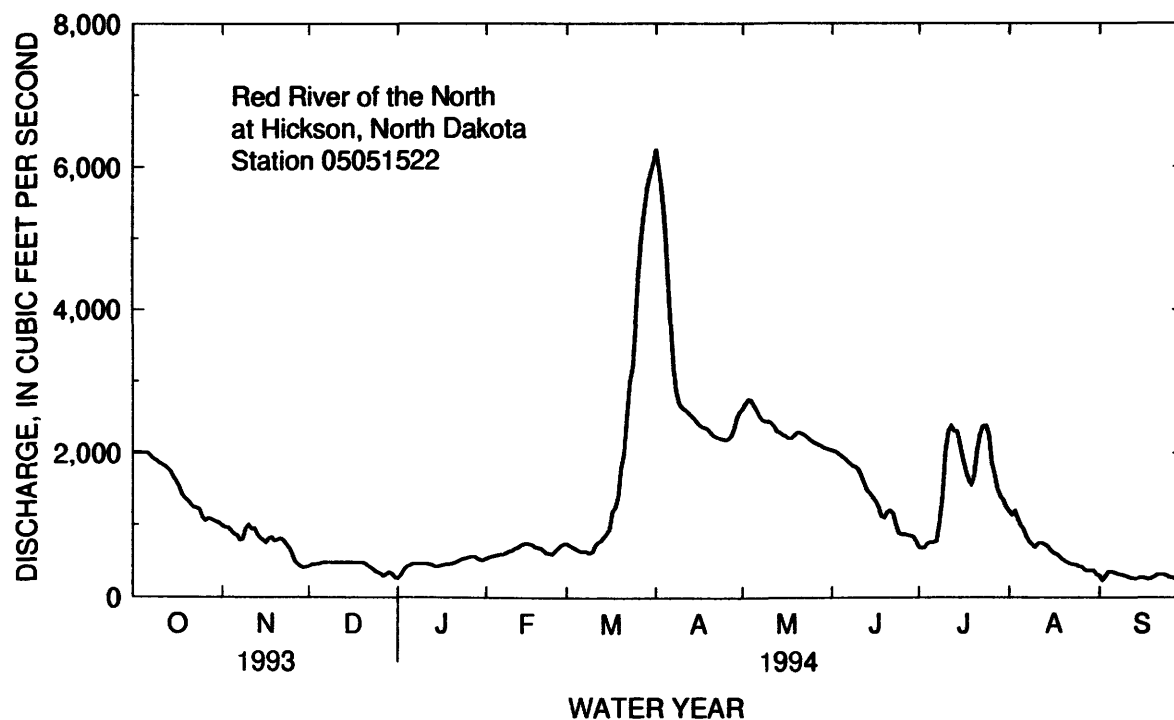
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	388	310	270	261	305	783	1707	1012	951	834	515	445
MAX	1558	900	817	747	745	2078	4165	3394	2485	2674	2674	2135
(WY)	1994	1987	1986	1986	1987	1994	1978	1986	1986	1993	1993	1993
MIN	2.02	.000	.000	4.95	14.0	75.9	165	22.0	86.4	73.4	35.6	12.6
(WY)	1977	1977	1977	1977	1977	1977	1977	1977	1977	1977	1977	1976

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1975 - 1994

ANNUAL TOTAL	520968	467036	649	
ANNUAL MEAN	1427	1280		
HIGHEST ANNUAL MEAN			1604	1986
LOWEST ANNUAL MEAN			53.1	1977
HIGHEST DAILY MEAN	6300	Apr 3	12000	Apr 7 1989
LOWEST DAILY MEAN	135	Jan 1	.00	Oct 26 1976
ANNUAL SEVEN-DAY MINIMUM	139	Jan 1	.00	Oct 26 1976
INSTANTANEOUS PEAK FLOW		6320	Apr 1	Apr 7 1989
INSTANTANEOUS PEAK STAGE		26.43	Apr 1	Apr 7 1989
ANNUAL RUNOFF (AC-FT)	1033000	926400	469900	
10 PERCENT EXCEEDS	2650	2450	1590	
50 PERCENT EXCEEDS	1240	817	356	
90 PERCENT EXCEEDS	268	348	77	



RED RIVER OF THE NORTH BASIN

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

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

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 AIR (DEG C) (00020)	TEMPER- ATURE WATER (DEG C) (00010)	HARD- NESS TOTAL AS CACO3 (00900)	ALKA- LITY LAB AS CACO3 (90410)	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)
OCT 13...	1535	1790	724	--	17.0	8.5	--	--	--	--	--
JAN 06...	1105	464	516	--	--	0.0	--	--	--	--	--
FEB 23...	1515	615	537	--	-4.0	0.0	--	--	--	--	--
MAR 15...	1010	890	502	--	1.5	0.0	--	--	--	--	--
28...	1350	5460	576	--	5.5	0.0	--	--	--	--	--
APR 07...	1225	3180	695	7.4	13.0	4.5	340	171	72	38	18
28...	1255	2350	667	--	5.0	8.0	--	--	--	--	--
MAY 17...	1620	2270	724	--	29.0	17.0	--	--	--	--	--
JUL 12...	1445	2380	584	--	24.5	22.5	--	--	--	--	--
26...	1300	1860	555	--	22.0	22.5	--	--	--	--	--
AUG 16...	0750	635	555	8.4	19.5	21.0	260	203	48	34	15

DATE	SODIUM AD- SORP- TION SODIUM PERCENT (00932)	POTAS- SIUM, DIS- SOLVED AS K) (00931)	SULFATE DIS- SOLVED RATIO AS SO4) (00935)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00945)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00940)	SILICA, DIS- SOLVED (MG/L SIO2) (00950)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- (MG/L (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- AS (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS SOLVED AC-FT) (70300)	SOLIDS, DIS- SOLVED (TONS SOLVED DAY) (70303)	PERPER (70302)
APR 07...	10	0.4	6.7	170	14	0.20	18	440	486	0.66	4170
AUG 16...	11	0.4	5.3	81	12	0.10	18	335	354	0.48	607

DATE	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BORON, DIS- SOLVED (UG/L AS B) (01020)	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)	OLYB- 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)
APR 07...	4	50	10	<1	30	20	<0.1	6	<1	320
AUG 16...	3	60	10	2	20	20	0.1	<1	<1	210

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RED RIVER OF THE NORTH BASIN

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 mi 453.

DRAINAGE AREA.--6,800 mi², approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--May 1901 to current year. Published as "at Moorhead, Minn.", 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 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, other controlled lakes and ponds, and several power-plants. Some small diversions for municipal supply. Figures of daily discharge do not include diversions to cities of Fargo and Moorhead and from Sheyenne River.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 7, 1897, reached a stage of 39.1 ft present datum, discharge, 25,000 ft³/s at site 1.5 mi downstream.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2210	966	e440	e400	e600	e880	10800	3220	2310	736	1950	371
2	2200	939	e450	e420	e600	e900	11100	3320	2280	675	1820	280
3	2210	928	e460	e480	e600	e880	11100	3390	2250	687	1670	266
4	2190	927	e480	e520	e620	e860	10900	3440	2240	821	1490	315
5	2180	875	e490	e580	e630	e840	10500	3370	2210	778	1380	385
6	2170	838	e500	e600	e640	e820	9830	3250	2170	777	1280	386
7	2150	806	e510	e610	e650	e790	8720	3150	2100	959	1340	361
8	2110	637	e520	e620	e660	e760	7270	3080	2050	1990	1100	355
9	2080	729	e520	e620	e680	e740	5870	3030	2020	2490	992	342
10	2050	823	e520	e630	e700	e720	4730	3010	1990	3000	923	329
11	2020	893	e520	e650	e720	e730	4020	3010	1920	3450	898	314
12	2000	818	e520	e660	e740	e760	3610	3000	1830	3700	881	290
13	1970	848	e520	e670	e760	e780	3370	2910	1710	3710	856	367
14	1940	784	e510	e660	e780	e810	3220	2860	1610	3490	824	313
15	1890	768	e500	e650	e800	e870	3130	2840	1570	3270	783	310
16	1840	838	e500	e620	e790	e990	3040	2800	1520	3120	710	333
17	1800	716	e500	e600	e770	e1050	e2950	2770	1450	2940	671	312
18	1720	737	e490	e600	e750	e1150	e2900	2740	1300	2760	646	303
19	1630	823	e480	e600	e730	e1350	e2860	2740	1240	2570	659	314
20	1590	765	e480	e600	e700	e1800	e2820	2760	1270	2530	582	341
21	1560	808	e470	e620	e690	e2200	e2780	2750	1300	2940	548	372
22	1520	1080	e460	e640	e670	e3000	e2740	2730	1310	3370	507	365
23	1500	622	e450	e650	e660	e3700	2700	2670	1210	3800	554	357
24	1490	500	e430	e660	e650	e4500	2660	2620	1040	4170	497	346
25	1420	e470	e420	e650	e640	e5400	2660	2560	931	4270	478	297
26	1310	e460	e410	e640	e680	e5800	2740	2520	919	4090	447	257
27	1160	e450	e400	e620	e780	e6800	2720	2450	913	3550	409	232
28	1040	e440	e390	e610	e840	e8000	2740	2400	911	3010	381	227
29	1020	e430	e370	e610	---	e8500	2900	2380	894	2590	378	213
30	1010	e430	e360	e610	---	e9000	3090	2340	842	2280	422	213
31	985	---	e380	e600	---	e10000	---	2310	---	2070	392	---
TOTAL	53965	22148	14450	18700	19530	85380	150470	88420	47310	80593	26468	9466
MEAN	1741	738	466	603	697	2754	5016	2852	1577	2600	854	316
MAX	2210	1080	520	670	840	10000	11100	3440	2310	4270	1950	386
MIN	985	430	360	400	600	720	2660	2310	842	675	378	213
AC-FT	107000	43930	28660	37090	38740	169400	298500	175400	93840	159900	52500	18780

(+) 1331 1129 1192 1242 1298 1338 1198 1439 1684 1566 1609 1360

* 108300 45060 29850 38330 40040 170700 299700 176800 95520 161500 54110 20140

e Estimated.

RED RIVER OF THE NORTH BASIN

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

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1901 - 1994, BY WATER YEAR (WY)

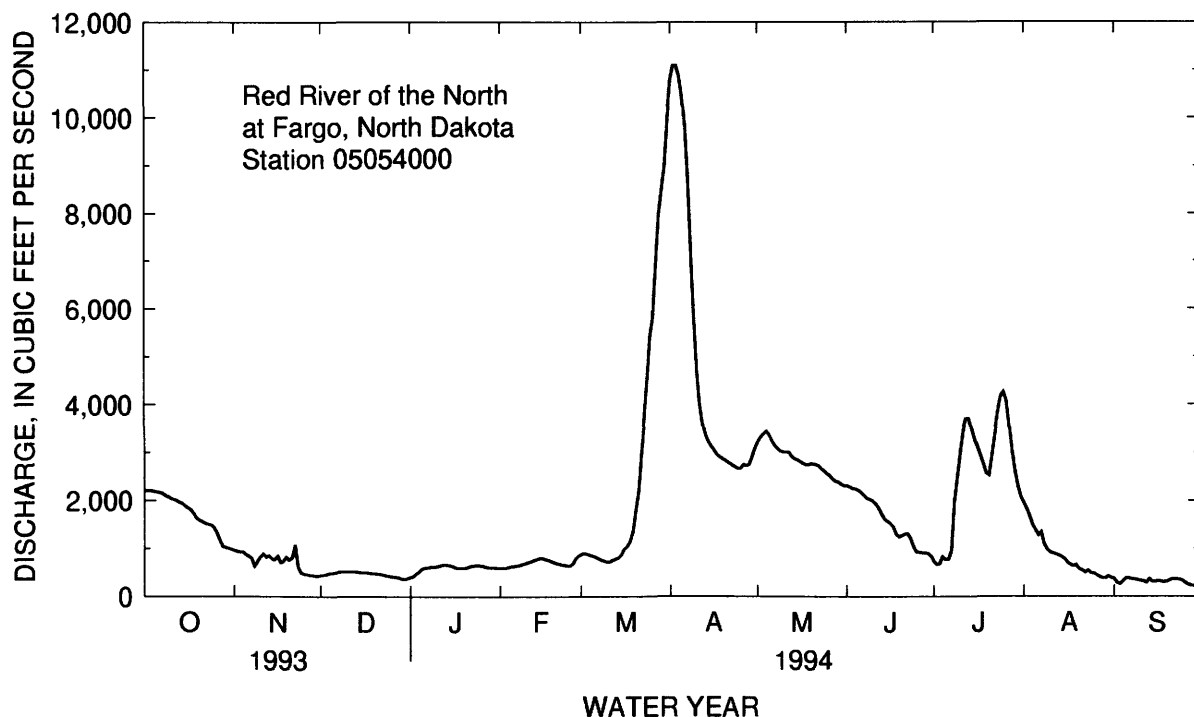
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	306	266	220	202	202	661	1699	995	1006	847	411	316
MAX	1741	942	800	740	778	3756	9924	4589	5122	5692	3293	2280
(WY)	1994	1907	1987	1986	1987	1966	1969	1986	1962	1962	1993	1993
MIN	.000	.000	.000	.000	.18	26.8	102	8.12	2.87	.000	.000	.000
(WY)	1935	1937	1938	1933	1933	1937	1934	1934	1936	1934	1932	1934

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1901 - 1994

ANNUAL TOTAL	645471					616900						
ANNUAL MEAN	1768 (*1783)					1690 (*1712)				596		
HIGHEST ANNUAL MEAN										1928		1986
LOWEST ANNUAL MEAN										17.5		1934
HIGHEST DAILY MEAN	9940	Apr 6				11100	Apr 2		24800		Apr 14	1969
LOWEST DAILY MEAN	155	Jan 3				213	Sep 29		.00		Jul 25	1932
ANNUAL SEVEN-DAY MINIMUM	158	Jan 1				255	Sep 24		.00		Jul 25	1932
INSTANTANEOUS PEAK FLOW						11200	Apr 3		25300		Apr 15	1969
INSTANTANEOUS PEAK STAGE						26.69	Apr 3		37.34		Apr 15	1969
INSTANTANEOUS LOW FLOW									.00		Jul 25	1932
ANNUAL RUNOFF (AC-FT)	1280000					1224000			431400			
10 PERCENT EXCEEDS	3650					3290			1310			
50 PERCENT EXCEEDS	1490					880			300			
90 PERCENT EXCEEDS	250					391			38			



RED RIVER OF THE NORTH BASIN

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

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

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 AIR (DEG C) (00020)	TEMPER- ATURE WATER (DEG C) (00010)	OXYGEN, DIS- SOLVED (MG/L) (00300)	HARD- NESS TOTAL (MG/L AS CACO3) (00900)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	MAGNE- CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	SILICUM, DIS- SOLVED (MG/L AS MG) (00925)
OCT 14...	1450	1920	754	--	10.5	8.5	--	--	--	--	--
JAN 13...	1500	672	600	--	-24.0	0.0	--	--	--	--	--
FEB 25...	1215	639	598	--	-9.0	0.0	--	--	--	--	--
MAR 26...	1230	5860	600	--	2.0	0.0	--	--	--	--	--
APR 01...	1210	10900	649	7.6	12.0	3.0	--	280	136	60	31
04...	1530	10700	680	--	-2.5	3.0	--	--	--	--	--
22...	1045	2730	741	--	17.0	12.0	--	--	--	--	--
MAY 20...	1150	2790	795	--	25.0	19.0	--	--	--	--	--
JUN 24...	0715	1040	709	--	25.0	24.0	--	--	--	--	--
JUL 13...	1345	3700	587	--	22.5	21.5	--	--	--	--	--
AUG 23...	0930	544	610	--	21.0	21.5	6.6	--	--	--	--
SEP 21...	0945	556	556	8.2	14.5	20.0	6.6	--	--	--	--
DATE	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	SODIUM PERCENT (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
APR 01...	21	14	0.5	7.8	160	14	0.20	16	392	425	0.58
DATE	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BORON, DIS- SOLVED (UG/L AS B) (01020)	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)
APR 01...	12500	3	70	40	<1	40	70	<0.1	1	<1	130

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RED RIVER OF THE NORTH BASIN

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.--322 mi².

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 fair.

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 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	79	e52	e60	e41	e37	e40	318	270	72	66	57	36
2	76	e56	e59	e40	e37	e40	424	245	67	59	56	34
3	75	e56	e58	e40	e37	e40	442	213	61	51	58	32
4	71	e55	e58	e40	e37	e40	422	196	59	58	61	31
5	68	e54	e57	e39	e37	e40	356	187	90	58	61	31
6	66	e53	e57	e39	e37	e40	251	184	138	56	57	30
7	64	e54	e56	e39	e37	e40	230	173	111	65	59	29
8	62	e54	e55	e39	e37	e41	207	162	89	137	61	28
9	60	e52	e54	e38	e37	e42	206	153	76	267	59	26
10	59	e50	e53	e38	e37	e44	210	147	66	260	55	26
11	58	e50	e52	e38	e38	e46	195	138	62	226	53	27
12	58	e49	e51	e38	e39	e49	193	129	61	192	52	31
13	58	e49	e50	e38	e40	e54	194	125	59	148	57	62
14	57	e48	e50	e38	e40	e70	180	126	54	124	59	108
15	57	e49	e49	e38	e40	e110	176	127	51	108	53	129
16	57	e50	e49	e38	e40	e100	197	120	49	96	48	136
17	56	e51	e48	e38	e40	e100	208	112	51	89	45	101
18	56	e53	e48	e37	e40	e110	198	107	57	79	46	79
19	57	e54	e48	e37	e40	e135	183	104	60	77	59	66
20	56	e55	e47	e37	e40	e160	169	100	153	79	50	56
21	54	e56	e47	e37	e40	e230	158	98	228	86	45	49
22	49	e57	e46	e37	e40	e450	152	99	169	94	41	57
23	51	e58	e46	e37	e40	e520	143	99	137	97	42	58
24	50	e59	e45	e37	e40	e475	136	102	128	90	42	52
25	52	e60	e44	e37	e40	e440	129	104	112	83	41	47
26	49	e60	e44	e37	e40	e410	149	100	98	78	40	43
27	50	e60	e43	e37	e40	e308	222	98	86	72	39	40
28	52	e60	e43	e37	e40	362	240	95	78	67	35	37
29	60	e61	e42	e37	---	322	231	88	70	64	32	36
30	58	e61	e42	e37	---	282	248	83	66	60	34	34
31	49	---	e41	e37	---	260	---	78	---	58	36	---
TOTAL	1824	1636	1542	1177	1087	5400	6767	4162	2658	3144	1533	1551
MEAN	58.8	54.5	49.7	38.0	38.8	174	226	134	88.6	101	49.5	51.7
MAX	79	61	60	41	40	520	442	270	228	267	61	136
MIN	49	48	41	37	37	40	129	78	49	51	32	26
AC-FT	3620	3250	3060	2330	2160	10710	13420	8260	5270	6240	3040	3080
CFSM	.18	.17	.15	.12	.12	.54	.70	.42	.28	.31	.15	.16
IN.	.21	.19	.18	.14	.13	.62	.78	.48	.31	.36	.18	.18

e Estimated.

RED RIVER OF THE NORTH BASIN

05061000 BUFFALO RIVER NEAR HAWLEY, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1945 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	36.8	34.2	24.0	20.2	21.1	82.7	250	123	98.1	99.1	52.4	38.2
MAX	151	176	63.8	54.7	99.6	434	792	372	530	784	472	182
(WY)	1974	1972	1972	1981	1981	1966	1978	1985	1962	1993	1955	1957
MIN	11.6	12.2	10.6	9.94	9.87	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

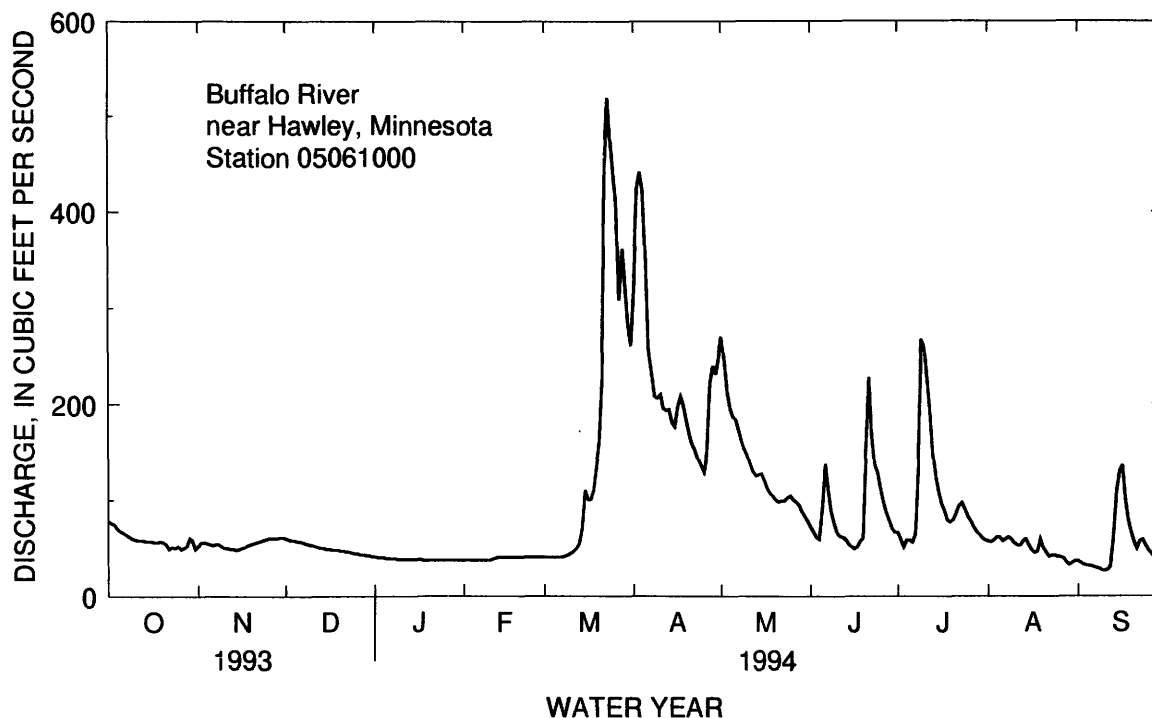
SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1945 - 1994

ANNUAL TOTAL	64236	32481	
ANNUAL MEAN	176	89.0	73.0
HIGHEST ANNUAL MEAN			168
LOWEST ANNUAL MEAN			16.7
HIGHEST DAILY MEAN	1860	Jul 18	520
LOWEST DAILY MEAN	12	Jan 1	26
ANNUAL SEVEN-DAY MINIMUM	12	Jan 1	28
INSTANTANEOUS PEAK FLOW			540
INSTANTANEOUS PEAK STAGE			7.88 ^a
INSTANTANEOUS LOW FLOW			23
ANNUAL RUNOFF (AC-FT)	127400	64430	52910
ANNUAL RUNOFF (CFSM)	.55	.28	.23
ANNUAL RUNOFF (INCHES)	7.42	3.75	3.08
10 PERCENT EXCEEDS	391	195	171
50 PERCENT EXCEEDS	62	57	30
90 PERCENT EXCEEDS	18	37	13

a Backwater from ice.



RED RIVER OF THE NORTH BASIN

05061500 SOUTH BRANCH BUFFALO RIVER AT SABIN, MN

LOCATION.--Lat 46°46'20", long 96°37'40", in SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 9, T. 138 N., R. 47 W., Clay County, Hydrologic Unit 09020106, near center of span on downstream side of highway bridge, 0.3 mi downstream from Stony Creek and 1 mi east of Sabin.

DRAINAGE AREA.--522 mi².

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: 1949 (M).

GAGE.--Water-stage recorder. Datum of gage is 902.39 ft above mean sea level (levels by Soil Conservation Service). Prior to Aug. 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 poor.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8.5	8.1	e6.9	e6.0	e5.8	e5.8	508	221	15	14	4.5	7.8
2	8.1	8.2	e6.9	e6.0	e5.8	e5.8	690	214	11	14	3.4	8.2
3	8.9	8.4	e6.8	e6.0	e5.8	e5.8	629	178	9.8	13	10	8.5
4	9.3	e8.6	e6.8	e6.0	e5.8	e5.8	480	148	9.6	19	4.5	4.6
5	11	e8.8	e6.7	e6.0	e5.8	e5.8	338	141	8.7	23	3.1	5.3
6	11	e8.7	e6.6	e6.0	e5.8	e6.0	229	145	8.1	29	2.2	6.5
7	9.1	e8.7	e6.6	e6.0	e5.8	e6.1	185	130	8.1	e38	7.9	6.9
8	10	e8.6	e6.6	e6.0	e5.8	e6.2	167	112	7.3	e60	9.3	7.0
9	11	e8.5	e6.6	e6.0	e5.8	e6.4	162	93	7.3	e74	11	7.0
10	11	e8.5	e6.5	e6.0	e5.8	e6.8	169	79	7.7	e84	13	7.3
11	12	e8.4	e6.5	e6.0	e5.8	e7.2	164	63	8.6	e70	10	7.4
12	12	e8.4	e6.5	e6.0	e5.8	e7.8	150	54	7.3	e54	7.8	8.1
13	12	e8.3	e6.4	e6.0	e5.8	e8.6	135	49	6.8	43	5.3	8.3
14	13	e8.2	e6.4	e5.9	e5.8	e9.7	121	62	5.3	40	5.9	8.5
15	11	e8.2	e6.4	e5.9	e5.8	e12	113	52	4.6	37	5.7	9.1
16	11	e8.1	e6.4	e5.9	e5.8	e15	111	50	5.2	31	4.3	9.3
17	10	e8.0	e6.3	e5.9	e5.8	e21	117	51	4.9	28	4.1	9.1
18	11	e7.9	e6.3	e5.9	e5.8	e35	112	49	3.6	35	2.9	9.1
19	13	e7.8	e6.3	e5.9	e5.8	e70	104	44	3.7	34	2.8	9.2
20	12	e7.8	e6.3	e5.9	e5.8	e170	93	37	21	31	3.3	9.6
21	11	e7.7	e6.2	e5.9	e5.8	e400	80	30	57	28	3.5	9.9
22	11	e7.6	e6.2	e5.9	e5.8	e660	71	25	60	26	4.0	10
23	11	e7.5	e6.2	e5.9	e5.8	e710	67	22	36	25	4.2	11
24	11	e7.4	e6.2	e5.9	e5.8	e720	61	21	23	21	4.8	11
25	11	e7.3	e6.2	e5.9	e5.8	e710	69	24	15	18	5.1	11
26	9.9	e7.2	e6.2	e5.9	e5.8	e680	80	29	13	14	5.5	10
27	9.5	e7.2	e6.1	e5.9	e5.8	e620	125	28	12	9.4	6.2	9.7
28	9.6	e7.1	e6.1	e5.9	e5.8	e530	189	25	8.1	5.9	7.1	10
29	9.5	e7.1	e6.1	e5.9	---	401	214	21	9.5	4.9	7.4	10
30	8.8	e7.0	e6.1	e5.9	---	328	213	18	9.6	5.1	7.5	10
31	7.6	---	e6.0	e5.9	---	333	---	16	---	4.6	7.5	---
TOTAL	324.8	239.3	198.4	184.2	162.4	6508.8	5946	2231	406.8	932.9	183.8	259.4
MEAN	10.5	7.98	6.40	5.94	5.80	210	198	72.0	13.6	30.1	5.93	8.65
MAX	13	8.8	6.9	6.0	5.8	720	690	221	60	84	13	11
MIN	7.6	7.0	6.0	5.9	5.8	5.8	61	16	3.6	4.6	2.2	4.6
AC-FT	644	475	394	365	322	12910	11790	4430	807	1850	365	515
CFSM	.02	.02	.01	.01	.01	.40	.38	.14	.03	.06	.01	.02
IN	.02	.02	.01	.01	.01	.46	.42	.16	.03	.07	.01	.02

e Estimated.

RED RIVER OF THE NORTH BASIN

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

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1945 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	13.9	14.2	4.96	1.67	1.61	104	254	76.7	93.1	77.4	12.1	13.9
MAX	51.1	76.7	23.5	13.1	14.0	581	928	580	1068	1112	152	173
(WY)	1978	1972	1978	1978	1987	1966	1969	1962	1962	1975	1993	1986
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 1993 CALENDAR YEAR

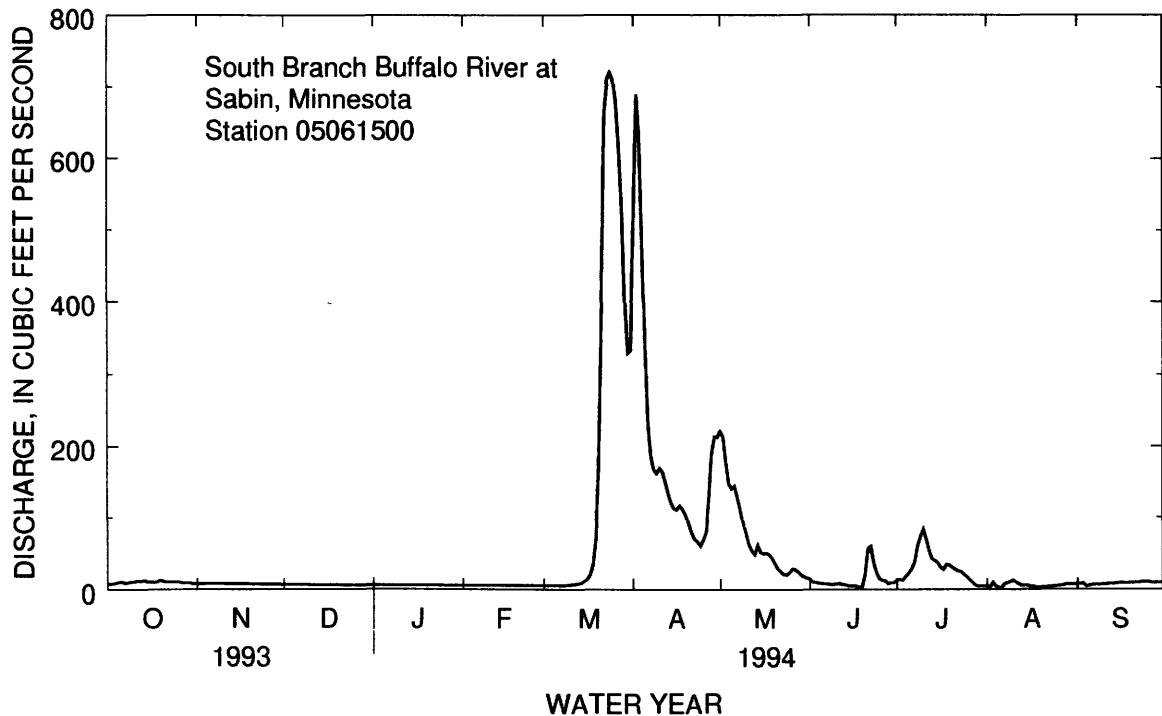
FOR 1994 WATER YEAR

WATER YEARS 1945 - 1994

ANNUAL TOTAL	34463.8	17577.8	
ANNUAL MEAN	94.4	48.2	55.8 ^a
HIGHEST ANNUAL MEAN			198
LOWEST ANNUAL MEAN			12.2
HIGHEST DAILY MEAN	1850	Mar 30	720
LOWEST DAILY MEAN	2.2	Feb 6	2.2
ANNUAL SEVEN-DAY MINIMUM	2.2	Feb 6	3.5
INSTANTANEOUS PEAK FLOW			730
INSTANTANEOUS PEAK STAGE			14.95 ^b
INSTANTANEOUS LOW FLOW			1.7
ANNUAL RUNOFF (AC-FT)	68360	34870	40440
ANNUAL RUNOFF (CFSM)	.18	.092	.11
ANNUAL RUNOFF (INCHES)	2.46	1.25	1.45
10 PERCENT EXCEEDS	170	123	101
50 PERCENT EXCEEDS	11	8.4	7.1
90 PERCENT EXCEEDS	2.3	5.8	.00

a Median of annual mean discharges is 41 ft³/s.

b Backwater from ice.



RED RIVER OF THE NORTH BASIN

05062000 BUFFALO RIVER NEAR DILWORTH, MN

LOCATION--Lat 46° 57'40", long 96° 39'40", in SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 6, T.140 N., R.47 W., Clay County, Hydrologic Unit 09020106, on left bank 4.5 mi southeast of Kragnes, 6.5 mi northeast of Dilworth, and 9 mi downstream from South Branch.

DRAINAGE AREA--1,040 mi², approximately.

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 fair.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	103	72	e70	e58	e52	e48	946	638	108	96	75	41
2	124	74	e70	e58	e52	e48	924	631	100	89	73	40
3	124	75	e70	e58	e52	e48	971	620	94	87	70	40
4	117	e76	e70	e56	e52	e48	1070	581	88	88	69	38
5	112	e70	e70	e56	e52	e48	1080	522	85	90	73	38
6	108	e70	e70	e56	e52	e48	1010	466	83	96	76	38
7	104	e70	e70	e54	e52	e50	869	429	104	102	76	38
8	92	e70	e70	e54	e52	e50	695	407	135	119	73	34
9	82	e72	e70	e54	e52	e50	556	375	126	182	74	31
10	79	e74	e70	e54	e52	e52	487	343	110	302	81	29
11	76	e76	e70	e54	e50	e52	458	311	96	365	82	29
12	75	e76	e70	e54	e50	e52	441	279	88	359	79	28
13	79	e76	e70	e54	e50	e52	418	255	84	318	77	32
14	80	e76	e68	e54	e50	e52	398	248	82	272	75	39
15	78	e76	e68	e52	e50	e56	375	271	79	224	75	47
16	78	e76	e68	e52	e50	e60	353	269	76	191	74	48
17	78	e76	e68	e52	e50	e80	341	244	73	167	68	76
18	76	e76	e68	e52	e50	e130	350	223	71	147	62	107
19	74	e76	e66	e52	e50	e200	356	209	70	136	62	92
20	73	e76	e66	e52	e50	e350	343	196	81	130	64	77
21	79	e74	e66	e52	e48	e550	320	182	99	130	68	67
22	83	e74	e66	e52	e48	e1000	294	167	202	130	64	60
23	79	e72	e64	e52	e48	e2200	272	152	259	130	60	55
24	72	e72	e64	e52	e48	3200	256	143	231	134	54	57
25	68	e72	e64	e52	e48	2410	246	139	192	134	53	58
26	67	e72	e62	e52	e48	1930	263	135	168	125	53	55
27	65	e72	e62	e52	e48	1670	368	136	147	115	53	52
28	65	e70	e62	e52	e48	1480	462	135	129	107	52	50
29	61	e70	e60	e52	---	1330	545	133	116	90	49	47
30	60	e70	e60	e52	---	1180	622	125	108	81	46	44
31	65	---	e60	e52	---	1030	---	116	---	81	43	---
TOTAL	2576	2201	2072	1658	1404	19554	16089	9080	3484	4817	2053	1487
MEAN	83.1	73.4	66.8	53.5	50.1	631	536	293	116	155	66.2	49.6
MAX	124	76	70	58	52	3200	1080	638	259	365	82	107
MIN	60	70	60	52	48	48	246	116	70	81	43	28
AC-FT	5110	4370	4110	3290	2780	38790	31910	18010	6910	9550	4070	2950
CFSM	.08	.07	.06	.05	.05	.61	.52	.28	.11	.15	.06	.05
IN	.09	.08	.07	.06	.05	.70	.58	.32	.12	.17	.07	.05

e Estimated.

RED RIVER OF THE NORTH BASIN

05062000 BUFFALO RIVER NEAR DILWORTH, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	50.5	48.0	29.2	19.3	19.5	176	535	216	197	185	72.9	54.1
MAX	186	305	97.0	53.5	61.1	1308	1984	909	2138	2814	910	517
(WY)	1958	1972	1972	1994	1984	1966	1978	1986	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

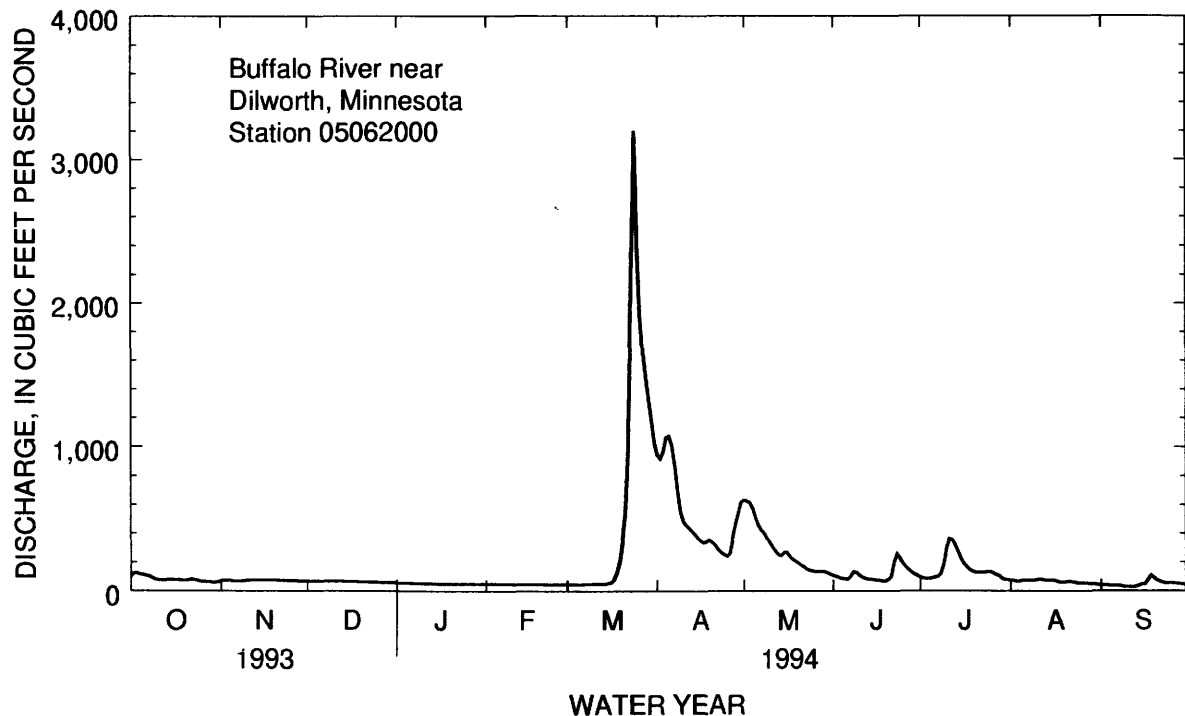
SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1931 - 1994

ANNUAL TOTAL	122947		66475									
ANNUAL MEAN	337		182							135		
HIGHEST ANNUAL MEAN										441		1975
LOWEST ANNUAL MEAN										25.6		1934
HIGHEST DAILY MEAN	3380	Jul 21				3200	Mar 24			13500	Jul 2	1975
LOWEST DAILY MEAN	25	Jan 1				28	Sep 12			.00	Jul 22	1936
ANNUAL SEVEN-DAY MINIMUM	25	Jan 1				32	Sep 7			.00	Jul 28	1936
INSTANTANEOUS PEAK FLOW						3270	Mar 24			13600	Jul 2	1975
INSTANTANEOUS PEAK STAGE						20.82 ^a	Mar 24			27.10	Jul 2	1975
INSTANTANEOUS LOW FLOW						28	Sep 10			.00	Jul 22	1936
ANNUAL RUNOFF (AC-FT)	243900					131900				97810		
ANNUAL RUNOFF (CFSM)	.32					.18				.13		
ANNUAL RUNOFF (INCHES)	4.40					2.38				1.76		
10 PERCENT EXCEEDS	879					384				285		
50 PERCENT EXCEEDS	104					74				35		
90 PERCENT EXCEEDS	27					50				9.4		

a From floodmark.



RED RIVER OF THE NORTH BASIN

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 highway bridge, 0.8 mi northeast of Twin Valley, and 2 mi upstream from small tributary.

DRAINAGE AREA.--888 mi².

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 mean 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 fair. Flow slightly regulated by Rice Lake and many other small lakes above station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	151	e86	e102	e94	e90	e94	e760	799	270	565	286	147
2	148	e96	e101	e94	e90	e94	985	769	261	529	273	134
3	146	e105	e100	e94	e90	e94	1050	736	242	487	274	122
4	141	e105	e100	e94	e90	e94	923	742	227	467	275	114
5	136	e105	e100	e94	e90	e94	e776	749	243	462	259	109
6	133	e98	e99	e93	e90	e96	676	720	241	455	246	106
7	127	e78	e99	e93	e90	e100	622	687	244	471	244	101
8	125	e96	e99	e93	e90	e120	586	652	234	914	235	95
9	127	e108	e99	e93	e90	e135	561	608	213	1200	226	89
10	120	e107	e99	e93	e90	e140	555	572	194	1200	214	85
11	116	e105	e98	e92	e90	e140	552	541	186	1050	206	87
12	114	e96	e98	e92	e90	e130	552	508	185	862	201	102
13	109	e96	e98	e92	e90	e120	554	491	185	712	194	192
14	106	e95	e98	e92	e90	e120	559	506	238	645	183	265
15	100	e95	e98	e92	e90	e150	548	493	607	588	176	464
16	97	e96	e97	e91	e90	e190	537	479	598	552	173	528
17	97	e97	e97	e91	e90	e230	540	460	442	504	162	451
18	94	e98	e97	e91	e90	e280	552	438	388	458	154	431
19	90	e99	e97	e91	e90	e340	518	418	369	432	153	385
20	93	e100	e97	e91	e90	e420	510	403	1280	464	156	350
21	95	e102	e96	e90	e92	e500	515	388	1750	535	159	330
22	99	e104	e96	e90	e92	e580	498	357	1500	555	155	316
23	96	e105	e96	e90	e92	e600	487	339	1090	551	159	309
24	98	e106	e96	e90	e92	e580	500	324	865	519	155	295
25	103	e107	e96	e90	e92	e560	501	349	712	477	156	283
26	100	e106	e95	e90	e94	e540	580	375	613	440	157	269
27	96	e105	e95	e90	e94	e520	760	352	566	405	159	265
28	98	e105	e95	e90	e94	e490	820	330	528	378	154	247
29	97	e104	e95	e90	---	e470	808	308	504	349	146	240
30	98	e104	e95	e90	---	e450	803	295	539	322	154	229
31	e98	---	e95	e90	---	e540	---	281	---	301	149	---
TOTAL	3448	3009	3023	2840	2542	9011	19188	15469	15514	17849	5993	7140
MEAN	111	100	97.5	91.6	90.8	291	640	499	517	576	193	238
MAX	151	108	102	94	94	600	1050	799	1750	1200	286	528
MIN	90	78	95	90	90	94	487	281	185	301	146	85
AC-FT	6840	5970	6000	5630	5040	17870	38060	30680	30770	35400	11890	14160
CFSM	.13	.11	.11	.10	.10	.33	.72	.56	.58	.65	.22	.27
IN.	.14	.13	.13	.12	.11	.38	.80	.65	.65	.75	.25	.30

e Estimated.

RED RIVER OF THE NORTH BASIN

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

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	84.2	73.5	49.8	38.3	35.5	129	562	414	306	236	107	86.7
MAX	614	488	123	100	90.8	747	1543	2259	1560	1923	1024	788
(WY)	1974	1972	1972	1910	1994	1945	1979	1950	1943	1909	1993	1973
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 1993 CALENDAR YEAR

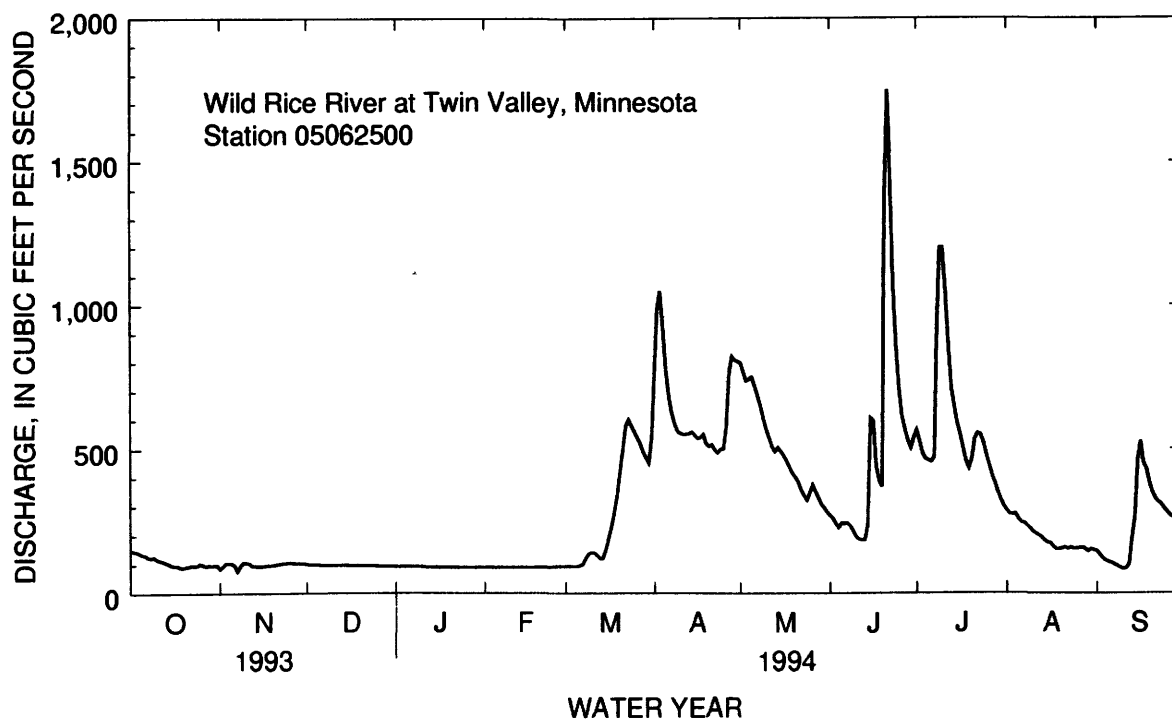
FOR 1994 WATER YEAR

WATER YEARS 1909 - 1994

ANNUAL TOTAL	129154	105026	174 ^a	1950
ANNUAL MEAN	354	288	500	1977
HIGHEST ANNUAL MEAN			22.7	1977
LOWEST ANNUAL MEAN			9100	Jul 22 1909
HIGHEST DAILY MEAN	3920	Jul 27	1750	Jun 21
LOWEST DAILY MEAN	63	Feb 16	78	Nov 7
ANNUAL SEVEN-DAY MINIMUM	63	Feb 16	90	Jan 21
INSTANTANEOUS PEAK FLOW			1810	Jun 21
INSTANTANEOUS PEAK STAGE			8.37	Jun 21
INSTANTANEOUS LOW FLOW			.50	Nov 4 1939
ANNUAL RUNOFF (AC-FT)	256200	208300	125900	
ANNUAL RUNOFF (CFSM)	.40	.32	.20	
ANNUAL RUNOFF (INCHES)	5.41	4.40	2.66	
10 PERCENT EXCEEDS	924	599	453	
50 PERCENT EXCEEDS	164	154	65	
90 PERCENT EXCEEDS	65	90	15	

a Median of annual mean discharges is 154 ft³/s.b From rating curve extended above 3300 ft³/s.

c Site and datum then in use.



RED RIVER OF THE NORTH BASIN

05062500 WILD RICE RIVER AT TWIN VALLEY, MN--Continued
(National Water Quality Assessment Station)

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DATE	TIME	DIS- CHARGE, IN CUBIC FEET PER SECOND (00060)	DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPF- 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)	TEMPER- ATURE AIR (DEG C) (00020)	BARO- METRIC PRES- SURE (MM OF HG) (00025)
OCT										
21...	0915	--	94	624	641	8.3	8.1	4.0	3.0	739
DEC										
28...	1230	E95	--	646	701	7.7	7.7	0.0	-25.5	737
FEB										
16...	1020	E90	--	638	645	7.4	7.4	0.0	-2.5	734
MAR										
25...	0800	E560	--	515	515	8.0	7.1	0.5	-1.0	741
APR										
19...	0910	--	521	487	500	8.0	7.5	10.5	8.0	739
29...	0900	--	809	616	625	8.1	7.8	2.5	3.5	744
JUN										
01...	1020	--	270	529	511	8.1	7.9	19.0	21.5	740
22...	0810	--	1600	440	436	7.6	7.6	23.0	--	734
JUL										
11...	1015	--	1060	555	562	8.1	7.8	20.5	18.0	730
AUG										
15...	0900	--	177	467	465	8.2	7.8	16.0	18.0	738

DATE	CALCIUM OXYGEN, DIS- SOLVED (MG/L) (00300)	MAGNE- SIUM, DIS- SOLVED (MG/L AS CA) (00915)	SODIUM, DIS- SOLVED (MG/L AS MG) (00925)	POTAS- SIUM, DIS- SOLVED (MG/L AS NA) (00930)	ALKA- LITY WAT DIS DIS- SOLVED (MG/L AS K) (00935)	ALKA- LITY TOT IT FIELD MG/L AS CACO3 (39086)	LAB (MG/L AS CACO3) (90410)	CAR- BONATE WATER DIS IT FIELD MG/L AS CO3 (00452)	BICAR- BONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)
OCT										
21...	11.4	76	31	14	3.9	310	314	17	345	35
DEC										
28...	7.4	76	31	10	4.0	342	372	0	417	22
FEB										
16...	8.8	78	33	10	3.5	312	333	0	380	22
MAR										
25...	11.3	58	24	6.2	8.6	175	196	0	214	61
APR										
19...	10.4	58	25	6.6	4.7	215	224	0	263	36
29...	8.8	68	32	11	5.3	216	225	0	264	85
JUN										
01...	9.1	59	27	7.9	3.5	234	252	12	261	27
22...	6.5	55	20	5.9	4.8	--	160	--	--	57
JUL										
11...	6.9	69	29	7.9	4.7	214	228	0	261	66
AUG										
15...	9.0	57	24	6.2	2.1	230	239	5	271	14

RED RIVER OF THE NORTH BASIN

05062500 WILD RICE RIVER AT TWIN VALLEY, MN--Continued
(National Water Quality Assessment Station)

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DATE	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N) (00625)
OCT 21...	10	0.20	13	328	<0.010	<0.050	0.020	0.60	0.70
DEC 28...	5.0	0.20	21	443	<0.010	0.130	0.170	0.80	0.80
FEB 16...	4.4	0.20	24	391	<0.010	0.180	0.380	1.0	1.0
MAR 25...	11	0.20	14	333	0.080	2.00	0.300	1.4	1.5
APR 19...	6.2	0.10	9.9	274	<0.010	0.066	0.040	0.60	1.0
29...	15	0.20	11	405	0.020	1.10	0.090	1.1	1.2
JUN 01...	4.1	0.50	10	332	<0.010	<0.050	0.030	0.80	0.90
22...	6.3	0.20	15	304	0.040	0.390	0.060	1.0	1.5
JUL 11...	8.5	0.20	18	376	0.010	0.110	0.040	1.0	1.2
AUG 15...	2.7	0.20	19	293	<0.010	<0.050	0.040	0.70	0.80

DATE	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)	SEDI- MENT, SUS- PENDE D (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS- PENDE D TOTAL (MG/L AS C) (00689)
OCT 21...	<0.010	<0.010	<0.010	5	76	<3	<1	12	0.3
DEC 28...	0.030	0.010	0.010	6	98	41	180	12	0.3
FEB 16...	<0.010	<0.010	<0.010	--	--	47	370	10	--
MAR 25...	0.120	0.090	0.070	12	66	150	63	13	0.5
APR 19...	0.100	<0.010	<0.010	109	87	75	21	11	1.7
29...	0.080	0.030	0.030	85	98	44	22	14	0.8
JUN 01...	0.050	0.040	0.040	80	16	87	29	16	0.6
22...	0.240	0.070	0.070	388	73	59	6	--	--
JUL 11...	0.140	0.070	0.060	250	38	51	10	16	1.6
AUG 15...	0.070	0.050	0.030	57	99	46	23	15	0.4

RED RIVER OF THE NORTH BASIN
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 highway bridge, 0.5 mi east of Hendrum and 4 mi upstream from mouth.

DRAINAGE AREA.--1,600 mi², approximately.

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 mean sea level (levels by U.S. Army Corps of Engineers). Prior to July 18, 1989, nonrecording gage at same site and datum.

REMARKS.--Records 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 pollution from Ada sewage plant effluent. Amount of diversion not known.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	175	84	e117	e94	e78	e84	e860	e1400	e320	575	354	e200
2	173	e98	e116	e92	e78	e86	e1600	1320	e310	e560	e340	219
3	178	e108	e115	e92	e77	e87	e2600	e1270	294	e540	e330	e200
4	163	e115	e114	e90	e76	e88	e2550	e1220	e270	534	e320	e190
5	160	e115	e113	e90	e76	e90	e2400	e1180	e320	e520	317	172
6	158	e105	e113	e88	e76	e94	e2100	1110	398	e520	e315	e160
7	155	e97	e111	e88	e76	e99	e1700	e1050	e360	e540	e310	e150
8	154	e105	e110	e88	e76	e105	e1400	e950	e330	867	304	e140
9	140	e110	e109	e87	e76	e125	e1200	e880	301	1510	e290	138
10	137	e113	e108	e87	e76	e140	e1050	800	271	1910	e280	e130
11	143	e115	e107	e87	e76	e140	e900	e750	e250	1950	e260	e122
12	137	e117	e106	e86	e76	e130	e780	e680	e240	1760	243	135
13	131	e118	e106	e86	e76	e120	e760	618	233	1620	e230	e180
14	128	e119	e105	e86	e76	e130	e750	e620	e260	1380	220	e300
15	128	e120	e104	e84	e76	e160	e740	e620	e450	1190	e210	e500
16	127	e120	e103	e84	e76	e200	e730	623	e740	1030	e200	1120
17	124	e120	e102	e82	e76	e240	e720	e590	929	884	e200	e1300
18	125	e120	e101	e82	e76	e280	702	e560	e760	767	e195	e1200
19	126	e120	e100	e82	e78	e370	e670	e520	e440	e660	193	1080
20	124	e120	e100	e82	e78	e440	e640	481	798	579	e190	e850
21	114	e120	e99	e82	e78	e520	e620	e460	1960	e580	e190	e680
22	111	e120	e98	e82	e78	e660	605	e430	2160	619	189	e560
23	108	e120	e98	e82	e78	e730	e570	407	2200	e640	e190	456
24	119	e120	e98	e80	e80	e750	e540	e380	1800	e660	204	e420
25	111	e120	e98	e80	e80	e750	556	e390	e1400	679	e200	e390
26	117	e120	e98	e80	e80	e720	e700	e410	e1100	e620	196	355
27	115	e120	e96	e80	e80	e700	924	418	897	e540	e190	334
28	117	e120	e96	e80	e82	e680	e1200	e400	e720	e480	e190	321
29	117	e119	e96	e80	---	e640	1480	e370	e600	e440	193	306
30	115	e118	e96	e78	---	e630	e1420	355	e540	411	e190	290
31	109	---	e94	e78	---	e660	---	e340	---	e380	e190	---
TOTAL	4139	3436	3227	2619	2165	10648	33467	21602	21651	25945	7423	12598
MEAN	134	115	104	84.5	77.3	343	1116	697	722	837	239	420
MAX	178	120	117	94	82	750	2600	1400	2200	1950	354	1300
MIN	108	84	94	78	76	84	540	340	233	380	189	122
AC-FT	8210	6820	6400	5190	4290	21120	66380	42850	42940	51460	14720	24990
CFSM	.08	.07	.07	.05	.05	.21	.70	.44	.45	.52	.15	.26
IN.	.10	.08	.08	.06	.05	.25	.78	.50	.50	.60	.17	.29

e Estimated.

RED RIVER OF THE NORTH BASIN
05064000 WILD RICE RIVER AT HENDRUM, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1944 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	115	104	63.0	45.9	44.4	271	1080	564	419	332	147	114
MAX	744	784	160	121	124	1485	3261	2074	1776	3136	1833	824
(WY)	1972	1972	1972	1986	1984	1966	1978	1985	1962	1975	1993	1973
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 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1944 - 1994

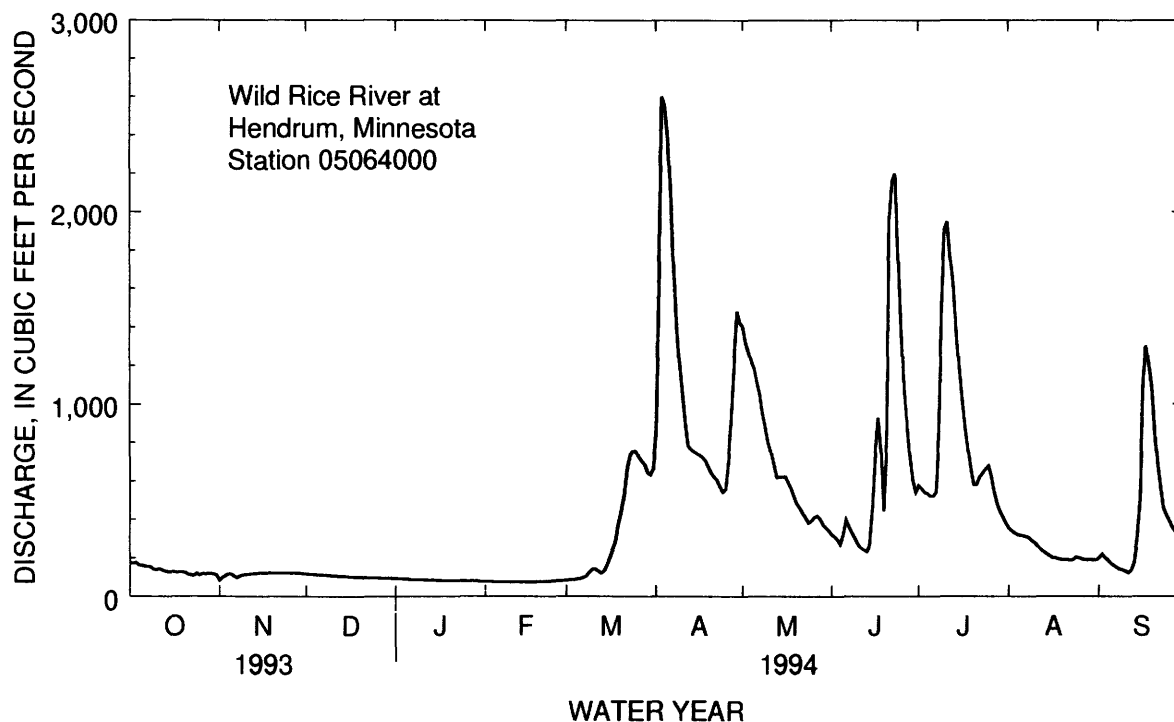
ANNUAL TOTAL	195413	148920	
ANNUAL MEAN	535	408	267 ^a
HIGHEST ANNUAL MEAN			682
LOWEST ANNUAL MEAN			28.9
HIGHEST DAILY MEAN	3670	2600	9220
LOWEST DAILY MEAN	68	76	.00
ANNUAL SEVEN-DAY MINIMUM	69	76	.00
INSTANTANEOUS PEAK FLOW		2600 ^b	9350
INSTANTANEOUS PEAK STAGE		21.22 ^{b,c}	32.30 ^d
ANNUAL RUNOFF (AC-FT)	387600	295400	193100
ANNUAL RUNOFF (CFSM)	.33	.25	.17
ANNUAL RUNOFF (INCHES)	4.54	3.46	2.26
10 PERCENT EXCEEDS	1820	1040	673
50 PERCENT EXCEEDS	198	190	82
90 PERCENT EXCEEDS	73	82	15

a Median of annual mean discharges is 230 ft³/s.

b Backwater from ice and Red River of the North.

c Highwater mark.

d Backwater from Red River of the North.



RED RIVER OF THE NORTH BASIN

05064000 WILD RICE RIVER AT HENDRUM, MN--Continued
(National Water Quality Assessment Station)

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	SPE- CIFIC CON- DUCT- ANCE (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 HG) (00025)	OXYGEN, DIS- SOLVED (MG/L) (00300)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)
JUN 22...	1300	2170	375	372	7.6	7.5	23.0	738	5.8	42	16
DATE		SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LITY LAB (MG/L AS CAO3) (90410)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)
JUN 22...	5.2	4.5	126	51	6.5	0.20	11	250	0.050	1.00	
DATE		NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	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)	SEDI- MENT, SUS- PENDE (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)
JUN 22...	0.080	0.80	2.0	0.410	0.060	0.060	495	98	48	5	

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RED RIVER OF THE NORTH BASIN

05064500 RED RIVER OF THE NORTH AT HALSTAD, MN
(National stream quality accounting network station)

LOCATION.--Lat 47 °21'10", long 96 °50'50", on line between secs.24 and 25, T.14S N., R.49 W., Trail County, Hydrologic Unit 09020107, on left bank on upstream side of highway bridge, 0.5 mi west of Halstad, 2.5 mi downstream from Wild Rice River, and at mile 375.2.

DRAINAGE AREA.--21,800 mi², approximately, including 3,800 mi² in closed basins.

WATER-DISCHARGE RECORDS

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 those for periods of estimated discharges, which are fair.

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

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2570	1240	e1290	e910	e862	e1070	e15800	e6030	3060	2220	3370	1100
2	2530	1240	e1290	e910	e848	e1100	16400	e6150	3020	2130	3090	1040
3	2500	1230	e1290	e910	e841	e1120	e16200	e6280	2980	2010	2870	e976
4	2470	1200	e1290	e910	e844	e1150	e15700	e6400	2970	1930	2670	e950
5	2450	1210	e1280	e910	e844	e1180	e15300	e6520	3000	2040	2440	e920
6	2410	1170	e1250	e900	e830	e1220	14700	6440	3100	2160	2220	e900
7	2380	1170	e1220	e900	e815	e1230	13900	6210	3000	2210	2160	e870
8	2340	1210	e1180	e900	e837	e1210	13200	e5950	2870	5070	2250	e850
9	2310	1140	e1140	e900	e837	e1180	12400	e5770	2790	9900	2210	e741
10	2280	1070	e1100	e900	e844	e1170	11300	e5590	2740	11700	2110	765
11	2240	1120	e1110	e900	e859	e1180	10100	e5400	2710	12000	1980	888
12	2190	1230	e1130	e900	e870	e1220	9080	e5220	2690	11900	e1860	848
13	2140	1250	e1200	e900	e884	e1290	8050	e5040	2610	11300	e1780	1010
14	2100	1210	e1200	e900	e902	e1340	7340	e4860	2750	9980	e1700	1700
15	2070	1200	e1180	e900	e917	e1400	6760	e4680	2680	8950	e1620	2140
16	2040	1440	e1160	e890	e928	e1480	6310	e4490	2920	8020	1560	3810
17	1980	1860	e1150	e885	e939	e1580	5950	e4310	3090	7290	1480	5900
18	1910	2350	e1150	e885	e961	e1720	5600	e4080	2850	6660	1410	6010
19	1830	2100	e1150	e885	e968	e2000	5370	e3950	2510	2860	1410	4900
20	1760	1860	e1140	e885	e986	e2220	5180	e3870	2560	5790	1520	3870
21	1690	e1800	e1130	e882	e986	e2700	5010	e3790	3200	5650	1610	3170
22	1630	e1750	e1120	e881	e972	e3500	4820	e3710	3970	5530	1540	2700
23	1570	e1700	e1100	e873	e964	e4700	4630	e3630	4130	5620	1460	2400
24	1520	e1400	e1050	e870	e964	e6800	4500	e3550	3870	6020	1400	2250
25	1490	e1360	e1000	e877	e982	e8800	4380	e3470	3410	6170	1370	2210
26	1450	e1360	e990	e892	e993	e10200	4380	3390	3010	6160	1330	2270
27	1390	e1350	e980	e899	e1010	e11500	4720	3350	2720	5970	1320	2310
28	1320	e1300	e960	e906	e1030	e12800	5290	3300	2550	5580	1250	2320
29	1310	e1300	e950	e906	---	e13400	5680	3230	2430	4950	1160	2310
30	1300	e1290	e920	e873	---	e14400	5860	3170	2320	4270	1130	2250
31	1270	---	e910	e877	---	e15000	---	3110	---	3750	1110	---
TOTAL	60440	42110	35010	27716	25517	130860	263910	144940	88510	185790	56390	64378
MEAN	1950	1404	1129	894	911	4221	8797	4675	2950	5993	1819	2146
MAX	2570	2350	1290	910	1030	15000	16400	6520	4130	12000	3370	6010
MIN	1270	1070	910	870	815	1070	4380	3110	2320	1930	1110	741
AC-FT	119900	83530	69440	54970	50610	259600	523500	287500	175600	368500	111800	127700

e Estimated.

RED RIVER OF THE NORTH BASIN

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

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1961 - 1994, BY WATER YEAR (WY)

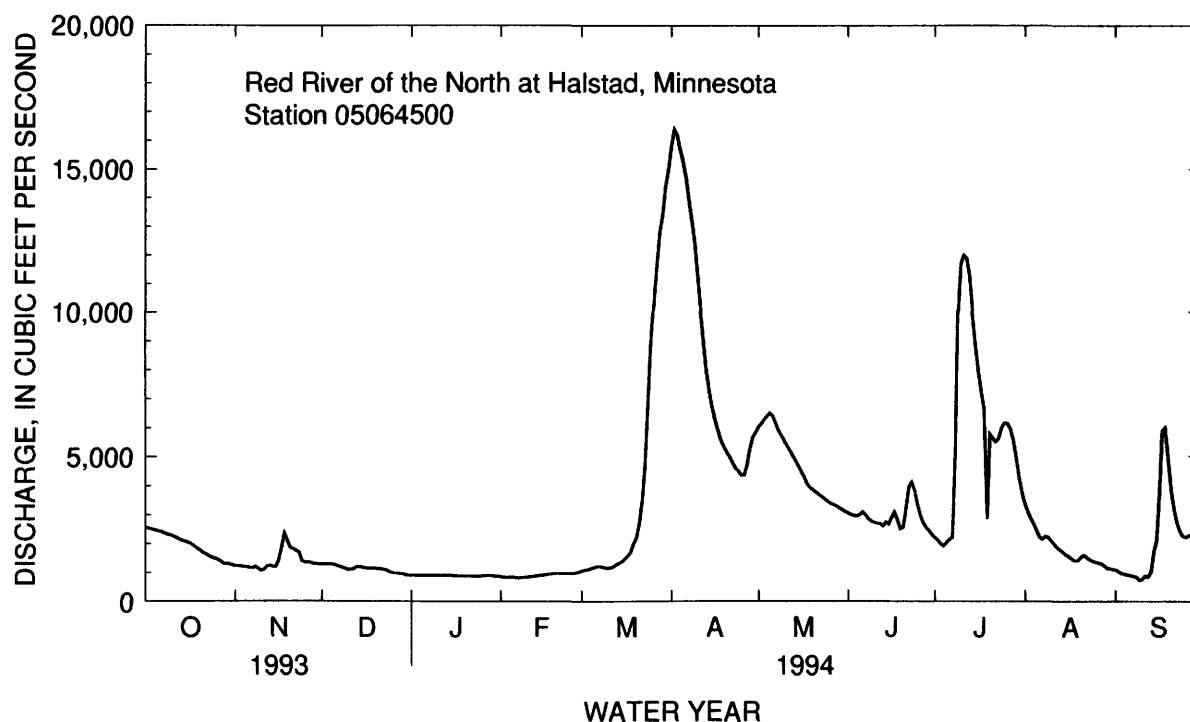
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	704	650	513	432	445	2053	6624	3066	2529	2555	1111	712
MAX	2188	1771	1253	1023	1052	9429	20080	8994	10310	20060	11700	3360
(WY)	1987	1972	1987	1987	1987	1966	1969	1979	1962	1975	1993	1993
MIN	61.5	92.3	51.2	32.1	45.9	249	705	449	242	153	59.5	38.4
(WY)	1977	1977	1977	1977	1977	1962	1981	1977	1977	1988	1977	1976

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1961 - 1994

ANNUAL TOTAL	1409050		1125571									
ANNUAL MEAN	3860		3084							1797		
HIGHEST ANNUAL MEAN										3968		1975
LOWEST ANNUAL MEAN										214		1977
HIGHEST DAILY MEAN	22300	Aug 2				16400	Apr 2			41500	Apr 22 1979	
LOWEST DAILY MEAN	300	Jan 10				741	Sep 9			10	Sep 2 1976	
ANNUAL SEVEN-DAY MINIMUM	333	Jan 6				835	Feb 3			17	Aug 28 1976	
INSTANTANEOUS PEAK FLOW						16600	Apr 3			42000	Apr 22 1979	
INSTANTANEOUS PEAK STAGE						25.62	Mar 29			39.00	Apr 22 1979	
INSTANTANEOUS LOW FLOW										5.4	Oct 8 1936	
ANNUAL RUNOFF (AC-FT)	2795000					2233000				1302000		
10 PERCENT EXCEEDS	12400					6350				3900		
50 PERCENT EXCEEDS	2100					1860				720		
90 PERCENT EXCEEDS	450					900				203		



RED RIVER OF THE NORTH BASIN

05064500 RED RIVER OF THE NORTH AT HALSTAD, MN--Continued
(National stream quality accounting network station and radiochemical program station)

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

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

DATE	TIME	CHARGE, INST. CUBIC FEET PER SECOND (00061)	DIS- CHARGE, IN CUBIC FEET PER SECOND (00060)	DIS- SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND- ARD UNITS) (00400)	BARO- METRIC PRES- SURE (MM OF HG) (00025)	TEMPER- ATURE AIR (DEG C) (00020)	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)
OCT											
19...	1040	1810	--	801	8.3	739	--	8.0	23	10.5	92
NOV											
22...	1100	--	1750	546	8.3	--	-20.0	0.5	4.0	--	--
JAN											
21...	1100	882	--	698	7.8	748	-8.0	0.0	--	10.3	72
FEB											
11...	1215	868	--	723	7.7	744	-10.0	0.0	2.1	12.0	84
MAR											
14...	1320	1330	--	704	--	--	9.0	0.5	--	--	--
29...	1200	13200	--	645	7.7	750	1.0	0.0	--	10.6	74
APR											
05...	1330	15300	--	689	--	--	4.0	2.5	--	--	--
15...	1015	6830	--	811	8.2	734	8.5	9.0	--	10.8	97
MAY											
05...	0930	6690	--	855	8.6	746	8.5	9.5	37	10.8	97
JUN											
06...	1320	3070	--	793	--	--	27.5	22.5	--	--	--
22...	0830	3940	--	523	7.9	738	25.0	23.5	--	5.5	67
JUL											
11...	1225	12000	--	433	--	--	25.0	20.5	--	--	--
14...	1200	9380	--	550	--	--	23.0	21.0	--	--	--
20...	0950	5800	--	743	--	--	24.0	22.0	--	--	--
26...	1210	6330	--	592	--	--	20.0	23.0	--	--	--
28...	0815	5670	--	627	8.1	743	19.0	20.0	110	6.4	72
SEP											
01...	0920	1120	--	721	8.2	--	10.5	18.5	--	--	--
08...	1140	858	--	753	8.0	--	27.0	--	--	--	--
28...	1115	2210	--	848	--	--	18.0	15.5	--	--	--

DATE	HARD- NESS TOTAL (MG/L AS CaCO3) (00900)	ALKA- LITY WAT DIS TOT IT FIELD MG/L AS CaCO3 (39086)	COLI- FORM, FECAL, 0.7 UM-MF (COLS/ 100 ML) (31625)	STREP- TOCOC- CI, FECAL, KF AGAR (COLS/ PER 100 ML) (31673)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	SODIUM PERCENT (00932)	POTAS- AD- SORP- TION RATIO (00931)	BICAR- BONATE SIUM, DIS- SOLVED (MG/L AS K) (00935)	WATER DIS IT FIELD MG/L AS HCO3 (00453)
OCT											
19...	360	245	K11	K16	73	44	32	16	0.7	8.8	299
NOV											
22...	300	--	--	--	62	36	32	18	0.8	6.7	--
JAN											
21...	290	257	--	--	61	34	27	16	0.7	6.5	314
FEB											
11...	310	271	35	58	64	37	31	17	0.8	6.8	331
MAR											
29...	260	135	--	--	58	27	24	16	0.7	10	165
APR											
15...	350	196	--	--	76	38	36	18	0.8	9.1	239
MAY											
05...	400	208	K13	82	84	45	35	16	0.8	8.1	232
JUN											
22...	230	--	--	--	50	25	18	14	0.5	6.4	--
JUL											
28...	250	141	250	530	57	26	24	17	0.7	7.9	172

RED RIVER OF THE NORTH BASIN

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DATE	WATER DIS IT FIELD MG/L AS CO3 (00452)	CAR- BONATE SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NITRATE DIS- SOLVED (MG/L AS N) (00618)
OCT 19...	0	170	16	0.20	14	507	542	0.74	2650	0.010	0.150
NOV 22...	--	89	21	0.20	14	425	444	0.60	2100	<0.010	--
JAN 21...	0	73	16	0.20	17	391	443	0.60	1050	0.010	0.310
FEB 11...	0	74	16	0.20	20	414	443	0.60	1040	<0.010	--
MAR 29...	0	140	17	0.20	15	395	427	0.58	15200	0.270	4.63
APR 15...	0	180	19	0.20	14	498	544	0.74	10000	0.050	1.65
MAY 05...	10	220	19	0.20	6.7	545	584	0.79	10500	0.020	0.440
JUN 22...	--	99	11	0.50	12	318	343	0.47	3650	0.060	0.920
JUL 28...	0	140	10	0.20	17	369	417	0.57	6380	0.020	0.200
SEP 01...	8	120	15	0.20	20	443	469	0.64	1420	<0.010	--
DATE	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITRO- GEN, ORGANIC DIS- SOLVED (MG/L AS N) (00607)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO- GEN,AM- MONIA + ORGANIC DIS- SOLVED (MG/L AS N) (00623)	NITRO- GEN, TOTAL (MG/L AS N) (00600)	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)
OCT 19...	0.160	0.160	0.090	0.71	--	0.80	--	0.96	0.180	0.090	0.090
NOV 22...	0.120	0.120	0.590	0.61	--	1.2	--	1.3	0.170	0.150	0.150
JAN 21...	0.320	0.320	0.240	0.56	0.56	0.80	0.80	1.1	0.100	0.080	0.080
FEB 11...	0.380	0.380	0.220	0.58	--	0.80	--	1.2	0.110	0.090	0.080
MAR 29...	4.90	4.90	0.400	1.4	1.2	1.8	1.6	6.7	0.440	0.300	0.270
APR 15...	1.70	1.70	0.310	1.7	0.79	2.0	1.1	3.7	0.370	0.160	0.150
MAY 05...	0.460	0.460	0.070	1.0	--	1.1	--	1.6	0.200	0.060	0.030
JUN 22...	0.980	0.980	0.070	2.1	0.63	2.2	0.70	3.2	0.620	0.110	0.110
JUL 28...	0.220	0.220	0.040	1.2	--	1.2	--	1.4	0.440	0.180	0.180
SEP 01...	0.180	0.180	0.010	0.99	0.69	1.0	0.70	1.2	0.230	0.140	0.110

RED RIVER OF THE NORTH BASIN

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DATE	ALUM- INUM, DIS- SOLVED (UG/L AS AL) (01106)	BARIUM, DIS- SOLVED (UG/L AS BA) (01005)	COBALT, DIS- SOLVED (UG/L AS CO) (01035)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	LITHIUM DIS- SOLVED (UG/L AS LI) (01130)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, DIS- SOLVED (UG/L AS AG) (01075)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)
OCT 19...	20	64	<3	7	44	8	<10	3	<1	<1.0	300
JAN 21...	--	--	--	14	--	57	--	--	--	--	--
FEB 11...	<10	69	<3	7	30	43	10	2	<1	<1.0	240
MAR 29...	--	--	--	30	--	81	--	--	--	--	--
APR 15...	--	--	--	12	--	3	--	--	--	--	--
MAY 05...	<10	57	<3	11	47	2	<10	3	<1	<1.0	320
JUN 22...	--	--	--	20	--	1	--	--	--	--	--
JUL 28...	<10	53	<3	20	30	1	<10	4	<1	<1.0	230
SEP 01...	--	--	--	17	--	5	--	--	--	--	--
DATE	VANA- DIUM, DIS- SOLVED (UG/L AS V) (01085)	RA-226 2 SIGMA WATER, DISS, (PCI/L) (76001)	RADIUM 226, DIS- SOLVED, RADON METHOD (PCI/L) (09511)	URANIUM NATURAL 2 SIGMA WATER, DISS, (UG/L) (75990)	URANIUM NATURAL DIS- SOLVED (UG/L AS U) (22703)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS- PENDE TOTAL (MG/L AS C) (00689)	SEDI- MENT, SUS- PENDE (MG/L) (80154)	SEDI- MENT, DIS- CHARGE, SUS- PENDE (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)	
OCT 19...	<6	--	--	--	--	9.8	0.8	52	254	99	
NOV 22...	--	--	--	--	--	--	--	49	232	97	
JAN 21...	--	--	--	--	--	--	--	9	21	97	
FEB 11...	<6	--	--	--	--	9.4	0.4	34	80	100	
MAR 29...	--	--	--	--	--	--	--	95	3390	99	
APR 15...	--	--	--	--	--	--	--	138	2540	99	
MAY 05...	<6	0.020	0.08	1.4	9.3	--	--	163	2940	100	
JUN 22...	--	--	--	--	--	8.6	>5.0	643	6840	99	
JUL 28...	<6	0.020	0.08	<1.0	2.4	--	--	343	5250	100	
SEP 01...	--	--	--	--	--	--	--	133	402	100	

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RED RIVER OF THE NORTH BASIN

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 bridge, 3.8 mi southeast of Shelly and 10 mi upstream from mouth.

DRAINAGE AREA.--151 mi².

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 mean 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. 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 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.19	---	---	---	---	---	e190	76	20	42	3.1	.65
2	.17	---	---	---	---	---	e540	59	15	36	2.1	.77
3	.20	---	---	---	---	---	e580	50	12	32	1.4	1.2
4	.20	---	---	---	---	---	e341	53	15	35	1.1	1.6
5	.17	---	---	---	---	---	226	55	35	33	.95	.88
6	.11	---	---	---	---	---	149	51	37	27	.82	.84
7	.14	---	---	---	---	---	123	44	19	39	4.0	.80
8	.12	---	---	---	---	---	80	38	11	557	13	.74
9	.09	---	---	---	---	---	64	34	6.1	935	8.5	.56
10	.07	---	---	---	---	---	67	29	3.9	678	3.8	.61
11	.08	---	---	---	---	---	64	24	2.9	412	1.8	.83
12	.07	---	---	---	---	---	51	20	2.6	232	.77	.93
13	.07	---	---	---	---	---	43	17	2.4	131	.67	1.1
14	.07	---	---	---	---	---	41	15	190	81	.60	1.3
15	.05	---	---	---	---	---	37	13	492	63	.56	3.5
16	.04	---	---	---	---	---	31	14	339	52	.59	457
17	.04	---	---	---	---	---	29	17	193	45	.42	925
18	.05	---	---	---	---	---	27	15	105	41	.40	557
19	.07	---	---	---	---	---	22	14	75	37	.40	288
20	---	---	---	---	---	---	19	12	250	42	.38	153
21	---	---	---	---	---	---	15	10	266	47	.46	94
22	---	---	---	---	---	---	11	8.7	165	47	.66	70
23	---	---	---	---	---	---	9.5	7.8	117	45	1.6	54
24	---	---	---	---	---	---	9.4	63	83	40	2.0	39
25	---	---	---	---	---	---	9.5	54	71	36	1.7	30
26	---	---	---	---	---	---	15	46	63	31	1.3	24
27	---	---	---	---	---	---	73	43	53	24	1.0	20
28	---	---	---	---	---	e101	166	32	50	18	.71	14
29	---	---	---	---	---	e74	154	31	47	12	.61	9.0
30	---	---	---	---	---	e70	107	31	45	7.8	.59	7.2
31	---	---	---	---	---	e78	---	26	---	5.1	.83	---
TOTAL	2.00	---	---	---	---	323	3293.4	1002.5	2785.9	3862.9	56.82	2757.51
MEAN	.11	---	---	---	---	80.7	110	32.3	92.9	125	1.83	91.9
MAX	.20	---	---	---	---	101	580	76	492	935	13	925
MIN	.04	---	---	---	---	70	9.4	7.8	2.4	5.1	.38	.56
AC-FT	4.0	---	---	---	---	641	6530	1990	5530	7660	113	5470
CFSM	.00	---	---	---	---	.53	.73	.21	.61	.83	.01	.61
IN.	.00	---	---	---	---	.08	.81	.25	.69	.95	.01	.68

e Estimated.

RED RIVER OF THE NORTH BASIN

05067500 MARSH RIVER NEAR SHELLY, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1944 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	12.4	10.7	5.60	3.79	3.29	69.5	289	126	81.5	73.6	20.8	13.2
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 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

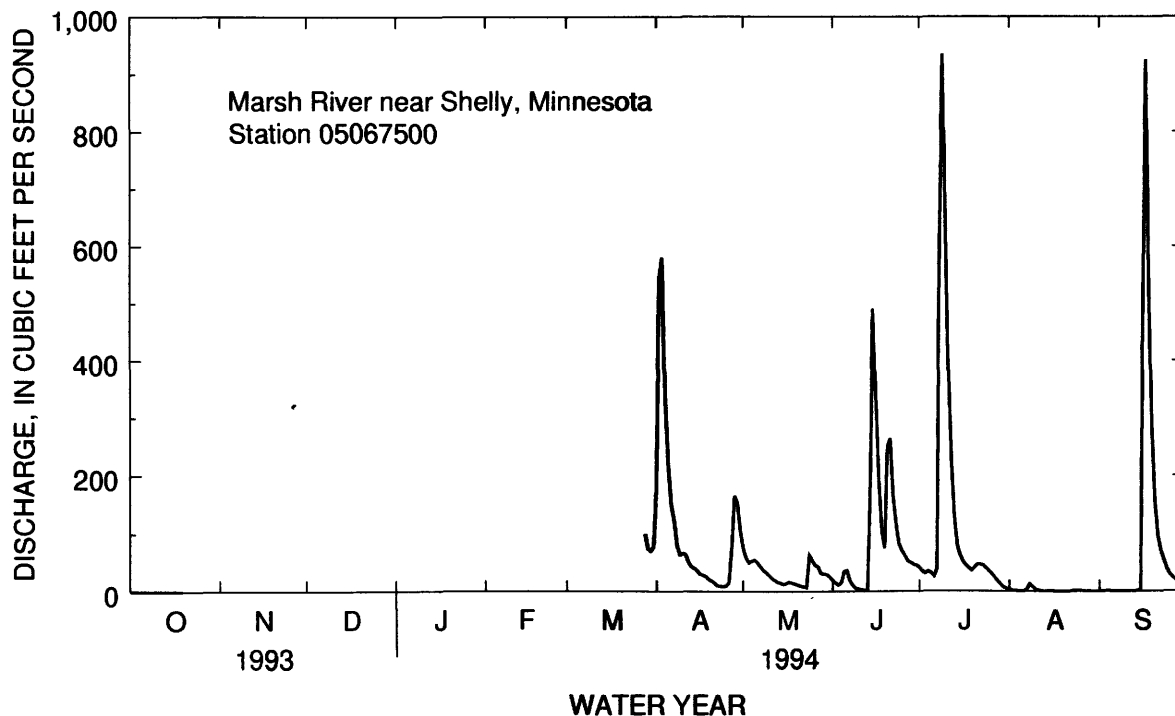
WATER YEARS 1944 - 1994

ANNUAL MEAN										63.3		
HIGHEST ANNUAL MEAN										543		1950
LOWEST ANNUAL MEAN										1.24		1977
HIGHEST DAILY MEAN				640	Apr 2		935	Jul 9		4740		Apr 19 1979
LOWEST DAILY MEAN							.04 ^a	Oct 16,17		.00 ^b		Sep 4 1945
ANNUAL SEVEN-DAY MINIMUM										.00		Sep 12 1945
INSTANTANEOUS PEAK FLOW							995	Sep 17		4880		Apr 19 1979
INSTANTANEOUS PEAK STAGE							11.50	Sep 17		23.36 ^c		Apr 19 1979

a Minimum observed.

b Many days, several years.

c From floodmark.



RED RIVER OF THE NORTH BASIN

05069000 SAND HILL RIVER AT CLIMAX, MN

LOCATION.--Lat 47°36'43", long 96°48'52", in NE1/4NE1/4 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.--426 mi².

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 mean 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 fair.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	24	e20	e25	e22	e14	e14	e410	231	62	232	133	34
2	23	e21	e25	e22	e14	e14	e445	201	57	201	119	33
3	23	e21	e25	e21	e14	e14	e450	184	54	178	117	32
4	23	e20	e25	e21	e14	e14	e440	193	51	188	103	29
5	22	e19	e25	e21	e14	e14	e430	186	46	194	93	28
6	23	e20	e25	e20	e14	e14	e410	166	44	185	85	29
7	24	e21	e25	e20	e14	e14	e380	147	40	218	82	29
8	23	e22	e26	e20	e14	e14	e350	135	35	1380	80	27
9	23	e21	e26	e19	e14	e14	e320	127	32	1540	74	26
10	23	e21	e26	e19	e14	e14	e290	114	33	1120	73	25
11	23	e20	e26	e19	e14	e14	271	100	32	800	68	24
12	23	e20	e26	e18	e14	e14	215	90	29	593	62	24
13	23	e20	e26	e18	e14	e14	185	88	27	490	58	30
14	24	e20	e26	e18	e14	e15	168	97	47	441	55	33
15	23	e20	e26	e18	e14	e15	151	83	63	371	53	30
16	23	e20	e26	e17	e14	e15	133	77	51	331	51	46
17	24	e21	e26	e17	e14	e16	120	77	74	300	49	127
18	23	e22	e26	e17	e14	e17	107	79	103	268	46	246
19	23	e22	e26	e16	e14	e18	99	73	187	245	47	278
20	24	e21	e26	e16	e14	e20	89	68	704	247	54	238
21	22	e21	e25	e16	e14	e25	81	63	674	234	47	265
22	22	e22	e25	e16	e14	e30	74	59	479	219	44	296
23	22	e20	e25	e15	e14	e40	68	59	379	204	44	311
24	22	e22	e25	e15	e14	e50	65	64	319	189	53	308
25	22	e24	e25	e15	e14	e60	62	70	300	183	51	281
26	22	e25	e24	e14	e14	e75	69	68	283	189	47	240
27	23	e26	e24	e14	e14	e100	122	74	264	198	42	203
28	24	e25	e24	e14	e14	e140	177	75	255	199	38	173
29	22	e25	e24	e14	---	e190	219	76	259	186	37	143
30	20	e25	e23	e14	---	e270	250	74	267	169	36	121
31	e20	---	e23	e14	---	e350	---	67	---	150	35	---
TOTAL	705	647	780	540	392	1628	6650	3265	5250	11642	1976	3709
MEAN	22.7	21.6	25.2	17.4	14.0	52.5	222	105	175	376	63.7	124
MAX	24	26	26	22	14	350	450	231	704	1540	133	311
MIN	20	19	23	14	14	14	62	59	27	150	35	24
AC-FT	1400	1280	1550	1070	778	3230	13190	6480	10410	23090	3920	7360
CFSM	.05	.05	.06	.04	.03	.12	.52	.25	.41	.88	.15	.29
IN.	.06	.06	.07	.05	.03	.14	.58	.29	.46	1.02	.17	.32

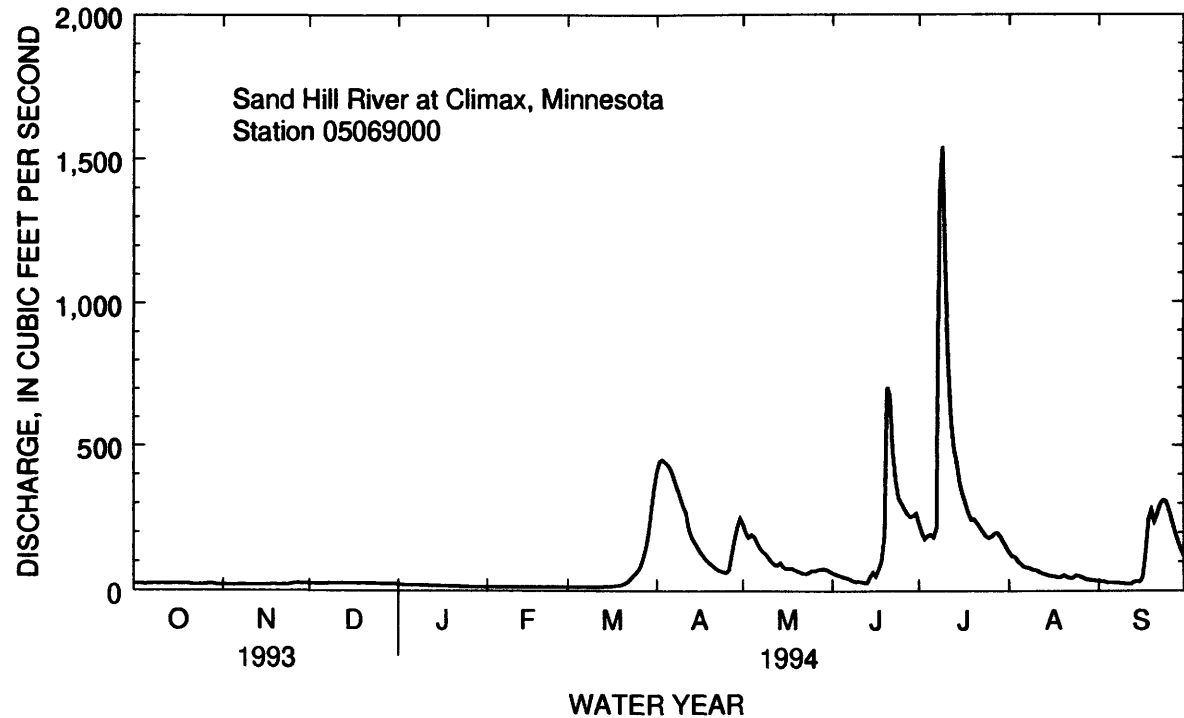
e Estimated.

RED RIVER OF THE NORTH BASIN
05069000 SAND HILL RIVER AT CLIMAX, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1943 - 1994, BY WATER YEAR (WY)												
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	31.7	27.1	16.9	12.4	12.2	74.2	343	117	95.5	67.5	38.2	27.1
MAX	223	209	48.7	30.1	46.8	385	946	1156	596	376	426	124
(WY)	1972	1972	1972	1986	1984	1966	1978	1950	1984	1994	1993	1994
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 1993 CALENDAR YEAR			FOR 1994 WATER YEAR			WATER YEARS 1943 - 1994		
ANNUAL TOTAL	38660		37184			71.3 ^a		
ANNUAL MEAN	106		102			204		1950
HIGHEST ANNUAL MEAN						18.4		1977
LOWEST ANNUAL MEAN						4360		Apr 14 1965
HIGHEST DAILY MEAN	1300	Aug 3	1540	Jul 9		1.0		Jan 17 1962
LOWEST DAILY MEAN	12	Feb 4	14	Jan 26 to Mar 13		1.1		Jan 12 1962
ANNUAL SEVEN-DAY MINIMUM	12	Feb 4	14	Jan 26		4560		Apr 14 1965
INSTANTANEOUS PEAK FLOW			1660		Jul 8	32.79 ^b		Apr 23 1979
INSTANTANEOUS PEAK STAGE			12.67		Jul 8			
INSTANTANEOUS LOW FLOW			2.9		Nov 3			
ANNUAL RUNOFF (AC-FT)	76680		73750			51640		
ANNUAL RUNOFF (CFSM)	.25		.24			.17		
ANNUAL RUNOFF (INCHES)	3.38		3.25			2.27		
10 PERCENT EXCEEDS	176		267			142		
50 PERCENT EXCEEDS	31		29			22		
90 PERCENT EXCEEDS	12		14			8.7		

a Median of annual mean discharges is 53 ft³/s.
b From floodmark (backwater from Red River of the North).



RED RIVER OF THE NORTH BASIN

05074000 LOWER RED LAKE NEAR RED LAKE, MN

LOCATION.--Lat 47°57'27", long 95°16'34", in SW 1/4 NW 1/4 sec. 28, T. 152 N., R. 36 W., Clearwater County, Hydrologic Unit 09020302, on Red Lake Indian Reservation, on left bank just upstream from dam at outlet, 13 mi northwest of city of Red Lake.

DRAINAGE AREA.--1,950 mi², approximately.

PERIOD OF RECORD.--June 1930 to November 1932 and May 1933 to current year. Published as "Red lake at Redby" prior to May 1933 and as "Red Lake near Red Lake" May 1933 to September 1940. Records on Upper Red Lake published as Red Lake at Waskish, April 1930 to September 1933, all in reports of Geological Survey. October 1921 to September 1929 gage heights at Redby and on Upper Red Lake at Waskish in files of Minnesota Department of Natural Resources (fragmentary).

GAGE.--Water-stage recorder. Datum of gage is 1,100.00 ft, adjustment of 1912 (levels by U.S. Army Corps of Engineers); gage readings have been reduced to elevations based on adjustment of 1912. May 1933 to Sept. 6, 1934, nonrecording gage and Sept. 7, 1934 to Sept. 30, 1986, recording gage at same site at datum 69.00 ft higher. Nonrecording gages at Waskish and Redby.

REMARKS.--Water level subject to fluctuation caused by change in direction and velocity of wind and by seiches.

EXTREMES FOR PERIOD OF RECORD.--Maximum elevation, 1,178.53 ft, June 25, 1950; minimum recorded, 1,169.80 ft, Nov. 20, 1936.

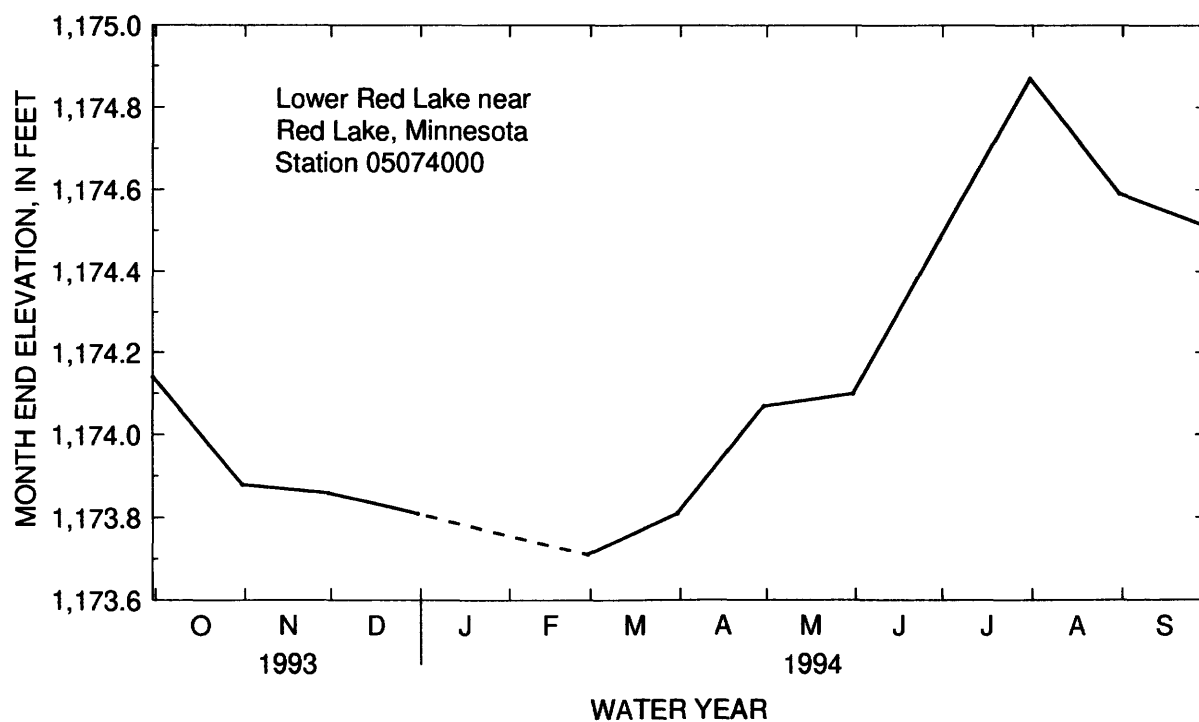
EXTREMES FOR CURRENT YEAR.--Maximum daily, 1,174.94 ft, Aug. 4; minimum daily, 1,173.52 ft, Oct. 28.

MONTHEND ELEVATION, IN FEET, OCTOBER 1993 TO SEPTEMBER 1994

Oct. 31	1173.88	Feb. 28	1173.71	June 30	1174.48
Nov. 30	1173.86	Mar. 31	1173.81	July 31	1174.87
Dec. 31	1173.81	Apr. 30	1174.07	Aug. 31	1174.59
Jan. 31	-----	May 31	1174.10	Sept. 30	1174.51

(NOTE.--Daily-mean gage heights are available).

RED RIVER OF THE NORTH BASIN
05074000 LOWER RED LAKE NEAR RED LAKE, MN--Continued



RED RIVER OF THE NORTH BASIN

05074500 RED LAKE RIVER NEAR RED LAKE, MN

LOCATION.--Lat 47°57'27", long 95°16'35", in SW¹/₄NW¹/₄ sec. 28, T. 152 N., R. 36 W., Clearwater County, Hydrologic Unit 09020302, on Red Lake Indian Reservation, on left bank 50 ft downstream from dam at outlet of Lower Red Lake and 13 mi northwest of city of Red Lake.

DRAINAGE AREA.--1,950 mi², approximately.

PERIOD OF RECORD.--May 1933 to current year. Monthly discharge only for May 1933, published in WSP 1308.

GAGE.--Water-stage recorder. Datum of gage is 1,100.00 ft, adjustment of 1912 (levels by U.S. Army Corps of Engineers). Prior to Sept. 7, 1934, nonrecording gage at site 50 ft upstream at datum 69.00 ft higher. Sept. 7, 1934, to Nov. 26, 1951, water-stage recorder at present site at datum 69.00 ft higher. Nov. 27, 1951 to Sept. 30, 1986, water-stage recorder at present site at datum 67.00 ft higher.

REMARKS.--Records poor. Flow completely regulated by outlet dam on Lower Red Lake.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e80	523	e561	e600	e640	e644	159	123	459	226	518	754
2	429	514	e562	e600	e640	e644	172	128	462	136	517	747
3	507	513	e563	e602	e640	e644	168	130	465	88	521	748
4	640	522	e565	e602	e641	e644	162	141	474	71	424	745
5	842	520	e567	e604	e641	e644	160	129	482	305	178	731
6	880	e520	e569	e606	e642	e646	154	124	503	786	81	730
7	941	e521	e570	e608	e642	e655	155	132	500	909	275	723
8	938	e522	e572	e610	e643	e680	154	149	495	795	705	726
9	910	e524	e575	e612	e643	e660	175	144	497	453	756	724
10	897	e526	e578	e614	e644	634	161	133	494	297	764	725
11	898	e527	e580	e616	e644	599	163	150	500	201	771	722
12	911	e530	e584	e618	e644	584	164	132	495	128	766	738
13	920	e532	e586	e620	e644	565	173	134	490	78	766	741
14	921	e535	e590	e620	e644	560	175	146	491	e72	761	743
15	932	e537	e594	e620	e644	536	187	141	510	e70	762	753
16	929	e538	e598	e620	e644	411	179	124	522	e68	757	759
17	935	e539	e600	e622	e644	151	166	112	533	e67	763	758
18	935	e540	e600	e624	e644	146	182	118	532	e66	767	765
19	934	e540	e600	e625	e644	141	169	213	539	e66	780	769
20	923	e540	e600	e625	e644	156	140	405	314	153	779	775
21	908	e541	e600	e625	e644	163	137	425	138	432	775	774
22	925	e543	e600	e627	e644	164	142	425	87	494	770	782
23	928	e545	e600	e628	e644	156	156	432	288	514	770	783
24	937	e548	e600	e629	e644	157	144	439	798	512	769	779
25	928	e550	e600	e630	e644	155	128	443	907	507	775	799
26	908	e552	e600	e631	e644	164	135	442	954	508	772	794
27	908	e554	e600	e632	e644	172	119	443	983	506	778	773
28	798	e557	e600	e633	e644	165	110	444	899	507	756	617
29	629	e559	e600	e635	---	161	118	456	508	506	768	505
30	568	e560	e600	e637	---	160	120	462	339	507	771	715
31	526	---	e600	e639	---	158	---	467	---	520	761	---
TOTAL	25265	16072	18214	19214	18008	12119	4627	7886	15658	10548	20876	22197
MEAN	815	536	588	620	643	391	154	254	522	340	673	740
MAX	941	560	600	639	644	680	187	467	983	909	780	799
MIN	80	513	561	600	640	141	110	112	87	66	81	505
AC-FT	50110	31880	36130	38110	35720	24040	9180	15640	31060	20920	41410	44030
CFSM	.42	.27	.30	.32	.33	.20	.08	.13	.27	.17	.35	.38
IN.	.48	.31	.35	.37	.34	.23	.09	.15	.30	.20	.40	.42

e Estimated.

RED RIVER OF THE NORTH BASIN

05074500 RED LAKE RIVER NEAR RED LAKE, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1933 - 1994, BY WATER YEAR (WY)

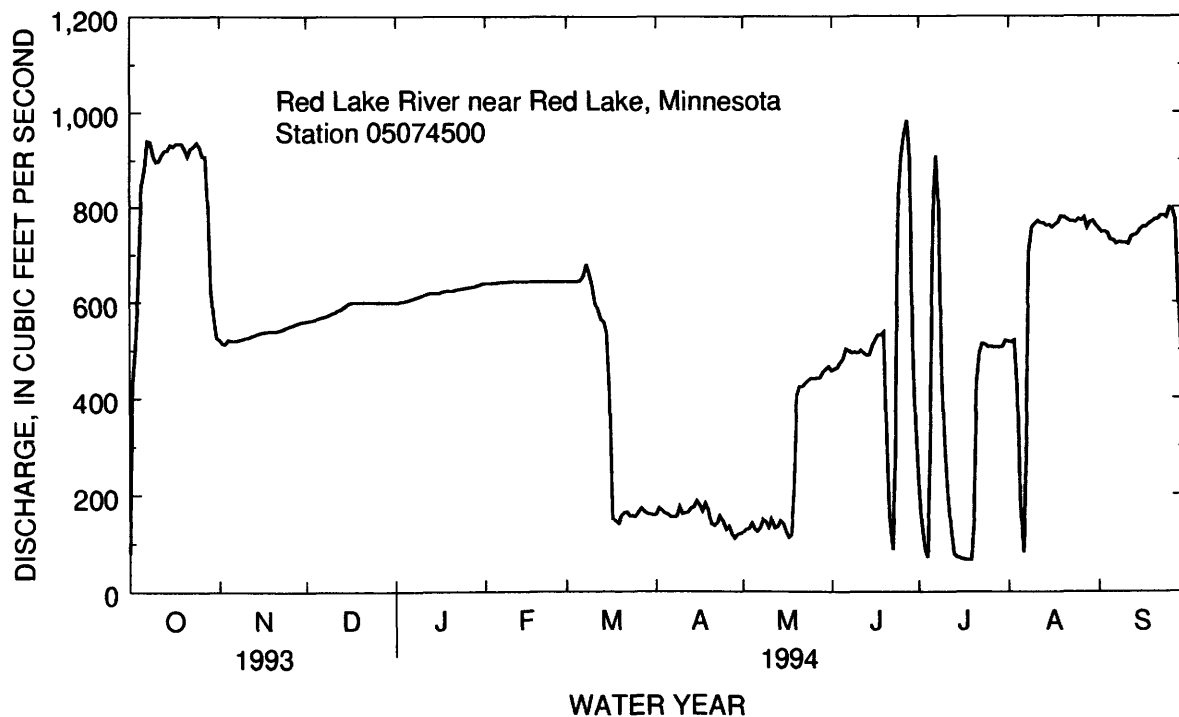
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	471	456	453	466	461	423	332	483	571	534	469	464
MAX	2071	1649	1498	1418	1342	1396	1199	1624	2025	1840	1464	1712
(WY)	1951	1951	1951	1951	1951	1951	1951	1950	1950	1950	1975	1950
MIN	5.10	3.57	.95	.35	.40	.60	4.00	.60	2.15	4.63	2.73	1.61
(WY)	1934	1934	1934	1934	1934	1936	1936	1933	1933	1934	1936	1934

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1933 - 1994

ANNUAL TOTAL	214316	190684	
ANNUAL MEAN	587	522	469
HIGHEST ANNUAL MEAN			1292
LOWEST ANNUAL MEAN			5.55
HIGHEST DAILY MEAN	941	Oct 7	983
LOWEST DAILY MEAN	80	May 26	66
ANNUAL SEVEN-DAY MINIMUM	113	Sep 25	70
INSTANTANEOUS PEAK FLOW			1040
INSTANTANEOUS PEAK STAGE			73.62
ANNUAL RUNOFF (AC-FT)	425100	378200	339600
ANNUAL RUNOFF (CFSM)	.30	.27	.24
ANNUAL RUNOFF (INCHES)	4.09	3.64	3.27
10 PERCENT EXCEEDS	898	781	1010
50 PERCENT EXCEEDS	530	570	384
90 PERCENT EXCEEDS	284	141	35



RED RIVER OF THE NORTH BASIN

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 highway bridge at High Landing, 7 mi south of Goodridge and 33 mi upstream from Thief River.

DRAINAGE AREA.--2,300 mi², 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 good except those for estimated daily discharges, which are fair. Flow regulated by outlet dam on Lower Red Lake.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	122	719	e610	e605	e600	e620	e245	352	530	971	662	826
2	126	672	e610	e605	e600	e620	e245	337	532	685	655	820
3	291	646	e610	e605	e600	e620	e240	333	525	504	642	816
4	415	636	e610	e605	e600	e640	e240	392	514	424	635	821
5	498	625	e610	e605	e600	e720	e240	401	508	455	625	826
6	611	e625	e610	e600	e600	e780	263	369	513	435	561	818
7	737	e620	e610	e600	e600	e800	258	344	519	640	445	805
8	842	e615	e610	e600	e600	e770	259	316	519	1780	340	794
9	910	e610	e610	e600	e600	e730	266	301	513	1960	380	791
10	942	e600	e610	e600	e600	e670	288	289	503	1630	526	790
11	948	e590	e610	e600	e600	e650	295	268	494	1140	648	796
12	950	e600	e610	e600	e600	e640	301	261	491	768	722	797
13	952	e620	e610	e600	e600	e690	304	261	485	572	760	805
14	963	e640	e610	e600	e600	e820	308	281	700	465	777	810
15	968	e660	e610	e600	e600	e920	306	298	772	399	788	814
16	982	e680	e610	e600	e600	e540	312	285	667	355	798	818
17	991	e700	e610	e600	e610	e300	308	275	651	318	802	821
18	998	e690	e610	e600	e610	e240	291	256	626	297	808	815
19	1010	e660	e610	e600	e620	e260	290	244	662	307	817	811
20	1010	e630	e610	e600	e620	e290	286	326	1420	330	821	807
21	1000	e600	e610	e600	e620	e320	261	511	1040	354	822	809
22	999	e570	e610	e600	e620	e370	245	540	574	459	826	809
23	996	e540	e610	e600	e620	e330	237	563	402	633	833	807
24	1000	e550	e610	e600	e620	e300	243	571	404	716	836	807
25	1010	e560	e610	e600	e620	e280	248	559	638	703	837	808
26	1010	e565	e605	e600	e620	e270	254	557	807	692	835	808
27	1010	e570	e605	e600	e620	e260	297	550	900	676	836	811
28	1000	e580	e605	e600	e620	e255	312	542	1270	657	843	810
29	982	e590	e605	e600	---	e250	339	545	1560	641	838	799
30	895	e600	e605	e600	---	e250	353	542	1340	629	832	718
31	789	---	e605	e600	---	e250	---	528	---	647	826	---
TOTAL	25957	18563	18880	18625	17020	15455	8334	12197	21079	21242	22376	24187
MEAN	837	619	609	601	608	499	278	393	703	685	722	806
MAX	1010	719	610	605	620	920	353	571	1560	1960	843	826
MIN	122	540	605	600	600	240	237	244	402	297	340	718
AC-FT	51490	36820	37450	36940	33760	30650	16530	24190	41810	42130	44380	47970
CFSM	.36	.27	.26	.26	.26	.22	.12	.17	.31	.30	.31	.35
IN.	.42	.30	.31	.30	.28	.25	.13	.20	.34	.34	.36	.39

e Estimated.

RED RIVER OF THE NORTH BASIN

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

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1930 - 1994, BY WATER YEAR (WY)

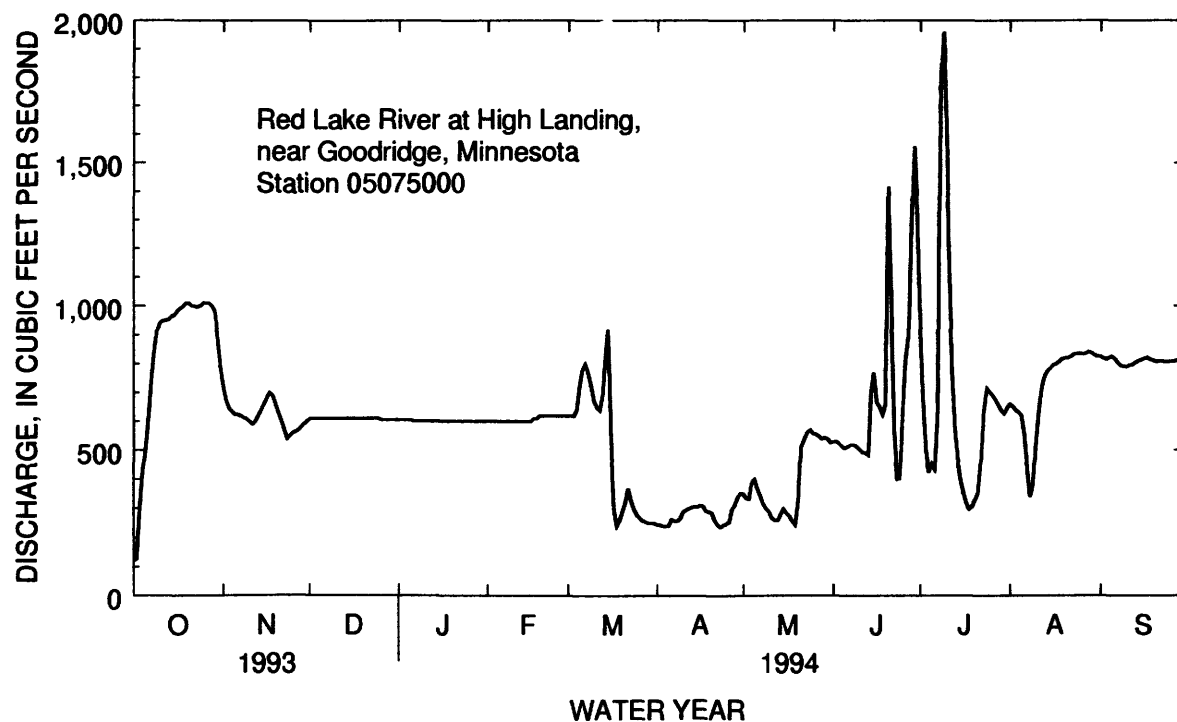
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN ^a	523	492	447	446	443	476	652	658	658	567	495	516
MAX	1955	1730	1539	1424	1366	1453	1980	3179	2161	2474	1478	1733
(WY)	1951	1951	1951	1951	1951	1951	1951	1950	1950	1975	1975	1950
MIN	2.11	1.61	.000	.000	.000	.000	24.7	5.58	1.04	5.92	.026	.000
(WY)	1934	1934	1934	1934	1934	1936	1933	1933	1936	1934	1934	1934

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1930 - 1994

ANNUAL TOTAL	259246	223915	
ANNUAL MEAN	710	613	531
HIGHEST ANNUAL MEAN			1407
LOWEST ANNUAL MEAN			6.21
HIGHEST DAILY MEAN	1770	1960	4040
LOWEST DAILY MEAN	122	122	.00
ANNUAL SEVEN-DAY MINIMUM	240	244	.00
INSTANTANEOUS PEAK FLOW		2020	4060
INSTANTANEOUS PEAK STAGE		10.66	13.44
ANNUAL RUNOFF (AC-FT)	514200	444100	384800
ANNUAL RUNOFF (CFSM)	.31	.27	.23
ANNUAL RUNOFF (INCHES)	4.19	3.62	3.14
10 PERCENT EXCEEDS	982	840	1160
50 PERCENT EXCEEDS	623	605	419
90 PERCENT EXCEEDS	535	289	33

^a Result of regulation.

RED RIVER OF THE NORTH BASIN

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.--959 mi².

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 1.12.33 ft above mean 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 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	326	e180	e14	e6.8	e.35	e.00	e170	154	39	353	566	30
2	317	178	e13	e6.7	e.20	e.00	e170	157	36	308	561	29
3	316	177	e13	e6.7	e.10	e.00	e160	146	35	267	566	26
4	313	180	13	e6.6	e.00	e.00	e155	158	27	248	559	29
5	312	174	13	e6.6	e.00	e.00	e150	168	21	243	533	32
6	313	e180	12	e6.5	e.00	e.15	e135	151	18	235	143	31
7	316	e180	12	e6.4	e.00	e.60	124	142	15	335	32	28
8	315	e185	11	e6.3	e.00	e10	110	127	14	1220	28	29
9	313	e185	12	e6.2	e.00	e58	113	122	13	1900	33	56
10	314	e180	11	e6.1	e.00	e47	118	103	13	1680	202	52
11	310	e175	11	e6.1	e.00	e43	123	86	18	1440	211	54
12	310	e170	11	e6.0	e.00	e38	119	79	18	1290	206	58
13	301	e165	11	e5.9	e.00	e34	77	72	15	1220	69	55
14	191	e160	12	e5.8	e.00	e52	70	76	113	1150	29	81
15	171	e160	11	e5.7	e.00	e70	74	110	170	1130	24	98
16	170	e160	13	e5.6	e.00	e85	72	112	146	1110	23	357
17	172	e160	13	e5.4	e.00	e70	65	108	120	1040	23	404
18	173	e155	12	e5.2	e.00	e60	55	97	79	1010	25	92
19	173	e155	12	e4.8	e.00	e53	54	73	47	1050	32	89
20	174	e150	11	e4.3	e.00	e68	50	59	46	1070	31	86
21	174	e145	9.7	e3.7	e.00	e150	44	54	64	1110	27	89
22	174	e140	9.3	e3.2	e.00	e520	37	52	71	1080	26	105
23	172	e130	9.2	e2.6	e.00	e500	34	58	78	1200	27	326
24	170	e110	8.8	e2.1	e.00	e450	32	72	82	1160	29	720
25	170	e70	8.9	e1.5	e.00	e410	36	72	66	1060	30	744
26	173	e30	8.1	e1.2	e.00	e370	46	64	63	990	31	736
27	174	e18	7.7	e1.0	e.00	e320	52	55	61	899	31	715
28	179	e15	e7.4	e.90	e.00	e270	63	51	156	728	41	696
29	178	e14	e7.2	e.70	---	e230	83	49	302	631	36	680
30	172	e14	e7.0	e.60	---	e200	122	44	390	594	34	671
31	e180	---	e6.9	e.50	---	e180	---	42	---	578	33	---
TOTAL	7216	4095	331.2	137.70	0.65	4288.75	2713	2913	2336	28329	4241	7198
MEAN	233	136	10.7	4.44	.023	138	90.4	94.0	77.9	914	137	240
MAX	326	185	14	6.8	.35	520	170	168	390	1900	566	744
MIN	170	14	6.9	.50	.00	.00	32	42	13	235	23	26
AC-FT	14310	8120	657	273	1.3	8510	5380	5780	4630	56190	8410	14280
CFSM	.24	.14	.01	.00	.00	.14	.09	.10	.08	.95	.14	.25
IN.	.28	.16	.01	.01	.00	.17	.11	.11	.09	1.10	.16	.28

e Estimated.

RED RIVER OF THE NORTH BASIN

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

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	86.6	62.8	19.1	5.55	3.49	67.4	573	454	282	208	94.5	99.3
MAX	637	844	206	100	45.0	609	2827	4274	1774	2103	1012	1012
(WY)	1986	1972	1945	1910	1910	1983	1966	1950	1962	1975	1993	1993
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 1993 CALENDAR YEAR

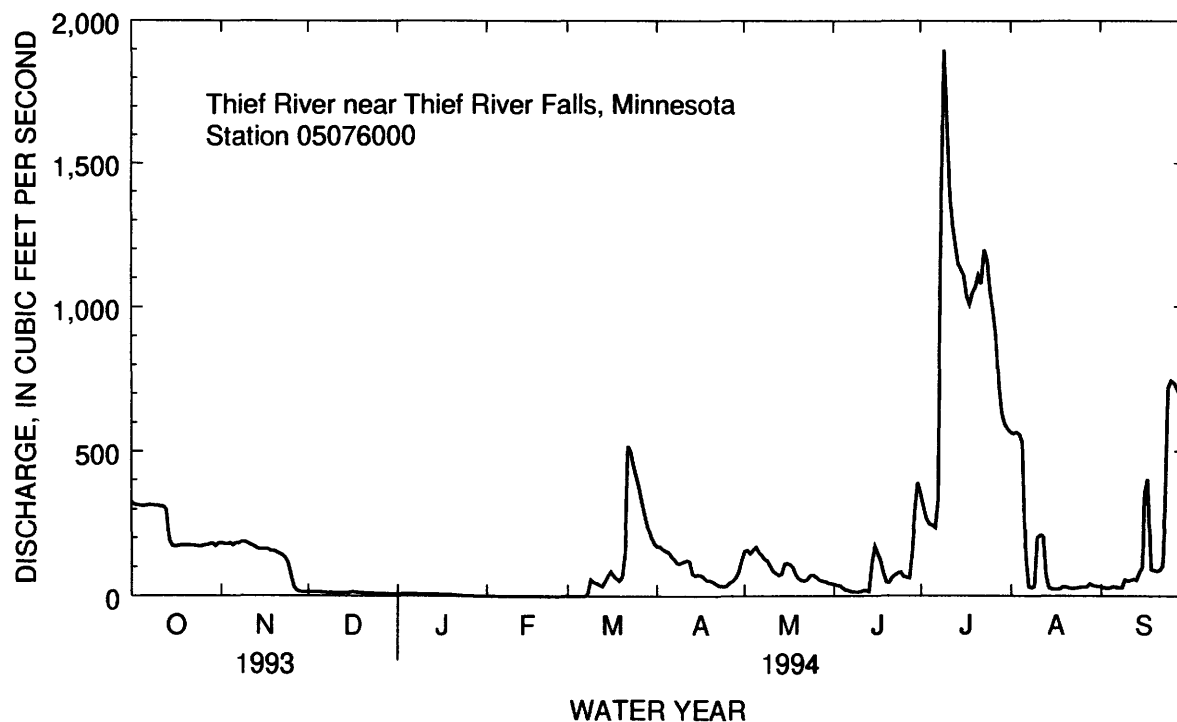
FOR 1994 WATER YEAR

WATER YEARS 1909 - 1994

ANNUAL TOTAL	124814.32	63799.30	
ANNUAL MEAN	342	175	162 ^a
HIGHEST ANNUAL MEAN			607
LOWEST ANNUAL MEAN			1.28
HIGHEST DAILY MEAN	2160	Aug 31	1900
LOWEST DAILY MEAN	.37	Mar 2	.00
ANNUAL SEVEN-DAY MINIMUM	.42	Feb 26	.00
INSTANTANEOUS PEAK FLOW			1960
INSTANTANEOUS PEAK STAGE			11.38
ANNUAL RUNOFF (AC-FT)	247600	126500	117400
ANNUAL RUNOFF (CFSM)	.36	.18	.17
ANNUAL RUNOFF (INCHES)	4.84	2.47	2.30
10 PERCENT EXCEEDS	1080	525	512
50 PERCENT EXCEEDS	156	64	7.2
90 PERCENT EXCEEDS	.98	.60	.00

a Median of annual mean discharges is 110 ft³/s.

b Many days, several years.



RED RIVER OF THE NORTH BASIN

05078000 CLEARWATER RIVER AT PLUMMER, MN

LOCATION.--Lat 47°55'24", long 96°02'46", in SE 1/4 SW 1/4 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.--512 mi².

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 500 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
May 1	1100	537	5.49	Jun. 30	1700	804	6.87
Jun. 14	1900	557	5.58	Jul. 9	1400	*1,440	*9.22
Jun. 21	0700	1220	8.58	Jul. 24	1500	834	7.02

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	60	64	e62	e54	e54	e52	e190	530	168	767	282	109
2	85	69	e62	e54	e54	e52	e210	525	111	668	273	90
3	69	58	e62	e54	e54	e47	e215	484	66	499	259	77
4	62	51	e62	e54	e54	e33	e210	499	72	391	254	81
5	61	53	e61	e54	e54	e50	e205	510	99	411	247	87
6	52	47	e60	e54	e54	e57	e190	482	114	419	247	93
7	56	49	e60	e54	e54	e60	e170	431	112	458	229	82
8	55	e52	e59	e54	e54	e58	e150	400	81	981	195	75
9	63	e54	e59	e54	e54	e52	e130	361	62	1390	190	72
10	49	e54	e58	e54	e54	e29	105	317	58	1260	182	66
11	46	e50	e58	e54	e54	e26	124	262	60	1030	170	65
12	44	e46	e58	e54	e54	e30	129	223	60	859	159	74
13	37	41	e58	e54	e54	e56	156	209	68	726	149	97
14	43	43	e58	e54	e54	e62	170	236	347	633	142	128
15	54	42	e58	e54	e54	e66	176	281	382	571	140	146
16	61	39	e57	e54	e53	e68	216	291	205	502	133	151
17	70	42	e57	e54	e53	e64	264	272	154	414	128	209
18	70	62	e57	e54	e53	e58	241	261	139	440	122	249
19	72	65	e56	e54	e53	e56	222	237	230	666	117	255
20	72	54	e56	e54	e53	e64	207	217	971	698	119	315
21	55	39	e56	e54	e53	e130	197	192	1190	715	116	330
22	54	e45	e56	e54	e53	e165	175	165	1000	730	103	281
23	50	e50	e56	e54	e53	e160	193	156	792	758	101	237
24	52	e42	e55	e54	e53	e150	211	176	561	822	105	219
25	54	e45	e55	e54	e53	e140	198	185	388	775	114	199
26	43	e54	e55	e54	e52	e133	183	203	369	636	116	187
27	45	e59	e55	e54	e52	e150	228	204	364	500	119	171
28	49	e60	e55	e54	e52	e180	330	193	510	390	111	171
29	45	e62	e55	e54	---	e180	411	189	716	342	108	164
30	46	e62	e55	e54	---	e160	480	205	793	303	106	159
31	52	---	e55	e54	---	e160	---	215	---	292	114	---
TOTAL	1726	1553	1786	1674	1496	2748	6286	9111	10242	20046	4950	4639
MEAN	55.7	51.8	57.6	54.0	53.4	88.6	210	294	341	647	160	155
MAX	85	69	62	54	54	180	480	530	1190	1390	282	330
MIN	37	39	55	54	52	26	105	156	58	292	101	65
AC-FT	3420	3080	3540	3320	2970	5450	12470	18070	20320	39760	9820	9200
CFSM	.11	.10	.11	.11	.10	.17	.41	.57	.67	1.26	.31	.30

e Estimated.

RED RIVER OF THE NORTH BASIN

05078000 CLEARWATER RIVER AT PLUMMER, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1939 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	113	90.9	63.3	50.7	47.1	109	516	347	254	206	123	106
MAX	483	503	140	90.1	98.4	351	1391	1974	1140	844	507	666
(WY)	1972	1972	1978	1952	1974	1945	1966	1950	1962	1975	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

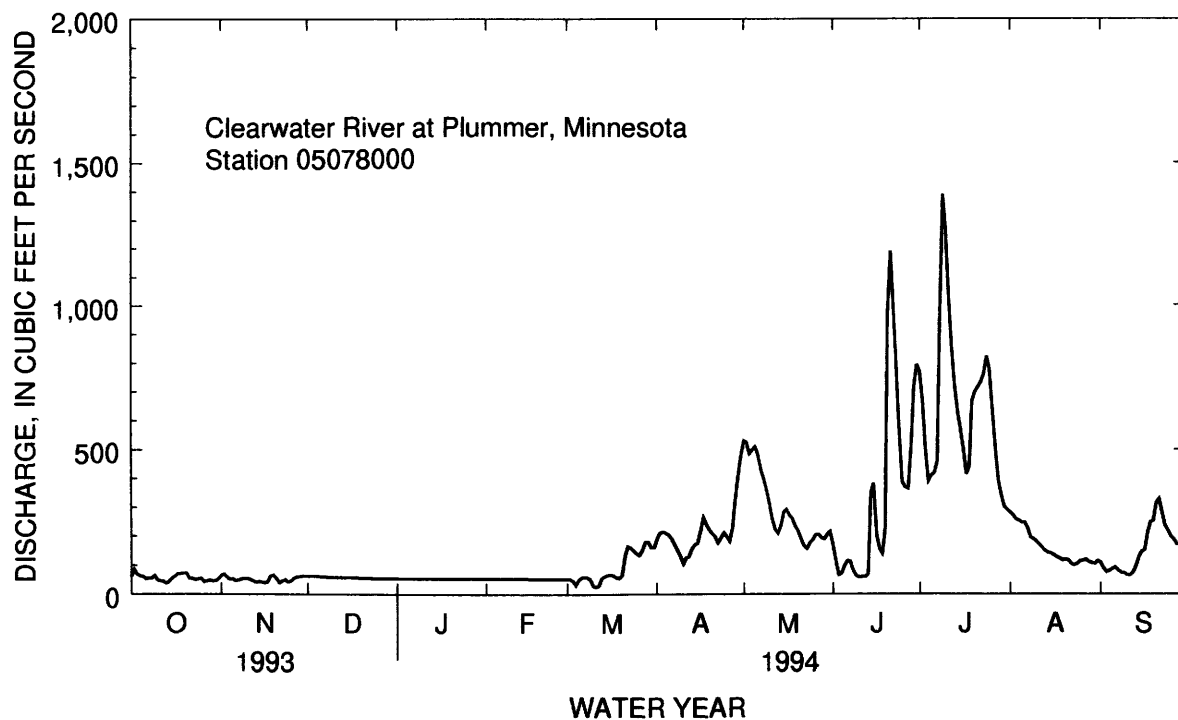
SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1939 - 1994

ANNUAL TOTAL	59201	66257	
ANNUAL MEAN	162	182	170
HIGHEST ANNUAL MEAN			354
LOWEST ANNUAL MEAN			57.0
HIGHEST DAILY MEAN	923	Jul 28	1390
LOWEST DAILY MEAN	37	Oct 13	26
ANNUAL SEVEN-DAY MINIMUM	43	Nov 11	43
INSTANTANEOUS PEAK FLOW			1440
INSTANTANEOUS PEAK STAGE			9.22
INSTANTANEOUS LOW FLOW			25
ANNUAL RUNOFF (AC-FT)	117400	131400	122900
ANNUAL RUNOFF (CFSM)	.32	.35	.33
10 PERCENT EXCEEDS	369	467	400
50 PERCENT EXCEEDS	65	77	74
90 PERCENT EXCEEDS	50	52	32

a Backwater from ice.



RED RIVER OF THE NORTH BASIN

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.--266 mi².

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 ft³/s.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	38	e29	e22	e14	e9.8	e20	e115	212	45	349	98	e27
2	38	e28	e23	e14	e9.7	e28	e140	179	43	262	96	e27
3	38	e28	e23	e14	e9.7	e39	e190	155	39	207	92	e26
4	38	e27	e22	e14	e9.7	e54	e175	182	32	190	90	e25
5	38	e27	e22	e14	e9.7	e73	e168	185	28	213	88	e25
6	38	e26	e21	e13	e9.7	e100	e150	159	26	188	89	e24
7	38	e26	e21	e13	e9.7	e150	e140	141	22	209	86	e24
8	38	e26	e20	e13	e9.7	e135	e130	127	19	1010	82	e24
9	38	e26	e20	e13	e9.7	e109	127	117	19	1250	76	30
10	38	e26	e19	e13	e9.7	e100	126	115	19	1080	73	34
11	38	e26	e19	e13	e9.7	e95	126	108	19	741	66	31
12	38	e26	e19	e13	e9.7	e90	127	99	21	432	48	34
13	34	e26	e18	e12	e9.7	e86	128	93	21	285	39	56
14	26	e26	e18	e12	e9.7	e120	132	99	32	225	38	69
15	22	e26	e18	e12	e9.7	e170	129	113	34	193	37	79
16	23	e26	e18	e12	e9.7	e210	123	113	31	167	35	93
17	25	e26	e18	e12	e10	e200	117	109	32	151	34	154
18	29	e24	e17	e12	e11	e180	113	104	37	202	33	188
19	33	e23	e17	e11	e12	e150	109	99	80	522	31	185
20	37	e21	e17	e11	e13	e155	102	92	849	620	30	136
21	38	e22	e16	e11	e14	e165	99	81	700	507	e28	101
22	38	e22	e16	e11	e14	e180	96	79	388	423	e26	88
23	38	e22	e16	e11	e14	e200	86	84	248	386	e26	83
24	38	e22	e16	e11	e14	e180	73	96	175	344	e26	78
25	38	e22	e15	e11	e14	e160	69	94	138	269	e27	76
26	37	e22	e15	e10	e14	e140	78	90	161	207	30	72
27	32	e22	e15	e10	e14	e130	120	76	184	170	30	66
28	e32	e22	e15	e10	e15	e115	179	64	297	146	30	63
29	e32	e22	e15	e10	---	e100	212	65	664	127	31	58
30	e31	e22	e15	e10	---	e84	229	61	515	115	31	56
31	e30	---	e14	e9.9	---	e98	---	53	---	103	29	---
TOTAL	1069	739	560	369.9	314.3	3816	3908	3444	4918	11293	1575	2032
MEAN	34.5	24.6	18.1	11.9	11.2	123	130	111	164	364	50.8	67.7
MAX	38	29	23	14	15	210	229	212	849	1250	98	188
MIN	22	21	14	9.9	9.7	20	69	53	19	103	26	24
AC-FT	2120	1470	1110	734	623	7570	7750	6830	9750	22400	3120	4030
CFSM	.13	.09	.07	.04	.04	.46	.49	.42	.62	1.37	.19	.25
IN.	.15	.10	.08	.05	.04	.53	.55	.48	.69	1.58	.22	.28

e Estimated.

RED RIVER OF THE NORTH BASIN

05078230 LOST RIVER AT OKLEE, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1960 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	45.1	29.9	13.3	7.94	7.66	71.0	297	129	84.6	78.4	40.9	37.4
MAX	470	232	56.6	19.8	25.8	242	745	622	657	442	351	330
(WY)	1972	1972	1978	1986	1984	1986	1966	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 1993 CALENDAR YEAR

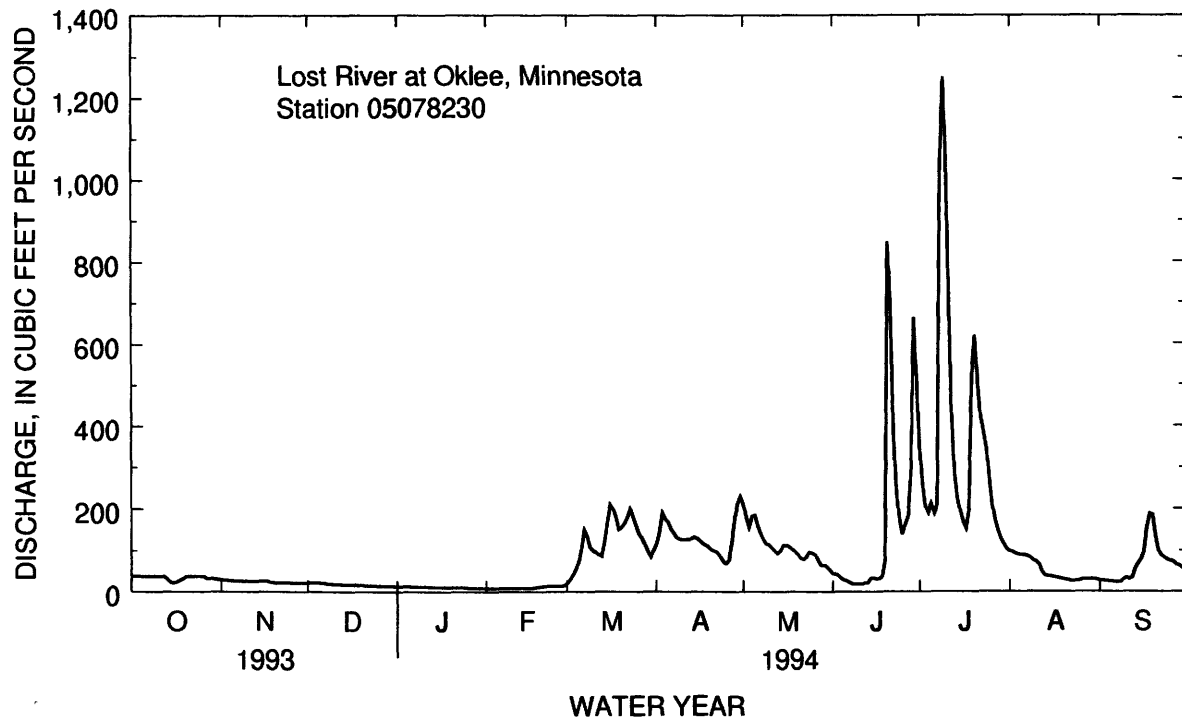
FOR 1994 WATER YEAR

WATER YEARS 1960 - 1994

ANNUAL TOTAL	28933.9		34038.2			69.7	
ANNUAL MEAN	79.3		93.3				
HIGHEST ANNUAL MEAN						177	1962
LOWEST ANNUAL MEAN						18.2	1990
HIGHEST DAILY MEAN	1000	Mar 30	1250	Jul 9		3040	Apr 11 1969
LOWEST DAILY MEAN	8.4	Mar 2	9.7	Feb 2-16		.00a	Feb 16 1963
ANNUAL SEVEN-DAY MINIMUM	8.4	Mar 2	9.7	Feb 2		.00	Feb 16 1963
INSTANTANEOUS PEAK FLOW			1270	Jul 8		3210	Apr 11 1969
INSTANTANEOUS PEAK STAGE			11.94	Jul 9		16.72b	May 24 1962
ANNUAL RUNOFF (AC-FT)	57390		67510			50510	
ANNUAL RUNOFF (CFSM)	.30		.35			.26	
ANNUAL RUNOFF (INCHES)	4.05		4.76			3.56	
10 PERCENT EXCEEDS	160		190			165	
50 PERCENT EXCEEDS	38		38			17	
90 PERCENT EXCEEDS	9.4		12			2.2	

a Many days, several years.

b Present datum.



RED RIVER OF THE NORTH BASIN

05078500 CLEARWATER RIVER AT RED LAKE FALLS, MN

LOCATION.--Lat 47°53'15", long 96°16'25", in NW¼, NE¼, 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.--1,370 mi², approximately.

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 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	121	113	e129	e101	e73	e72	e390	1120	295	1740	559	189
2	128	118	e130	e100	e73	e72	e450	1050	243	1400	520	181
3	113	125	e132	e99	e73	e72	e550	984	197	1080	502	163
4	100	123	e132	e99	e73	e72	e600	1100	162	871	494	154
5	102	103	e130	e97	e73	e73	e590	1130	163	875	470	156
6	98	80	e130	e95	e73	e76	578	1020	173	894	439	157
7	95	e83	e130	e95	e73	e82	531	885	182	884	411	154
8	96	e87	e129	e94	e73	e98	521	779	181	3540	375	144
9	98	e90	e129	e94	e73	e110	447	690	152	5210	350	134
10	104	e92	e129	e92	e73	e115	429	610	130	4550	337	137
11	96	e94	e129	e91	e73	e110	440	547	128	3500	317	142
12	98	e96	e129	e90	e73	e95	443	473	133	2590	299	138
13	97	e96	e129	e89	e73	e90	438	422	128	1940	296	152
14	89	e95	e129	e88	e73	e89	456	409	210	1580	264	228
15	87	e93	e127	e87	e73	e92	463	446	589	1350	250	243
16	97	e92	e125	e85	e73	e100	455	488	386	1150	244	293
17	102	e90	e125	e84	e72	e140	500	485	271	957	236	541
18	113	e90	e122	e82	e72	e160	505	457	231	861	230	619
19	112	e92	e120	e82	e72	e190	455	432	249	1400	229	609
20	116	e92	e120	e80	e72	e230	424	399	2000	1860	219	657
21	115	e91	e119	e80	e72	e270	398	367	2880	1850	218	820
22	103	e88	e117	e80	e72	e330	366	326	2550	1720	207	735
23	98	e93	e115	e79	e72	e390	353	315	1830	1630	206	635
24	97	e108	e112	e79	e72	e415	371	311	1230	1670	208	548
25	97	e108	e111	e78	e72	e400	349	332	858	1600	210	474
26	97	e93	e110	e76	e72	e370	357	335	760	1310	213	418
27	89	e102	e110	e76	e72	e350	399	344	750	1040	211	378
28	93	e111	e109	e75	e72	e360	685	321	872	839	206	342
29	95	e120	e108	e75	---	e380	918	305	1500	734	196	326
30	91	e125	e105	e75	---	e360	1070	296	1920	655	190	314
31	79	---	e102	e74	---	e340	---	308	---	594	188	---
TOTAL	3116	2983	3773	2671	2032	6103	14931	17486	21353	51874	9294	10181
MEAN	101	99.4	122	86.2	72.6	197	498	564	712	1673	300	339
MAX	128	125	132	101	73	415	1070	1130	2880	5210	559	820
MIN	79	80	102	74	72	72	349	296	128	594	188	134
AC-FT	6180	5920	7480	5300	4030	12110	29620	34680	42350	102900	18430	20190
CFSM	.07	.07	.09	.06	.05	.14	.36	.41	.52	1.22	.22	.25
IN.	.08	.08	.10	.07	.06	.17	.41	.47	.58	1.41	.25	.28

e Estimated.

RED RIVER OF THE NORTH BASIN

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

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	178	134	85.6	68.0	62.8	225	1122	663	481	367	204	179
MAX	1350	1233	260	220	150	993	3458	5059	3042	1673	1686	1267
(WY)	1972	1972	1910	1910	1984	1946	1966	1950	1962	1994	1985	1973
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 1993 CALENDAR YEAR

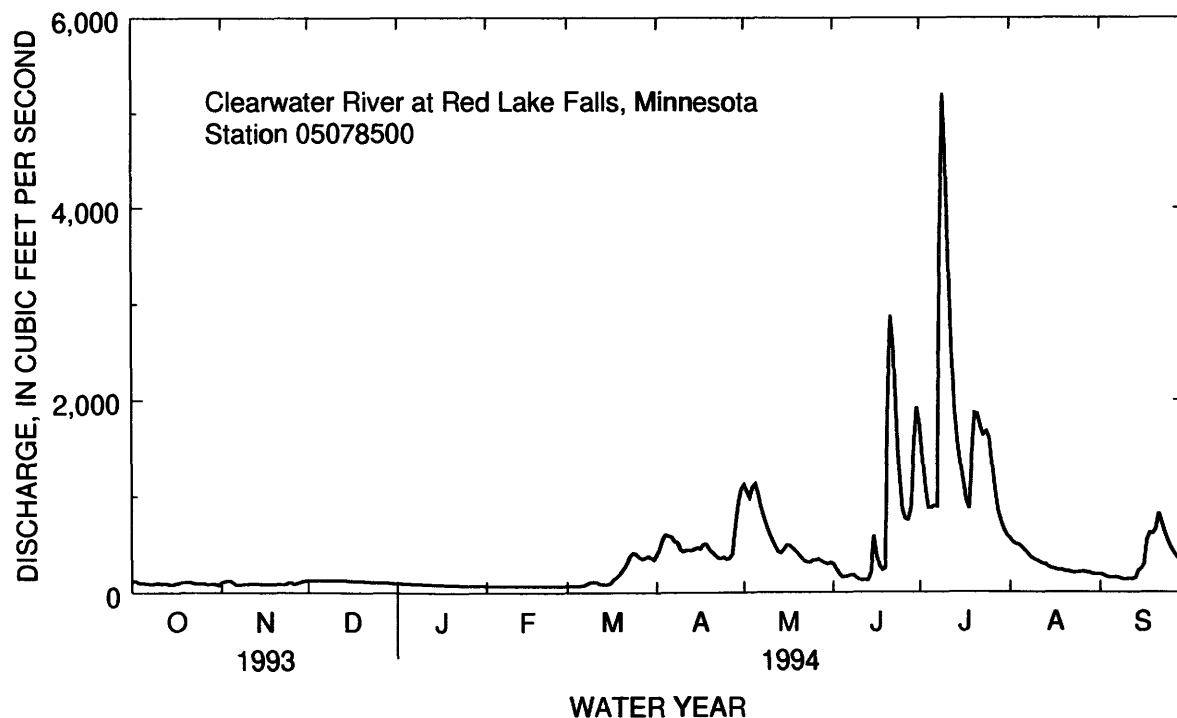
FOR 1994 WATER YEAR

WATER YEARS 1909 - 1994

ANNUAL TOTAL	131504		145797									
ANNUAL MEAN	360		399							311 ^a		
HIGHEST ANNUAL MEAN										855		1950
LOWEST ANNUAL MEAN										64.4		1939
HIGHEST DAILY MEAN	3200	Mar 30		5210	Jul 9				9930		Apr 25	1979
LOWEST DAILY MEAN	79	Oct 31		72	Feb 17 to Mar 4				.10		Sep 15	1936
ANNUAL SEVEN-DAY MINIMUM	83	Jan 1		72	Feb 17				.24		Sep 12	1936
INSTANTANEOUS PEAK FLOW				5350	Jul 8				10300		Apr 25	1979
INSTANTANEOUS PEAK STAGE				8.99	Jul 8				15.85 ^b		Mar 6	1983
INSTANTANEOUS LOW FLOW				48	Nov 6				.00		Sep 15	1936
ANNUAL RUNOFF (AC-FT)	260800			289200					225200			
ANNUAL RUNOFF (CFSM)	.26			.29					.23			
ANNUAL RUNOFF (INCHES)	3.57			3.96					3.08			
10 PERCENT EXCEEDS	810			934					772			
50 PERCENT EXCEEDS	130			157					105			
90 PERCENT EXCEEDS	83			75					37			

a Median of annual mean discharges is 277 ft³/s.

b Highwater mark, backwater from ice.



RED RIVER OF THE NORTH BASIN

05079000 RED LAKE RIVER AT CROOKSTON, MN

LOCATION.--Lat 47°46'32", long 96°36'33", in SW¹/₄/SW¹/₄ 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.--5,280 mi², approximately.

WATER-DISCHARGE RECORDS

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 fair. Diurnal fluctuation prior to 1975 caused by powerplant 1,000 ft upstream. Runoff from 1,950 mi² 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 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	936	1210	e640	e715	e605	e600	e1780	1770	936	4240	1890	985
2	796	1150	e660	e715	e600	e600	e1770	1840	903	3510	1830	1010
3	733	1150	e670	e710	e600	e600	e1780	1830	832	2780	1850	949
4	678	1090	e675	e705	e600	e600	e1780	1840	788	2210	1790	948
5	699	1010	e680	e705	e600	e610	e1740	1960	762	1910	1720	972
6	939	e680	e690	e700	e600	e640	e1600	1970	723	1900	1670	975
7	1010	e580	e700	e695	e600	e670	e1400	1810	733	1880	1420	982
8	1140	e500	e700	e690	e600	e710	e1200	1560	727	5520	1090	936
9	1250	e510	e710	e690	e600	e800	e1100	1410	715	12300	1020	925
10	1330	e520	e710	e685	e600	e940	e1000	1300	701	13200	864	931
11	1400	e540	e720	e680	e600	e890	993	1170	681	10900	748	957
12	1460	e580	e730	e675	e600	e830	1030	1060	707	8000	1010	1020
13	1450	e620	e740	e670	e600	e800	1010	962	679	5740	1140	981
14	1420	e660	e760	e665	e600	e800	982	894	825	4640	1110	1040
15	1360	e710	e790	e665	e600	e870	971	904	2120	3930	986	1150
16	1300	e750	e785	e660	e600	e1000	958	965	2710	3450	972	1270
17	1320	e780	e780	e655	e600	e1150	966	1050	1980	3090	984	1540
18	1350	e780	e775	e650	e600	e1300	1010	974	1420	2680	991	1950
19	1370	e780	e770	e650	e600	e1500	982	1010	1420	3500	1010	1940
20	1380	e760	e765	e645	e600	e1700	900	869	3430	4340	1010	1840
21	1360	e720	e760	e640	e600	e1900	842	837	5580	4330	1000	1900
22	1370	e680	e760	e640	e600	e2200	819	815	e4500	4060	996	1930
23	1340	e640	e755	e635	e600	e2500	776	1060	e3820	3690	977	1830
24	1320	e610	e750	e630	e600	e2400	727	1120	2690	4110	1030	1730
25	1330	e600	e745	e630	e600	e2300	742	1090	2000	4020	1010	1630
26	1330	e610	e740	e625	e600	e2100	756	1090	1670	3520	1030	1560
27	1340	e610	e740	e620	e600	e1950	823	1090	1840	3050	1040	1510
28	1350	e615	e735	e620	e600	e1850	950	1060	1990	2710	1010	1460
29	1360	e620	e730	e615	---	e1820	1280	1020	2560	2320	1010	1450
30	1320	e630	e725	e615	---	e1800	1560	976	4020	2140	1010	1460
31	1260	---	e720	e610	---	e1800	---	959	---	1960	999	---
TOTAL	38001	21695	22610	20505	16805	40230	34227	38265	54462	135630	36217	39761
MEAN	1226	723	729	661	600	1298	1141	1234	1815	4375	1168	1325
MAX	1460	1210	790	715	605	2500	1780	1970	5580	13200	1890	1950
MIN	678	500	640	610	600	600	727	815	679	1880	748	925
AC-FT	75370	43030	44850	40670	33330	79800	67890	75900	108000	269000	71840	78870
CFSM	.23	.14	.14	.13	.11	.25	.22	.23	.34	.83	.22	.25
IN.	.27	.15	.16	.14	.12	.28	.24	.27	.38	.96	.26	.28

e Estimated.

RED RIVER OF THE NORTH BASIN

05079000 RED LAKE RIVER AT CROOKSTON, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1901 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	805	660	547	494	470	938	2924	2030	1643	1285	815	810
MAX	2836	3172	1900	1663	1464	3626	10260	15290	7205	6851	3868	3009
(WY)	1972	1972	1904	1951	1951	1910	1966	1950	1962	1975	1985	1905
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

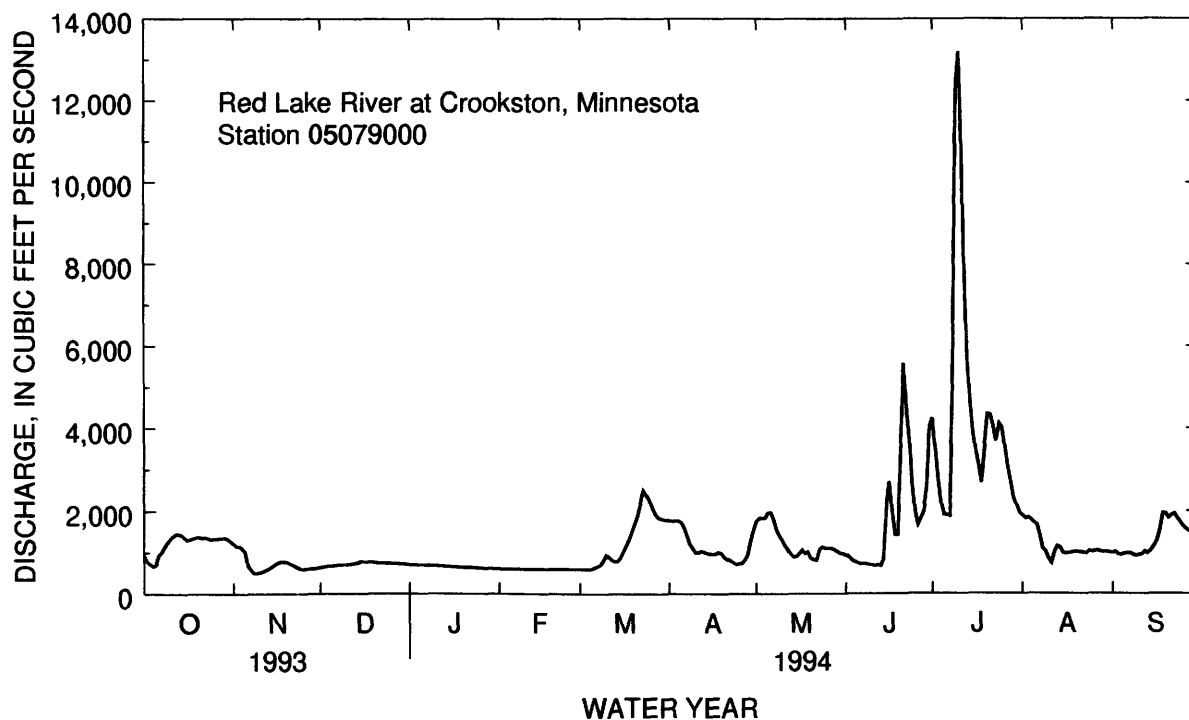
SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1901 - 1994

ANNUAL TOTAL	535238	498408	
ANNUAL MEAN	1466	1366	1114
HIGHEST ANNUAL MEAN			3129
LOWEST ANNUAL MEAN			83.6
HIGHEST DAILY MEAN	7080	Apr 1	13200
LOWEST DAILY MEAN	500	Nov 8	500
ANNUAL SEVEN-DAY MINIMUM	550	Nov 7	550
INSTANTANEOUS PEAK FLOW			13600
INSTANTANEOUS PEAK STAGE			20.41
INSTANTANEOUS LOW FLOW			.00 ^a
ANNUAL RUNOFF (AC-FT)	1062000	988600	807300
ANNUAL RUNOFF (CFSM)	.28	.26	.21
ANNUAL RUNOFF (INCHES)	3.77	3.51	2.87
10 PERCENT EXCEEDS	2840	2250	2490
50 PERCENT EXCEEDS	1100	976	659
90 PERCENT EXCEEDS	586	600	110

a Caused by regulation of powerplant upstream.



RED RIVER OF THE NORTH BASIN

05079000 RED LAKE RIVER AT CROOKSTON, MN--Continued
(National stream-quality accounting network station)

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1962, 1974-76, 1979 to current year

REMARKS.--Letter K indicates non-ideal colony count.

WATER QUALITY DATA COLLECTED THROUGH THE NATIONAL STREAM-QUALITY ACCOUNTING NETWORK

WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT- ANCE (US/CM) (00095)	SPE-CIFIC CON-DUCT- ANCE (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)	OXYGEN, DIS- SOLVED (MG/L) (00300)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)
OCT												
19...	0900	1380	345	382	8.3	7.9	6.0	4.4	738	11.6	K10	57
DEC												
01...	0945	1350	392	421	7.7	7.6	0.5	2.7	737	12.7	K19	K15
FEB												
02...	1500	603	383	399	7.8	7.9	0.0	2.7	728	11.0	K13	41
APR												
27...	1600	6.0	470	482	8.3	8.2	6.0	1.7	746	11.4	32	110
AUG												
17...	1445	981	399	407	8.6	8.2	23.0	5.1	738	7.8	31	36

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)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY WAT DIS TOT IT FIELD (MG/L AS CACO3) (39086)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CAR- BONATE WATER DIS IT FIELD (MG/L AS CO3) (00452)	BICAR- BONATE WATER DIS IT FIELD (MG/L AS HCO3) (00453)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)	SILICA, DIS- SOLVED (MG/L AS SiO2) (00955)
OCT												
19...	46	17	4.9	3.1	168	172	0	205	25	4.1	0.10	6.9
DEC												
01...	52	21	5.5	2.9	196	206	0	239	21	3.4	0.20	9.8
FEB												
02...	50	20	5.2	1.8	193	201	0	235	12	2.8	0.10	11
APR												
27...	58	22	6.6	4.4	204	213	0	249	42	6.4	0.10	3.8
AUG												
17...	52	20	5.0	2.9	190	193	12	207	23	3.7	0.30	10

RED RIVER OF THE NORTH BASIN

05079000 RED LAKE RIVER AT CROOKSTON, MN--Continued

WATER QUALITY DATA COLLECTED THROUGH THE NATIONAL STREAM-QUALITY ACCOUNTING NETWORK

DATE	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L) AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L) AS N) (00631)	NITRO- GEN, DIS- SOLVED (MG/L) AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L) AS N) (00625)	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)	SEDI- MENT, SUS- PENDE (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)	ALUM- INUM, DIS- SOLVED (UG/L) AS AL) (01106)
OCT 19...	237	<0.010	<0.050	0.040	0.80	0.040	0.010	<0.010	13	95	<10
DEC 01...	265	<0.010	0.067	0.050	0.80	0.020	<0.010	<0.010	14	82	--
FEB 02...	257	0.030	0.100	0.110	0.90	0.010	0.020	0.010	18	96	<10
APR 27...	298	<0.010	0.050	0.020	0.80	0.070	0.020	0.020	52	84	<10
AUG 17...	263	<0.010	<0.050	0.030	0.50	0.030	0.010	<0.010	31	96	<10

DATE	BARIUM, DIS- SOLVED (UG/L) AS BA) (01005)	COBALT, DIS- SOLVED (UG/L) AS CO) (01035)	IRON, DIS- SOLVED (UG/L) AS FE) (01046)	LITHIUM, DIS- SOLVED (UG/L) AS LI) (01130)	MANGA- NESE, DIS- SOLVED (UG/L) AS MN) (01056)	MOLYB- DENUM, DIS- SOLVED (UG/L) AS MO) (01060)	NICKEL, DIS- SOLVED (UG/L) AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L) AS SE) (01145)	SILVER, DIS- SOLVED (UG/L) AS AG) (01075)	STRON- TIUM, DIS- SOLVED (UG/L) AS SR) (01080)	VANA- DIUM, DIS- SOLVED (UG/L) AS V) (01085)
OCT 19...	41	<3	9	8	6	<10	<1	<1	<1.0	97	<6
DEC 01...	--	--	--	--	--	--	--	--	--	--	--
FEB 02...	57	<3	46	7	19	<10	<1	<1	<1.0	110	<6
APR 27...	53	<3	80	10	61	<10	1	<1	<1.0	140	<6
AUG 17...	43	<3	18	6	8	<10	<1	<1	<1.0	120	<6

RED RIVER OF THE NORTH BASIN

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 the right bank 200 ft upstream from the DeMers Avenue bridge, 0.4 mi downstream from Red Lake River, and at mile 293.8.

DRAINAGE AREA.--30,100 mi², approximately, including 3,800 mi² in closed basins.

WATER-DISCHARGE RECORDS

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 those for period of estimated daily discharges, which are fair.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4040	2790	1720	e1680	e1500	e1750	e22000	8140	4300	6950	6200	2320
2	3830	2700	1800	e1600	e1500	e1800	e22400	8590	4210	7180	5690	2280
3	3650	2640	1850	e1550	e1480	e1850	e22700	8980	4130	6610	5320	2210
4	3570	2560	1900	e1500	e1480	e1900	e21700	9240	4040	5870	5030	2200
5	3480	2530	1980	e1550	e1440	e1900	e20800	9500	3980	5080	4770	2050
6	3430	2290	2070	e1550	e1420	e1900	e19900	9880	3990	4720	4490	1960
7	3570	1810	2140	e1600	e1400	e1900	e19600	9900	3960	4810	4240	1920
8	3650	1570	2190	e1600	e1400	e1900	e19300	9470	3930	7020	4030	1920
9	3720	1630	2200	e1650	e1400	e1950	e18400	8500	3820	15200	3930	1930
10	3820	1720	2200	e1700	e1420	e2000	e17300	7760	3720	21600	3990	1870
11	3870	1800	2180	e1650	e1500	e2200	e16100	7250	3680	25400	3890	1840
12	3900	2030	2190	e1600	e1550	e2300	e14900	6850	3660	e26500	3740	1940
13	3930	2270	2220	e1550	e1580	e2300	e13700	6540	3620	e25500	3800	1990
14	3920	2490	2240	e1500	e1600	e2250	e12200	6230	3820	e24400	3830	2090
15	3880	2420	2290	e1550	e1600	e2200	e10900	5890	4040	e23500	3720	2680
16	3830	2210	2270	e1600	e1600	e2300	e9670	5670	5310	e20000	3440	3510
17	3710	2140	2200	e1600	e1600	e2500	8560	5600	6070	e17300	3210	5680
18	3680	2100	2150	e1600	e1600	e3000	7620	5550	5750	e14500	3100	7840
19	3650	2270	2140	e1600	e1580	e3800	7210	5310	5510	e12100	2910	8580
20	3610	2020	2110	e1600	e1560	e4500	6890	5130	6470	e11900	2830	7840
21	3530	2010	2090	e1580	e1540	e5000	6630	4890	8710	e11800	2830	6880
22	3430	1840	2070	e1580	e1520	e6500	6400	4780	11700	e11700	2880	6400
23	3400	1320	e2020	e1560	e1500	e8000	6160	4720	12900	e11500	2890	6020
24	3310	1030	e2000	e1540	e1500	e10000	5830	4780	12100	11400	2790	5580
25	3210	1040	e1850	e1540	e1500	e13000	5560	4770	9680	11600	2720	5140
26	3150	1070	e1800	e1520	e1500	e15000	5490	4730	6840	11600	2660	4810
27	3120	1230	e1750	e1520	e1600	e17000	5560	4690	5770	11000	2570	4640
28	3000	1370	e1750	e1500	e1670	e18500	5960	4650	5490	10300	2560	4520
29	2940	1410	e1710	e1500	---	e19500	6780	4570	5450	9240	2480	4380
30	2940	1580	e1710	e1500	---	e20500	7570	4450	5900	7780	2400	4280
31	2870	---	e1700	e1500	---	e21000	---	4370	---	6830	2360	---
TOTAL	109640	57890	62490	48670	42540	200200	373790	201380	172550	400890	111300	117300
MEAN	3537	1930	2016	1570	1519	6458	12460	6496	5752	12930	3590	3910
MAX	4040	2790	2290	1700	1670	21000	22700	9900	12900	26500	6200	8580
MIN	2870	1030	1700	1500	1400	1750	5490	4370	3620	4720	2360	1840
AC-FT	217500	114800	123900	96540	84380	397100	741400	399400	342300	795200	220800	232700

e Estimated.

RED RIVER OF THE NORTH BASIN

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

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1904 - 1994, BY WATER YEAR (WY)

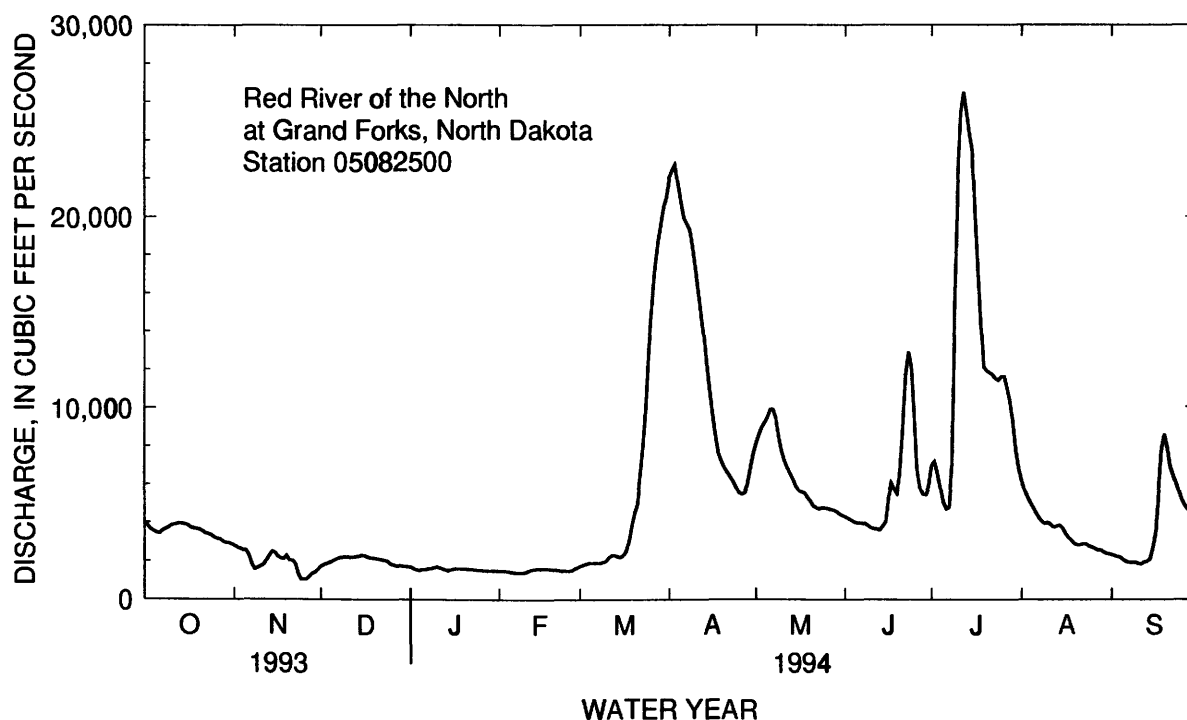
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	1337	1148	932	796	766	2355	9163	4889	3858	3231	1728	1420
MAX	4290	5218	3073	1929	1869	10250	31480	36510	19340	25270	17050	6251
(WY)	1972	1972	1972	1951	1952	1966	1979	1950	1962	1975	1993	1993
MIN	12.1	30.5	17.8	18.8	2.87	42.1	954	373	151	88.8	30.6	20.3
(WY)	1937	1937	1937	1937	1937	1937	1938	1934	1934	1936	1934	1936

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1904 - 1994

ANNUAL TOTAL	2101525		1898640									
ANNUAL MEAN	5758		5202							2615		
HIGHEST ANNUAL MEAN										7580		1950
LOWEST ANNUAL MEAN										244		1934
HIGHEST DAILY MEAN			26200	Aug 3			26500	Jul 12		80900		Apr 23 1979
LOWEST DAILY MEAN			730	Jan 8			1030	Nov 24		1.8		Sep 2 1977
ANNUAL SEVEN-DAY MINIMUM			746	Jan 4			1210	Nov 23		2.5		Feb 12 1937
INSTANTANEOUS PEAK FLOW							26800	Jul 12		85000		Apr 10 1897
INSTANTANEOUS PEAK STAGE							34.30	Jul 12		50.20		Apr 10 1897
ANNUAL RUNOFF (AC-FT)	4168000						3766000			1894000		
10 PERCENT EXCEEDS	17900						11700			5860		
50 PERCENT EXCEEDS	3530						3530			1300		
90 PERCENT EXCEEDS	1000						1550			264		



RED RIVER OF THE NORTH BASIN

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

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

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)	PH WATER WHOLE LAB (STAND- ARD UNITS) (00403)	BARO- METRIC PRES- SURE (MM OF HG) (00025)	TEMPER- ATURE AIR (DEG C) (00020)	TEMPER- ATURE WATER (DEG C) (00010)	OXYGEN, DIS- SOLVED (MG/L) (00300)
OCT										
08...	1045	3680	--	678	--	8.1	750	3.5	9.0	10.8
NOV										
02...	1220	2670	--	--	--	--	--	6.0	3.0	--
DEC										
30...	1000	1710	--	615	7.7	--	742	-5.5	0.5	9.8
JAN										
31...	1030	1500	--	621	7.6	--	747	-22.0	0.5	9.9
FEB										
28...	1225	1670	--	616	--	--	--	-6.0	0.5	--
MAR										
10...	0915	--	2000	--	7.8	--	750	-3.0	0.0	13.0
30...	1100	--	20500	648	--	7.3	742	5.0	0.5	12.0
APR										
04...	1105	22000	--	496	--	--	--	-10.0	2.0	--
06...	1000	19800	--	645	--	7.5	743	3.0	1.0	11.5
08...	0835	19400	--	439	--	--	--	5.0	0.5	--
22...	1400	6370	--	710	--	--	--	10.0	5.0	--
MAY										
19...	1350	5290	--	757	8.1	--	741	24.5	10.0	10.0
JUN										
29...	1015	5460	--	613	--	--	--	18.0	22.5	--
JUL										
11...	1645	26000	--	430	--	--	--	26.0	21.0	--
13...	0945	25600	--	440	--	--	--	19.0	20.0	--
13...	1230	25600	--	452	7.8	--	735	21.0	20.0	9.2
19...	1110	12100	--	610	--	--	--	19.0	22.0	--
26...	1645	11700	--	570	--	--	--	23.0	23.0	--
AUG										
01...	0945	6260	--	632	--	--	--	24.0	23.0	--
25...	0830	2760	--	649	8.2	--	732	18.5	19.5	6.4
SEP										
06...	1515	1950	--	578	--	--	--	26.0	19.5	--
22...	0900	6440	--	580	8.0	--	743	--	18.0	7.5

RED RIVER OF THE NORTH BASIN

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DATE	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	HARD- NESS TOTAL (MG/L AS CACO3) (00900)	ALKA- LITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)	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 PERCENT (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	BICAR- BONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)
OCT 08...	95	320	217	69	37	24	14	0.6	7.5	264
DEC 30...	70	270	239	58	30	19	13	0.5	5.3	292
JAN 31...	70	270	230	60	30	20	13	0.5	5.1	280
MAR 10...	--	260	207	56	29	21	15	0.6	5.5	253
30...	86	240	132	55	26	23	16	0.6	9.9	161
APR 06...	83	280	155	64	28	23	15	0.6	8.6	189
MAY 19...	91	370	220	77	42	30	15	0.7	8.9	253
JUL 13...	105	190	134	44	19	16	15	0.5	7.3	163
AUG 25...	73	270	203	60	29	26	17	0.7	6.4	247
SEP 22...	82	260	177	60	26	20	14	0.5	9.8	216

DATE	CAR- BONATE WATER DIS IT FIELD MG/L AS CO3 (00452)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)	SILICA, DIS- SOLVED (MG/L AS SiO2) (00955)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)
OCT 08...	0	140	14	0.30	13	436	469	0.64	4660	<0.010
DEC 30...	0	59	12	0.10	14	342	382	0.52	1760	0.010
JAN 31...	0	53	12	0.10	16	336	379	0.52	1530	0.020
MAR 10...	0	45	14	0.20	15	312	360	0.49	1940	0.010
30...	0	140	18	0.20	15	388	422	0.57	23400	0.270
APR 06...	0	130	14	0.20	16	395	414	0.56	22100	0.190
MAY 19...	8	180	18	0.20	4.6	494	547	0.74	7810	0.010
JUL 13...	0	70	11	0.20	19	270	291	0.40	20100	0.030
AUG 25...	0	100	14	0.20	15	373	416	0.57	3100	<0.010
SEP 22...	0	94	13	0.20	21	352	357	0.49	6210	<0.010

RED RIVER OF THE NORTH BASIN

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DATE	(MG/L)	NITRO- GEN, NITRATE DIS- SOLVED (MG/L AS N) (00618)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITRO- GEN, ORGANIC DIS- SOLVED (MG/L AS N) (00607)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO- GEN,AM- MONIA + ORGANIC DIS- SOLVED (MG/L AS N) (00623)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)
OCT 08...	--	0.170	0.170	0.050	0.75	0.65	0.80	0.70	0.97	0.160
DEC 30...	0.230	0.240	0.240	0.130	0.77	0.57	0.90	0.70	1.1	0.060
JAN 31...	0.280	0.300	0.300	0.150	0.75	0.65	0.90	0.80	1.2	0.080
MAR 10...	0.390	0.400	0.400	0.110	0.69	0.69	0.80	0.80	1.2	0.090
30...	4.33	4.60	4.60	0.380	1.2	0.92	1.6	1.3	6.2	0.460
APR 06...	3.61	3.80	3.80	0.270	1.2	1.0	1.5	1.3	5.3	0.450
MAY 19...	0.340	0.350	0.350	0.030	1.1	0.77	1.1	0.80	1.4	0.150
JUL 13...	0.620	0.650	0.650	0.050	0.95	0.75	1.0	0.80	1.7	0.360
AUG 25...	--	0.240	0.240	0.020	0.78	0.78	0.80	0.80	1.0	0.200
SEP 22...	--	0.280	0.280	0.030	1.2	0.77	1.2	0.80	1.5	0.490

DATE	PHOS- PHORUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS- PENDED TOTAL (MG/L AS C) (00689)	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 08...	0.090	0.090	7	6	12	1.1	83	825	99
DEC 30...	0.050	0.040	8	19	--	--	7	32	100
JAN 31...	0.050	0.050	18	34	--	--	6	24	100
MAR 10...	0.090	0.090	24	19	--	--	13	70	100
30...	0.270	0.250	30	64	--	--	125	6920	99
APR 06...	0.220	0.210	24	23	--	--	240	12800	100
MAY 19...	0.030	0.030	9	3	12	1.3	136	1940	99
JUL 13...	0.220	0.230	26	4	--	--	148	10200	100
AUG 25...	0.120	0.110	8	3	12	0.9	45	335	100
SEP 22...	0.230	0.250	26	3	12	1.2	231	4020	99

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RED RIVER OF THE NORTH BASIN
05085900 SNAKE RIVER ABOVE ALVARADO, MN
(National Water Quality Assessment Station)

LOCATION.--Lat 48°10'27", long 96°59'55", in SW¼SW¼NW¼ sec. 8, T.154 N., R.49 W., Marshall County, Hydrologic Unit 09020309, on right bank 100 ft upstream from bridge on Minnesota State Highway 220, 1/2 south of Alvarado.

DRAINAGE AREA.--28 mi².

PERIOD OF RECORD.--October 1992 to current year. Annual maximum discharges, water years 1945, 1954-56 and 1978-81. Records of daily discharges for period March to September 1945, and October 1953 to July 1956, that were collected at a location 1/2 mi downstream (station 05086000, Snake River at Alvarado, MN) are not considered to be equivalent because of the controlled releases from the city's sewage treatment facility. This discharge enters the river between the two sites. Records for annual maximum discharges for these periods and those for the 1978-81 water years, when the station was operated as a high flow site can be considered to be equivalent.

GAGE.-- Water stage recorder. Datum of gage is 800 ft above sea level.

REMARKS.-- Records poor.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.6	12	e5.6	e.64	e.12	e.00	e52	42	e4.5	4.5	34	e18
2	6.2	12	e5.2	e.60	e.11	e.00	e47	42	e4.4	2.7	28	e16
3	6.3	12	e4.8	e.58	e.10	e.00	e40	36	e4.2	3.0	e26	e15
4	5.8	12	e4.5	e.54	e.08	e.00	e35	31	e4.1	11	e22	e20
5	6.5	12	e4.2	e.52	e.07	e.00	e33	30	e4.0	15	e30	e35
6	7.2	12	e3.9	e.50	e.06	e.00	e31	33	e3.8	17	e22	e27
7	11	12	e3.7	e.47	e.05	e.00	e30	31	e3.6	22	e17	e23
8	11	11	e3.5	e.45	e.03	e.00	e28	26	e3.4	44	e13	e20
9	9.7	11	e3.3	e.43	e.02	e.00	e26	22	e3.2	90	e10	e17
10	12	10	e3.0	e.40	e.01	e.00	30	19	e3.4	e240	e8.0	e15
11	13	10	e2.8	e.38	e.00	e.00	36	16	e3.4	e260	e6.5	e13
12	13	9.5	e2.6	e.36	e.00	e.00	33	15	e3.4	e210	e5.0	e20
13	12	9.0	e2.4	e.34	e.00	e.00	30	14	e3.4	e150	e7.0	e30
14	12	9.9	e2.2	e.32	e.00	e.15	28	13	e20	e100	e5.5	e50
15	12	8.8	e2.1	e.31	e.00	e.50	27	11	e90	e80	e4.5	e100
16	12	8.8	e1.9	e.30	e.00	e2.0	27	9.7	e75	59	e3.5	e175
17	12	8.9	e1.8	e.29	e.00	e5.0	26	10	e65	46	e2.5	e300
18	11	8.8	e1.6	e.28	e.00	e10	25	11	e55	44	e2.1	e500
19	12	8.5	e1.5	e.27	e.00	e50	22	10	e45	e100	e1.7	e675
20	13	9.5	e1.4	e.26	e.00	e150	20	e9.0	e40	e265	e5.0	308
21	13	9.5	e1.3	e.24	e.00	e520	18	e8.0	e100	e500	e1.5	189
22	14	9.1	e1.2	e.23	e.00	e650	17	e7.0	e50	e420	e1.0	128
23	11	e9.2	e1.1	e.22	e.00	e630	17	e6.3	e60	349	e1.3	95
24	6.7	e9.0	e1.0	e.21	e.00	e550	17	e8.0	e35	266	e1.7	75
25	4.3	e8.0	e.98	e.20	e.00	e350	16	e10	e20	286	e10	62
26	4.2	e7.5	e.92	e.19	e.00	e340	16	e9.0	e40	254	e20	55
27	7.7	e7.0	e.88	e.18	e.00	e220	15	e8.0	e20	171	e30	45
28	9.1	e6.5	e.82	e.17	e.00	e115	16	e7.0	e10	110	e26	38
29	11	e6.2	e.78	e.16	---	e75	17	e6.5	e6.5	76	e24	33
30	12	e6.0	e.72	e.15	---	e70	27	e5.5	6.9	56	e21	30
31	11	---	e.68	e.14	---	e62	---	e4.7	---	43	e19	---
TOTAL	311.3	285.7	72.38	10.33	0.65	3799.65	802	510.7	787.2	4294.2	408.8	3127
MEAN	10.0	9.52	2.33	.33	.023	123	26.7	16.5	26.2	139	13.2	104
MAX	14	12	5.6	.64	.12	650	52	42	100	500	34	675
MIN	4.2	6.0	.68	.14	.00	.00	15	4.7	3.2	2.7	1.0	13
AC-FT	617	567	144	20	1.3	7540	1590	1010	1560	8520	811	6200

e Estimated.

RED RIVER OF THE NORTH BASIN

05085900 SNAKE RIVER ABOVE ALVARADO, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1993 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	5.02	4.76	1.17	.17	.046	62.8	48.9	10.3	20.9	104	90.8	184
MAX	10.0	9.52	2.33	.33	.068	123	71.1	16.5	26.2	139	168	264
(WY)	1994	1994	1994	1994	1993	1994	1993	1994	1994	1994	1993	1993
MIN	.000	.000	.000	.002	.023	2.98	26.7	4.18	15.6	69.2	13.2	104
(WY)	1993	1993	1993	1993	1994	1993	1994	1993	1993	1993	1994	1994

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

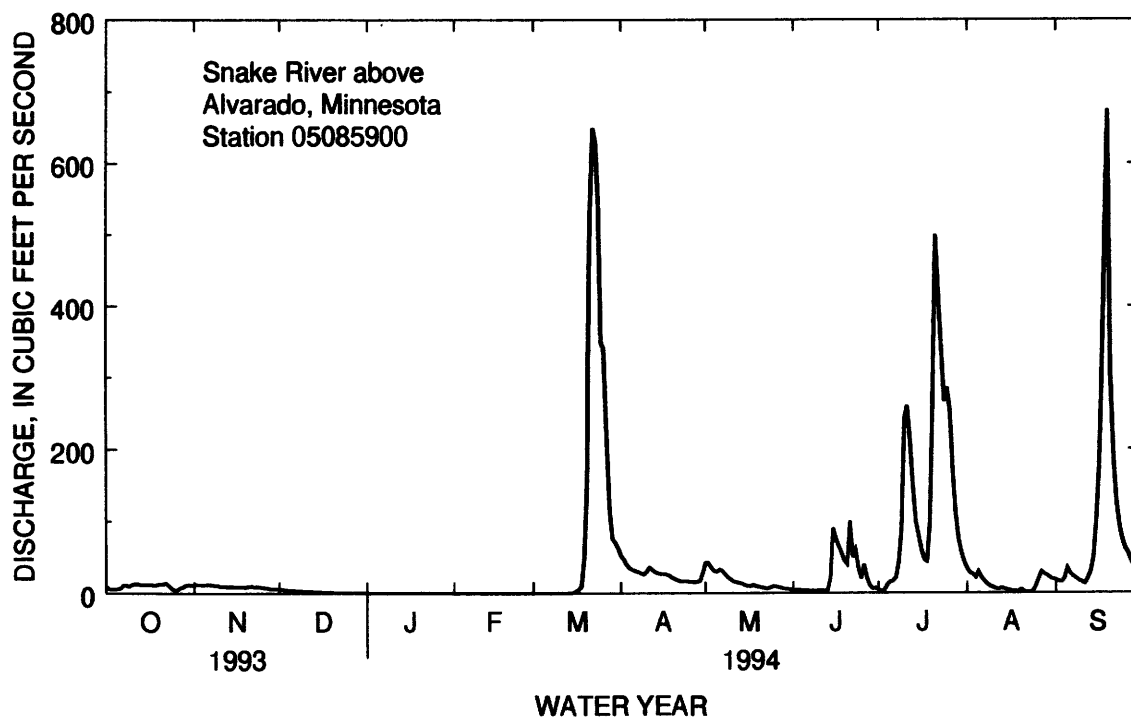
FOR 1994 WATER YEAR

WATER YEARS 1993 - 1994

ANNUAL TOTAL	18777.08	14409.91	
ANNUAL MEAN	51.4	39.5	
HIGHEST ANNUAL MEAN			44.5
LOWEST ANNUAL MEAN			49.6
HIGHEST DAILY MEAN	1320	Sep 3	1320
LOWEST DAILY MEAN	.00	Jan 1	.00
ANNUAL SEVEN-DAY MINIMUM	.00	Jan 1	.00
INSTANTANEOUS PEAK FLOW			725
INSTANTANEOUS PEAK STAGE			18.31 ^b
ANNUAL RUNOFF (AC-FT)	37240	28580	32270
10 PERCENT EXCEEDS	121	84	97
50 PERCENT EXCEEDS	7.8	9.9	6.3
90 PERCENT EXCEEDS	.00	.07	.00

a Maximum observed.

b Backwater from ice.



RED RIVER OF THE NORTH BASIN
05085900 SNAKE RIVER ABOVE ALVARADO, MN
 (National Water Quality Assessment Station)

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: June 1993 to current year.

SPECIFIC CONDUCTANCE: June 1993 to current year.

INSTRUMENTATION.--Water-quality monitor since June 1993.

REMARKS.--Records fair.

EXTREMES FOR PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: Maximum recorded, 1,750 microsiemens, Mar. 12, 1994; minimum recorded, 310 microsiemens, Aug. 11.

WATER TEMPERATURE: Maximum recorded, 24.5°C, June 21; minimum recorded, -0.5°C, Apr. 2, 1994.

EXTREMES FOR CURRENT YEAR.--

SPECIFIC CONDUCTANCE: Maximum recorded, 1750 microsiemens, Mar. 12; minimum recorded, 321 microsiemens, Mar. 27.

WATER TEMPERATURE: Maximum recorded, 24.0°C, Aug. 1; minimum recorded, -0.5°C, Apr. 2.

SPECIFIC CONDUCTANCE, US/CM @ 25 DEGREES CENTIGRADE, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER			NOVEMBER			DECEMBER			JANUARY			
1	819	809	814	931	915	922	1220	1210	1210	1390	1380	1380
2	809	802	805	927	912	920	1230	1220	1220	1390	1390	1390
3	832	807	820	916	911	914	1240	1230	1230	1400	1390	1390
4	834	824	829	912	908	910	1250	1240	1250	1400	1390	1400
5	834	823	828	916	906	911	1250	1250	1250	1410	1400	1400
6	848	832	839	937	912	927	1260	1250	1250	1420	1410	1410
7	847	835	840	943	924	935	1260	1250	1250	1430	1420	1420
8	838	824	830	955	924	941	1270	1260	1260	1440	1430	1440
9	828	817	823	1010	952	980	1270	1260	1270	1450	1440	1440
10	839	824	830	1050	1010	1030	1260	1260	1260	1460	1450	1460
11	844	834	839	1060	1050	1050	1270	1260	1260	1480	1460	1470
12	847	835	841	1060	1040	1060	1270	1260	1270	1490	1480	1480
13	861	847	853	1060	1040	1050	1270	1270	1270	1490	1490	1490
14	862	856	859	1040	1030	1040	1270	1260	1260	1500	1490	1500
15	869	858	862	1060	1040	1050	1260	1250	1260	1510	1500	1510
16	882	869	875	1070	1060	1070	1250	1250	1250	---	---	---
17	887	877	881	1080	1060	1070	1250	1250	1250	---	---	---
18	898	886	890	1080	1070	1080	1250	1250	1250	---	---	---
19	911	892	901	1090	1070	1080	1270	1250	1260	---	---	---
20	912	906	909	1100	1090	1090	1280	1270	1280	---	---	---
21	916	907	910	1100	1090	1090	1290	1280	1290	---	---	---
22	914	898	906	1140	1100	1110	1310	1290	1300	---	---	---
23	908	897	902	1150	1140	1150	1320	1310	1310	---	---	---
24	923	908	914	1180	1150	1160	1330	1320	1320	---	---	---
25	942	923	932	1220	1180	1200	1330	1330	1330	---	---	---
26	940	921	932	1240	1220	1230	1340	1330	1340	---	---	---
27	928	921	924	1230	1220	1230	1340	1340	1340	---	---	---
28	931	916	924	1220	1210	1210	1350	1340	1350	---	---	---
29	916	903	911	1210	1200	1210	1360	1350	1350	---	---	---
30	906	899	903	1210	1200	1200	1370	1360	1360	---	---	---
31	923	904	913	---	---	---	1380	1370	1370	---	---	---
MONTH	942	802	872	1240	906	1060	1380	1210	1280	---	---	---

RED RIVER OF THE NORTH BASIN

05085900 SNAKE RIVER ABOVE ALVARADO, MN--Continued

SPECIFIC CONDUCTANCE, US/CM @ 25 DEGREES CENTIGRADE, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	FEBRUARY			MARCH			APRIL			MAY		
1	---	---	---	---	---	---	447	425	439	780	751	760
2	1610	1610	1610	---	---	---	453	424	439	776	761	769
3	1610	1610	1610	---	---	---	478	446	463	783	772	778
4	1620	1610	1620	---	---	---	509	465	486	780	769	775
5	1620	1610	1610	---	---	---	525	508	519	786	771	778
6	1620	1610	1610	---	---	---	553	516	534	796	779	790
7	1620	1620	1620	---	---	---	570	538	554	805	790	798
8	1630	1620	1620	---	---	---	578	534	556	816	798	806
9	1650	1630	1640	---	---	---	604	573	586	831	811	822
10	1660	1650	1650	---	---	---	631	602	615	848	829	836
11	---	---	---	---	---	---	645	542	621	---	---	---
12	---	---	---	1750	1740	1740	663	600	638	860	840	848
13	---	---	---	1740	1720	1730	683	660	668	860	853	857
14	---	---	---	1720	1690	1710	680	666	674	867	855	859
15	---	---	---	1690	1580	1630	688	670	679	884	859	871
16	---	---	---	1580	1440	1480	695	671	683	885	873	881
17	---	---	---	1440	1270	1350	709	686	694	890	870	882
18	---	---	---	1270	708	1120	710	696	705	908	890	901
19	---	---	---	708	414	523	709	693	702	906	892	902
20	---	---	---	414	343	377	713	703	706	923	904	914
21	---	---	---	344	329	340	728	710	720	923	908	912
22	---	---	---	338	321	332	744	725	734	916	893	906
23	---	---	---	335	323	328	764	740	752	900	885	893
24	---	---	---	339	330	335	765	755	760	926	898	908
25	---	---	---	356	336	349	767	755	760	954	926	945
26	---	---	---	369	351	361	755	725	745	947	923	935
27	---	---	---	389	356	367	755	722	736	949	927	936
28	---	---	---	426	388	413	771	748	760	968	888	915
29	---	---	---	455	418	439	786	762	774	976	956	968
30	---	---	---	472	450	459	796	776	783	959	933	941
31	---	---	---	471	445	455	---	---	---	937	918	926
MONTH	---	---	---	---	---	---	796	424	649	---	---	---

[illegible]

RED RIVER OF THE NORTH BASIN

05085900 SNAKE RIVER ABOVE ALVARADO, MN--Continued

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCTOBER			NOVEMBER			DECEMBER			JANUARY		
1	9.0	7.0	7.5	.5	.0	.0	.0	.0	.0	.0	.0	.0
2	7.0	4.0	5.0	.5	.0	.5	.0	.0	.0	.0	.0	.0
3	8.5	5.5	6.5	1.0	.0	.5	.0	.0	.0	.0	.0	.0
4	8.0	6.5	7.0	1.0	.5	.5	.0	.0	.0	.0	.0	.0
5	8.5	6.5	7.5	.5	.0	.0	.0	.0	.0	.0	.0	.0
6	10.0	8.0	9.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
7	9.5	7.5	8.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
8	7.5	5.5	7.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
9	6.0	4.0	5.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
10	7.0	4.5	5.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
11	7.5	6.0	6.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
12	6.5	5.5	6.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
13	7.5	6.0	7.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
14	8.0	6.5	7.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
15	7.0	6.0	6.5	.0	.0	.0	.0	.0	---	.0	.0	.0
16	8.0	6.5	7.0	.0	.0	.0	.0	.0	.0	---	---	---
17	7.0	6.0	6.5	.0	.0	.0	.0	.0	.0	---	---	---
18	7.5	6.0	6.5	.0	.0	.0	.0	.0	.0	---	---	---
19	8.5	6.0	7.0	.0	.0	.0	.0	.0	.0	---	---	---
20	8.5	7.5	8.0	.0	.0	.0	.0	.0	.0	---	---	---
21	7.5	6.0	6.5	.0	.0	.0	.0	.0	.0	---	---	---
22	6.0	3.5	5.0	.0	.0	.0	.0	.0	.0	---	---	---
23	6.5	4.5	5.5	.0	.0	.0	.0	.0	.0	---	---	---
24	7.0	5.0	6.0	.0	.0	.0	.0	.0	.0	---	---	---
25	7.0	6.0	6.5	.0	.0	.0	.0	.0	.0	---	---	---
26	6.5	5.0	5.5	.0	.0	.0	.0	.0	.0	---	---	---
27	5.0	4.0	4.0	.0	.0	.0	.0	.0	.0	---	---	---
28	4.0	2.0	3.5	.0	.0	.0	.0	.0	.0	---	---	---
29	2.0	.5	1.0	.0	.0	.0	.0	.0	.0	---	---	---
30	.5	.0	.0	.0	.0	.0	.0	.0	.0	---	---	---
31	.5	.0	.0	---	---	---	.0	.0	.0	---	---	---
MONTH	10.0	.0	5.8	1.0	.0	.0	.0	.0	---	---	---	---

RED RIVER OF THE NORTH BASIN
05085900 SNAKE RIVER ABOVE ALVARADO, MN--Continued
WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	FEBRUARY			MARCH			APRIL			MAY		
1	---	---	---	.0	.0	.0	1.5	.0	.5	9.5	7.0	8.5
2	.0	.0	.0	.0	.0	.0	.5	.0	.0	10.5	7.0	9.0
3	.0	.0	.0	.0	.0	.0	---	---	---	11.0	9.0	10.0
4	.0	.0	.0	.0	.0	.0	---	---	---	10.5	7.5	8.5
5	.0	.0	.0	.0	.0	.0	---	---	---	9.5	6.5	8.0
6	.0	.0	.0	.0	.0	.0	---	---	---	11.0	7.5	9.5
7	.0	.0	.0	.0	.0	.0	---	---	---	12.5	9.0	10.5
8	.0	.0	.0	.0	.0	.0	1.0	.0	.5	13.5	10.5	12.0
9	.0	.0	.0	.0	.0	.0	3.5	.5	2.0	13.0	10.5	12.0
10	.0	.0	.0	.0	.0	.0	5.0	2.0	3.5	11.5	10.5	11.0
11	.0	.0	.0	.0	.0	.0	7.0	2.0	5.0	13.5	10.0	12.0
12	.0	.0	.0	.0	.0	.0	8.0	5.0	6.5	15.0	10.5	13.0
13	.0	.0	.0	.0	.0	.0	8.5	6.5	7.5	14.5	13.0	14.0
14	.0	.0	.0	.0	.0	.0	8.0	6.5	7.5	16.0	13.0	14.5
15	.0	.0	.0	.0	.0	.0	8.5	6.0	7.5	15.5	12.5	14.0
16	.0	.0	.0	.5	.0	.5	9.5	6.5	8.0	14.5	12.5	13.0
17	.0	.0	.0	.5	.5	.5	10.5	7.5	9.0	15.5	11.5	13.5
18	.0	.0	.0	.5	.5	.5	11.0	9.5	10.5	19.0	15.0	17.0
19	.0	.0	.0	.5	.5	.5	10.0	8.0	9.0	18.5	16.0	17.5
20	.0	.0	.0	1.0	.5	.5	9.5	7.5	8.5	19.5	15.0	17.0
21	.0	.0	.0	1.5	.5	1.0	10.0	6.5	8.5	18.0	16.5	17.5
22	.0	.0	.0	1.0	.5	1.0	11.5	8.0	10.0	19.5	15.0	17.0
23	.0	.0	.0	.5	.5	.5	15.0	10.0	12.5	19.5	17.0	18.0
24	.0	.0	.0	1.0	.5	.5	14.5	10.5	12.0	20.0	16.5	18.0
25	.0	.0	.0	1.0	.5	.5	11.0	7.5	9.0	19.5	16.5	17.5
26	.0	.0	.0	1.0	.5	.5	7.5	2.0	4.5	18.5	14.5	16.5
27	.0	.0	.0	.5	.0	.5	5.0	1.0	3.0	19.5	14.5	17.0
28	.0	.0	.0	1.0	.0	.0	6.5	3.5	5.5	20.0	16.5	18.5
29	---	---	---	1.5	.0	.5	8.0	4.5	6.5	19.0	16.5	17.5
30	---	---	---	2.5	.0	.5	9.5	6.5	8.0	17.5	16.0	16.5
31	---	---	---	2.5	.0	.5	---	---	---	18.5	14.5	16.0
MONTH	---	---	---	2.5	.0	.3	---	---	---	20.0	6.5	14.0

RED RIVER OF THE NORTH BASIN

05085900 SNAKE RIVER ABOVE ALVARADO, MN--Continued

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	JUNE			JULY			AUGUST			SEPTEMBER		
1	18.5	15.5	17.0	21.0	19.5	20.5	24.0	21.5	22.5	---	---	---
2	17.5	15.0	16.0	22.5	19.0	20.5	24.0	22.0	23.0	---	---	---
3	19.0	15.5	17.0	21.0	19.5	20.0	---	---	---	---	---	---
4	20.0	17.5	18.5	22.5	19.0	20.5	---	---	---	---	---	---
5	22.0	18.0	19.5	22.5	21.0	22.0	---	---	---	---	---	---
6	22.0	18.0	20.0	22.0	21.0	21.5	---	---	---	---	---	---
7	21.0	18.5	19.5	21.0	17.5	19.0	---	---	---	---	---	---
8	19.5	17.0	18.0	17.5	16.0	16.5	---	---	---	---	---	---
9	18.5	16.5	17.0	19.5	17.0	18.0	---	---	---	---	---	---
10	---	---	---	19.0	17.5	18.0	---	---	---	---	---	---
11	---	---	---	21.0	19.0	20.0	---	---	---	---	---	---
12	---	---	---	21.5	20.0	21.0	---	---	---	---	---	---
13	---	---	---	21.0	20.5	21.0	---	---	---	---	---	---
14	---	---	---	21.0	19.5	20.5	---	---	---	---	---	---
15	---	---	---	21.5	19.5	20.5	---	---	---	---	---	---
16	---	---	---	22.0	20.0	21.0	---	---	---	---	---	---
17	---	---	---	22.5	19.5	21.5	---	---	---	---	---	---
18	---	---	---	23.0	20.0	22.0	---	---	---	---	---	---
19	---	---	---	23.0	21.0	22.0	---	---	---	---	---	---
20	---	---	---	21.0	19.5	20.0	---	---	---	19.5	18.0	19.0
21	---	---	---	---	---	---	---	---	---	19.0	16.5	18.0
22	---	---	---	---	---	---	---	---	---	16.5	15.0	16.0
23	---	---	---	22.0	20.5	21.5	---	---	---	15.5	13.5	14.5
24	---	---	---	22.5	21.0	22.0	---	---	---	16.0	14.0	15.0
25	---	---	---	21.5	20.5	20.5	---	---	---	15.5	14.0	15.0
26	---	---	---	20.5	19.5	20.0	---	---	---	14.5	12.5	13.5
27	---	---	---	21.0	19.0	20.0	---	---	---	13.5	12.5	13.0
28	---	---	---	22.0	19.0	20.5	---	---	---	13.0	11.5	12.5
29	---	---	---	22.5	20.0	21.5	---	---	---	13.0	11.5	12.0
30	22.0	20.0	21.0	22.5	21.0	22.0	---	---	---	12.5	11.5	12.0
31	---	---	---	23.0	20.5	22.0	---	---	---	---	---	---

RED RIVER OF THE NORTH BASIN

05085900 SNAKE RIVER ABOVE ALVARADO, MINN--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND	SPE-CIFIC CON-DUCT- ANCE	SPE-CIFIC CON-DUCT- ANCE	PH WATER WHOLE FIELD	PH WATER WHOLE LAB	TEMPER- ATURE WATER	TEMPER- ATURE AIR	BARO- METRIC PRES- SURE	OXYGEN, DIS- SOLVED
		(00061)	(US/CM)	(US/CM)	(00400)	(00403)	(DEG C)	(DEG C)	(MM OF HG)	(MG/L)
OCT										
06...	0830	7.5	851	853	7.9	7.8	8.0	10.0	736	9.0
26...	0830	3.6	936	953	8.2	7.8	5.5	3.5	747	11.2
DEC										
16...	1235	1.9	1250	1240	7.6	7.8	0.0	3.5	--	--
MAR										
21...	1420	455	340	352	7.4	6.9	1.0	7.0	731	10.4
APR										
05...	0930	32	568	556	7.7	7.4	0.0	-3.0	745	12.2
MAY										
23...	1025	6.1	889	907	8.2	7.9	18.0	22.0	741	6.4
JUN										
16...	1030	86	443	--	7.9	--	19.5	--	--	--
20...	1225	39	482	485	7.8	7.7	22.0	28.0	742	6.0
JUL										
12...	0830	218	639	617	8.0	7.8	20.0	18.5	742	7.4
AUG										
24...	0950	1.7	878	868	7.8	7.6	20.5	21.5	741	4.7
SEP										
19...	0945	691	568	--	7.7	--	17.5	19.0	744	8.9

[illegible]

RED RIVER OF THE NORTH BASIN

05085900 SNAKE RIVER ABOVE ALVARADO, MN--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DATE	CHLORIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUORIDE, DIS- SOLVED (MG/L AS F) (00950)	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N) (00625)
OCT									
06...	18	0.30	12	548	<0.010	<0.050	0.040	1.0	1.4
26...	21	0.20	6.5	624	<0.010	<0.050	0.020	1.0	1.5
DEC									
16...	35	0.20	14	820	0.030	1.60	0.290	1.2	1.5
MAR									
21...	11	0.10	11	228	0.210	3.10	0.470	2.0	2.1
APR									
05...	13	0.20	14	361	0.050	1.10	0.230	1.2	1.2
MAY									
23...	26	0.20	3.7	607	0.010	<0.050	0.040	1.1	1.5
JUN									
16...	--	--	--	--	--	--	--	--	1.0
20...	10	0.20	16	312	0.070	0.760	0.100	1.0	2.0
JUL									
12...	10	0.20	22	446	0.020	0.130	0.080	1.5	1.5
AUG									
24...	24	0.20	18	583	0.010	<0.050	0.090	1.3	1.6
SEP									
19...	--	--	--	--	--	--	--	--	1.5
DATE (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)	SEDI- MENT, SUS- PENDE D (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS- PENDE D TOTAL (MG/L AS C) (00689)
OCT									
06...	0.080	0.020	0.020	12	98	37	26	18	2.7
26...	0.070	<0.010	<0.010	12	98	30	39	16	2.0
DEC									
16...	0.050	0.010	0.020	13	96	35	69	15	0.4
MAR									
21...	0.510	0.420	0.340	259	100	100	58	20	2.4
APR									
05...	0.190	0.130	0.120	45	99	69	74	12	0.7
MAY									
23...	0.130	0.060	0.060	24	97	21	96	19	1.0
JUN									
16...	0.340	--	--	--	--	--	--	--	--
20...	0.520	0.190	0.190	419	100	17	9	13	>5.0
JUL									
12...	0.190	0.100	0.080	172	100	47	27	16	1.3
AUG									
24...	0.180	0.110	0.080	37	100	14	110	17	1.4
SEP									
19...	0.300	--	--	--	--	--	--	--	--

RED RIVER OF THE NORTH BASIN

05087500 MIDDLE RIVER AT ARGYLE, MN

LOCATION.--Lat 48°20'25", long 96°48'58", in NE 1/4 NW 1/4 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.--265 mi²

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 mean 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 ft³/s.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	20	14	7.6	e4.2	e1.0	e1.6	e84	44	15	5.9	88	8.2
2	19	14	7.6	e4.2	e1.0	e1.6	e72	53	14	5.2	72	7.7
3	19	14	7.0	e4.1	e1.0	e1.6	e74	56	12	5.8	65	7.1
4	18	14	6.9	e4.0	e1.0	e1.7	75	52	11	10	55	8.4
5	16	15	6.9	e3.9	e1.0	e1.7	73	49	10	13	44	7.9
6	15	14	6.6	e3.9	e1.0	e1.7	67	49	9.7	16	37	15
7	14	14	6.6	e3.8	e1.1	e1.7	60	50	8.5	18	32	14
8	14	14	6.2	e3.8	e1.1	e1.7	54	48	7.9	26	27	12
9	14	13	6.4	e3.7	e1.1	e1.7	51	43	8.2	41	26	10
10	13	12	6.4	e3.6	e1.1	e1.7	48	39	7.5	62	23	8.7
11	14	12	e6.6	e3.5	e1.1	e1.7	48	34	7.0	92	21	8.8
12	14	11	e6.6	e3.4	e1.1	e1.7	50	31	7.5	107	18	8.6
13	14	11	6.5	e3.3	e1.1	e1.7	55	29	7.6	91	17	8.6
14	14	11	6.1	e3.2	e1.1	e1.8	61	28	9.1	72	15	12
15	14	10	6.0	e3.1	e1.1	e1.8	61	25	7.7	65	13	29
16	13	10	6.0	e2.9	e1.1	e1.9	61	23	7.4	88	11	99
17	15	10	5.9	e2.7	e1.1	e2.0	61	23	8.3	170	9.5	310
18	15	10	5.7	e2.5	e1.1	e2.2	58	23	8.3	170	9.9	526
19	15	9.6	5.5	e2.3	e1.1	e2.5	58	21	9.8	265	11	684
20	16	9.3	e5.5	e2.1	e1.1	e3.2	51	21	18	297	11	617
21	14	9.2	e5.6	e1.9	e1.1	e1.1	47	21	28	255	17	449
22	13	7.9	e5.6	e1.7	e1.1	e1.10	45	21	22	300	16	320
23	13	9.0	e5.4	e1.5	e1.1	e1.60	43	21	17	307	14	246
24	12	8.2	e5.2	e1.4	e1.2	e1.80	37	21	13	314	16	191
25	12	7.9	e5.0	e1.3	e1.2	e1.75	35	22	12	320	21	151
26	12	7.9	e4.8	e1.2	e1.3	e1.70	33	20	11	369	16	122
27	12	7.9	e4.7	e1.2	e1.4	e1.60	33	18	9.2	325	13	95
28	12	7.7	e4.6	e1.1	e1.5	e1.40	33	17	7.9	251	11	75
29	12	7.4	e4.5	e1.1	---	e1.30	34	16	7.3	192	10	59
30	13	7.3	e4.4	e1.1	---	e1.10	37	18	6.2	147	9.1	46
31	14	---	e4.3	e1.1	---	e1.03	---	16	---	113	8.5	---
TOTAL	445	322.3	182.7	82.8	31.3	1486.2	1599	952	328.1	4512.9	757.0	4156.0
MEAN	14.4	10.7	5.89	2.67	1.12	47.9	53.3	30.7	10.9	146	24.4	139
MAX	20	15	7.6	4.2	1.5	180	84	56	28	369	88	684
MIN	12	7.3	4.3	1.1	1.0	1.6	33	16	6.2	5.2	8.5	7.1
AC-FT	883	639	362	164	62	2950	3170	1890	651	8950	1500	8240
CFSM.	05	.04	.02	.01	.00	.18	.20	.12	.04	.55	.09	.52
IN.	.06	.05	.03	.01	.00	.21	.22	.13	.05	.63	.11	.58

e Estimated.

RED RIVER OF THE NORTH BASIN

05087500 MIDDLE RIVER AT ARGYLE, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1945 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	8.96	5.18	2.33	1.02	.75	25.1	200	70.0	70.0	54.1	11.0	16.3
MAX	94.1	33.4	15.8	4.65	3.32	217	747	330	660	688	265	272
(WY)	1983	1957	1983	1983	1983	1983	1966	1970	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 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

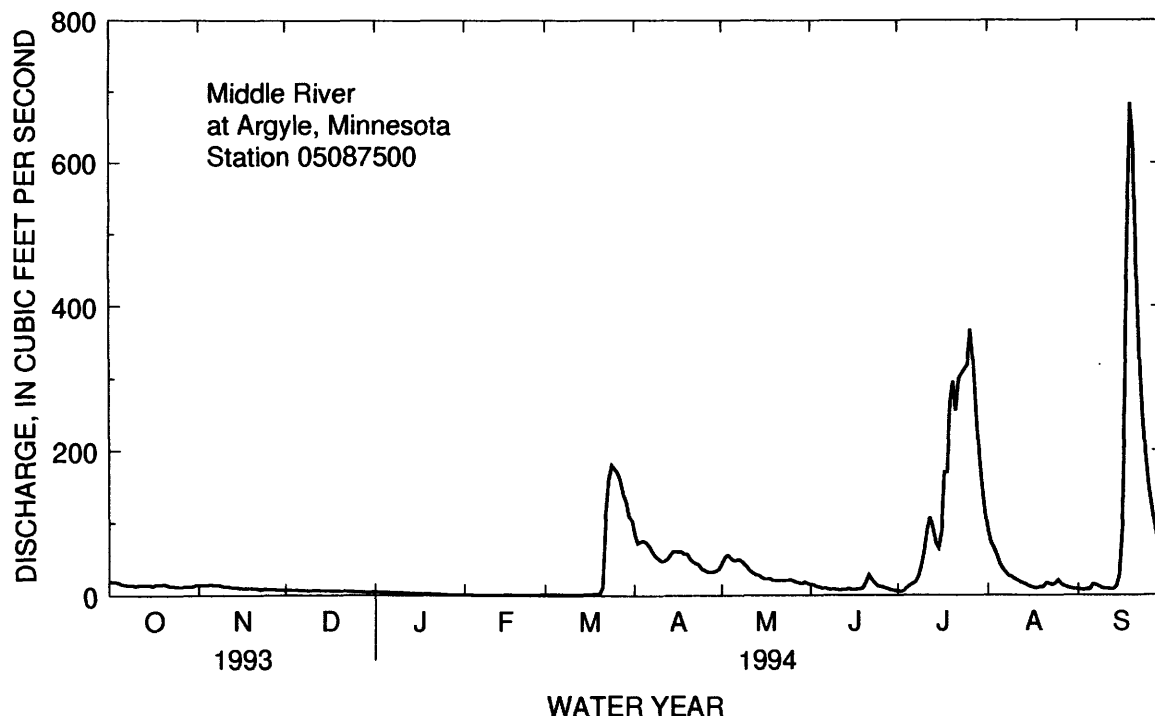
WATER YEARS 1945 - 1994

ANNUAL TOTAL	26340.67		14855.3									
ANNUAL MEAN	72.2		40.7							38.5 _a		
HIGHEST ANNUAL MEAN										112		1966
LOWEST ANNUAL MEAN										1.60		1977
HIGHEST DAILY MEAN			1150	Sep 3		684	Sep 19		3790		Jul 4	1975
LOWEST DAILY MEAN			.64	Mar 3		1.0	Feb 1-6		.00 _b		Aug 18	1952
ANNUAL SEVEN-DAY MINIMUM			.64	Mar 3		1.0	Jan 31		.00		Aug 18	1952
INSTANTANEOUS PEAK FLOW						707	Sep 19		4260		Jul 3	1975
INSTANTANEOUS PEAK STAGE						11.30	Sep 19		16.59 _c		Jul 3	1975
ANNUAL RUNOFF (AC-FT)	52250					29470			27910			
ANNUAL RUNOFF (CFSM)	.27					.15			.15			
ANNUAL RUNOFF (INCHES)	3.70					2.09			1.98			
10 PERCENT EXCEEDS	235					101			79			
50 PERCENT EXCEEDS	14					12			2.0			
90 PERCENT EXCEEDS	.70					1.5			.00			

a Median of annual mean discharges is 25.2 ft³/s.

b Many days, several years.

c Present datum.



RED RIVER OF THE NORTH BASIN

05092000 RED RIVER OF THE NORTH AT DRAYTON, ND

LOCATION.--Lat 48 34'20", long 97 08'50", in SE 1/4 SE 1/4 SE 1/4 sec.24, T.159 N., R.51 W., Pembina County, Hydrologic Unit 09020311, on downstream side of bridge on North Dakota State Highway 11, at the North Dakota-Minnesota border, 1.5 mi northeast of Drayton, and at mile 206.7.

DRAINAGE AREA.--34,800 mi², approximately, includes 3,800 mi² in closed basins.

WATER-DISCHARGE RECORDS

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 good except those for periods of estimated discharges, which are 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 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4740	2950	1390	e1600	e1460	e1590	e24500	7210	4420	6060	e9000	2510
2	4510	2880	1580	e1550	e1450	e1610	e25100	7980	4320	6490	e7600	2480
3	4270	2830	1730	e1520	e1440	e1630	e26000	8640	4190	6950	6690	2430
4	4070	2780	1860	e1500	e1430	e1650	e26700	9140	4110	6900	5880	2380
5	3920	2750	1960	e1480	e1420	e1700	e27600	9470	4010	6440	5280	2330
6	3820	2710	1980	e1450	e1420	e1700	e27900	9710	3900	5850	4890	2260
7	3760	2700	2000	e1400	e1410	e1700	e25000	9930	3820	5340	4590	2160
8	3750	2700	2030	e1450	e1410	e1700	e24000	10000	3800	5230	4330	2070
9	3810	2230	2130	e1500	e1400	e1710	e23000	9960	3790	6830	4110	2020
10	3840	1480	2160	e1550	e1400	e1750	e21800	9530	3770	11400	3930	2000
11	3900	1380	2160	e1580	e1400	e1800	e20800	8900	3680	15900	3890	2000
12	3950	1740	2140	e1620	e1400	e1900	e19500	8240	3600	19600	3830	1970
13	3990	1880	2120	e1620	e1400	e2040	e18200	7600	3560	e21200	3720	1940
14	4020	2010	2050	e1620	e1400	e2050	e16600	7060	3560	e22400	3670	1990
15	4060	2220	2020	e1620	e1500	e2060	e15500	6590	3740	e23100	3670	2090
16	4050	2370	e2000	e1610	e1600	e2100	e14100	6160	4180	e23500	3650	2430
17	4040	2500	e1960	e1610	e1600	e2120	e12800	5810	5010	e23000	3550	3300
18	3980	2500	e1920	e1600	e1600	e2300	e11500	5540	5970	e21600	3390	4780
19	3900	2380	e1880	e1600	e1600	e3000	e10100	5400	6260	e20300	3290	7250
20	3820	2040	e1840	e1600	e1600	e4500	e9100	5310	6310	e19000	3160	9260
21	3780	2080	e1800	e1580	e1600	e6200	e8150	5190	7360	e17800	3050	e9790
22	3690	2010	e1780	e1560	e1550	e8500	e7550	5080	9060	e16900	3000	e8960
23	3610	1450	e1760	e1540	e1520	e11500	e7100	4990	11100	e16100	2990	e8260
24	3560	1310	e1740	e1510	e1500	e14500	e6800	4950	12500	e15400	3000	e7500
25	3480	1300	e1720	e1500	e1500	e16900	6610	4940	12900	e14500	2970	6830
26	3420	1220	e1700	e1500	e1520	e19000	6230	4940	11600	e13800	2930	6020
27	3380	1110	e1680	e1500	e1550	e20600	6010	4920	10000	e13400	2840	5310
28	3260	1060	e1660	e1490	e1580	e22000	5840	4820	8200	e13000	2770	4890
29	3210	1090	e1640	e1490	---	e22900	5880	4710	7000	e12300	2700	4630
30	3150	1220	e1620	e1480	---	e23600	6400	4630	6370	e11300	2650	4480
31	3060	---	e1600	e1470	---	e24100	---	4520	---	e10000	2560	---
TOTAL	117800	60880	57610	47700	41660	230410	466370	211870	182090	431590	123580	126320
MEAN	3800	2029	1858	1539	1488	7433	15550	6835	6070	13920	3986	4211
MAX	4740	2950	2160	1620	1600	24100	27900	10000	12900	23500	9000	9790
MIN	3060	1060	1390	1400	1400	1590	5840	4520	3560	5230	2560	1940
AC-FT	233700	120800	114300	94610	82630	457000	925000	420200	361200	856100	245100	250600

e Estimated.

RED RIVER OF THE NORTH BASIN

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

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1949 - 1994, BY WATER YEAR (WY)

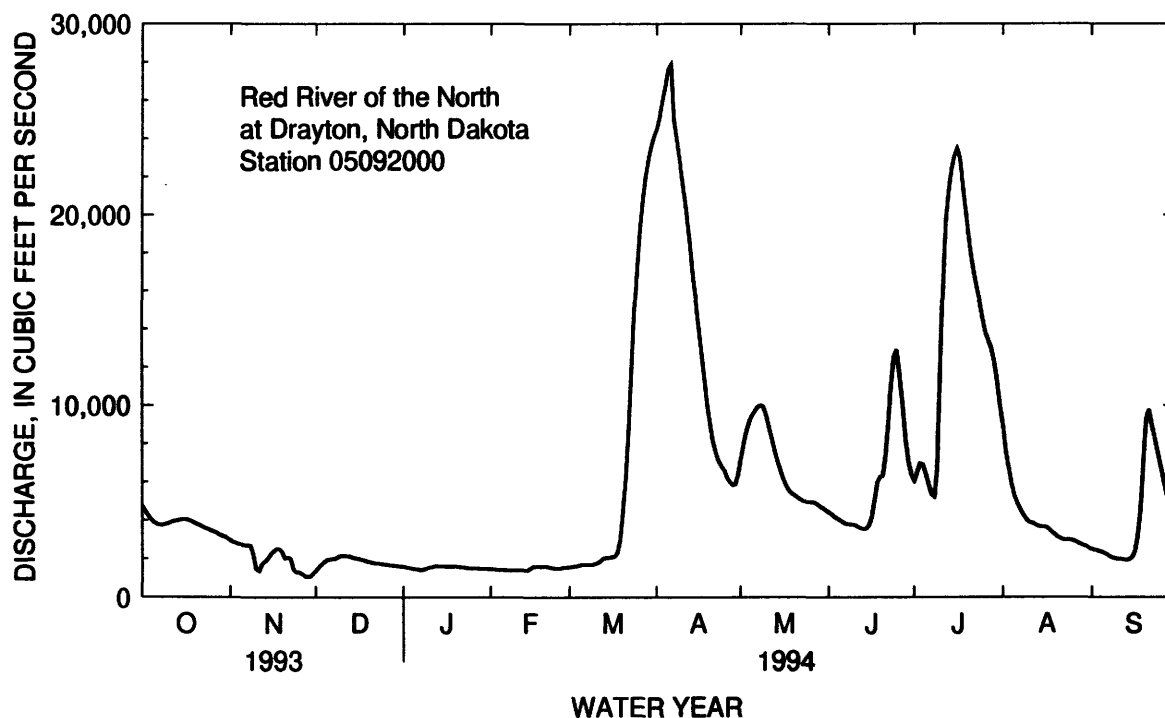
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	1734	1464	1175	1035	1011	2623	13570	8124	5205	4532	2413	1830
MAX	4463	5653	3072	2065	1876	9329	38390	58890	23420	28240	21580	7912
(WY)	1972	1972	1972	1966	1952	1983	1966	1950	1962	1975	1993	1993
MIN	317	277	149	174	201	280	1275	938	676	348	243	329
(WY)	1991	1977	1977	1990	1977	1962	1981	1977	1977	1988	1977	1988

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1949 - 1994

ANNUAL TOTAL	2286837		2097880									
ANNUAL MEAN	6265		5748							3741		
HIGHEST ANNUAL MEAN										10510		1950
LOWEST ANNUAL MEAN										536		1977
HIGHEST DAILY MEAN	27500	Aug 13		27900	Apr 6		91000	Apr 28 1979				
LOWEST DAILY MEAN	709	Jan 16		1060	Nov 28		110	Dec 23 1989				
ANNUAL SEVEN-DAY MINIMUM	746	Jan 5		1190	Nov 24		118	Dec 28 1989				
INSTANTANEOUS PEAK FLOW				27900	Apr 6		92900	Apr 28 1979				
INSTANTANEOUS PEAK STAGE				33.57	Apr 6		43.66	Apr 28 1979				
INSTANTANEOUS LOW FLOW							7.7	Oct 16 1936				
ANNUAL RUNOFF (AC-FT)	4536000		4161000				2710000					
10 PERCENT EXCEEDS	19200		14900				8100					
50 PERCENT EXCEEDS	3810		3610				1680					
90 PERCENT EXCEEDS	898		1500				460					



RED RIVER OF THE NORTH BASIN

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

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

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 AIR (DEG C) (00020)	TEMPER- ATURE WATER (DEG C) (00010)	HARD- NESS TOTAL (MG/L AS CACO3) (00900)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	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)
NOV											
01...	1540	2940	700	--	9.0	9.0	--	--	--	--	--
DEC											
14...	1530	2040	671	--	--	--	--	--	--	--	--
JAN											
24...	1305	1510	654	--	--	0.5	--	--	--	--	--
MAR											
01...	1250	1590	650	--	2.0	0.5	--	--	--	--	--
APR											
05...	1200	27500	640	--	4.0	1.0	--	--	--	--	--
08...	1235	24000	711	8.0	3.0	3.0	320	190	73	34	36
15...	1325	15500	--	--	12.0	5.0	--	--	--	--	--
25...	1330	6620	834	--	8.0	11.0	--	--	--	--	--
JUN											
06...	1600	3830	820	--	24.5	23.0	--	--	--	--	--
27...	1710	9620	--	--	20.0	22.5	--	--	--	--	--
JUL											
12...	1150	19400	421	--	22.0	19.5	--	--	--	--	--
15...	1150	23000	440	--	26.0	20.0	--	--	--	--	--
18...	1400	21600	600	--	27.0	22.0	--	--	--	--	--
23...	1320	13400	686	--	23.0	23.0	--	--	--	--	--
AUG											
02...	1320	7620	677	--	27.5	23.5	--	--	--	--	--
29...	1230	2700	714	--	22.0	20.0	--	--	--	--	--
SEP											
22...	1550	8850	539	--	15.0	17.5	--	--	--	--	--

DATE	SODIUM PERCENT (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)
APR											
08...	19	0.9	9.0	170	34	0.20	16	486	509	0.69	33000

DATE	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BORON, DIS- SOLVED (UG/L AS B) (01020)	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)
APR										
08...	3	70	20	<1	40	<10	0.1	<1	<1	150

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RED RIVER OF THE NORTH BASIN

05094000 SOUTH BRANCH TWO RIVERS AT LAKE BRONSON, MN

LOCATION.--Lat 48°43'50", long 96°39'50", in SW $\frac{1}{4}$ SW $\frac{1}{4}$ 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.--444 mi².

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 mean 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 by Bronson Lake, usable capacity, 3,700 acre-ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	72	39	e10	e7.9	e4.5	e3.7	303	28	8.2	11	17	17
2	72	38	e10	e7.8	e4.4	e3.7	319	32	1.1	11	16	17
3	72	37	e10	e7.6	e4.3	e3.7	311	38	.27	13	16	18
4	68	34	e10	e7.5	e4.2	e3.8	233	45	.21	14	13	19
5	66	32	e10	e7.3	e4.2	e3.9	150	38	3.4	13	12	20
6	54	36	e10	e7.2	e4.1	e4.0	127	30	7.1	4.1	14	35
7	15	47	e10	e7.1	e4.0	e4.1	117	11	8.0	6.9	21	74
8	22	62	e10	e7.0	e3.9	e4.1	109	57	8.4	21	19	84
9	41	60	e10	e6.8	e3.9	e4.1	116	26	17	33	16	74
10	39	62	e10	e6.7	e3.8	e4.1	122	1.5	16	33	14	61
11	34	60	e10	e6.6	e3.7	e4.1	147	12	15	35	13	52
12	10	60	e10	e6.5	e3.7	e4.4	156	21	20	33	12	49
13	13	42	e10	e6.3	e3.7	e5.0	141	23	19	30	11	42
14	19	2.2	e10	e6.2	e3.7	e7.0	126	23	19	31	8.8	5.2
15	24	1.2	e10	e6.1	e3.7	e5.0	92	22	19	28	8.8	67
16	29	1.1	e10	e6.0	e3.7	e6.0	77	30	17	27	7.5	367
17	52	.98	e10	e5.9	e3.8	e7.0	81	38	1.9	29	7.5	655
18	50	e1.4	e10	e5.8	e3.9	e18.0	81	33	.48	43	7.3	702
19	50	e2.7	e10	e5.7	e4.0	e19.0	76	29	4.2	48	9.5	699
20	34	e5.0	e9.8	e5.6	e4.1	e20.0	65	13	25	44	9.0	651
21	17	e10	e9.7	e5.5	e4.1	e23.0	56	13	23	42	18	625
22	12	e10	e9.5	e5.4	e4.0	e30.0	51	15	24	22	35	548
23	1.6	e10	e9.4	e5.3	e3.9	e38.0	46	24	17	52	42	365
24	1.1	e10	e9.2	e5.2	e3.9	e50.0	53	23	1.5	70	44	291
25	7.4	e10	e9.0	e5.1	e3.8	e66.0	55	22	.82	69	42	306
26	16	e10	e8.8	e5.0	e3.8	e80.0	54	22	1.0	59	35	346
27	24	e10	e8.7	e4.9	e3.8	e78.0	40	22	2.8	34	32	295
28	40	e10	e8.5	e4.8	e3.8	e58.0	25	21	4.7	6.3	28	84
29	45	e10	e8.4	e4.7	---	e45.0	18	21	9.3	16	25	45
30	40	e10	e8.2	e4.6	---	36.1	21	18	14	18	23	151
31	39	---	e8.0	e4.5	---	33.5	---	12	---	18	22	---
TOTAL	1079.1	723.58	297.2	188.6	110.4	6185.7	3368	763.5	308.38	914.3	598.4	6764.2
MEAN3	4.8	24.1	9.59	6.08	3.94	200	112	24.6	10.3	29.5	19.3	225
MAX	72	62	10	7.9	4.5	800	319	57	25	70	44	702
MIN	1.1	.98	8.0	4.5	3.7	3.7	18	1.5	.21	4.1	7.3	5.2
AC-FT	2140	1440	589	374	219	12270	6680	1510	612	1810	1190	13420
CFSM	.08	.05	.02	.01	.01	.45	.25	.06	.02	.07	.04	.51
IN.	.09	.06	.02	.02	.01	.52	.28	.06	.03	.08	.05	.57

e Estimated.

RED RIVER OF THE NORTH BASIN

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

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1929 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	19.1	11.2	4.59	2.81	3.20	59.8	398	189	161	106	48.2	45.7
MAX	153	87.5	34.5	12.1	23.6	362	1977	1338	1336	1136	1349	525
(WY)	1958	1957	1992	1992	1981	1986	1966	1970	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 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

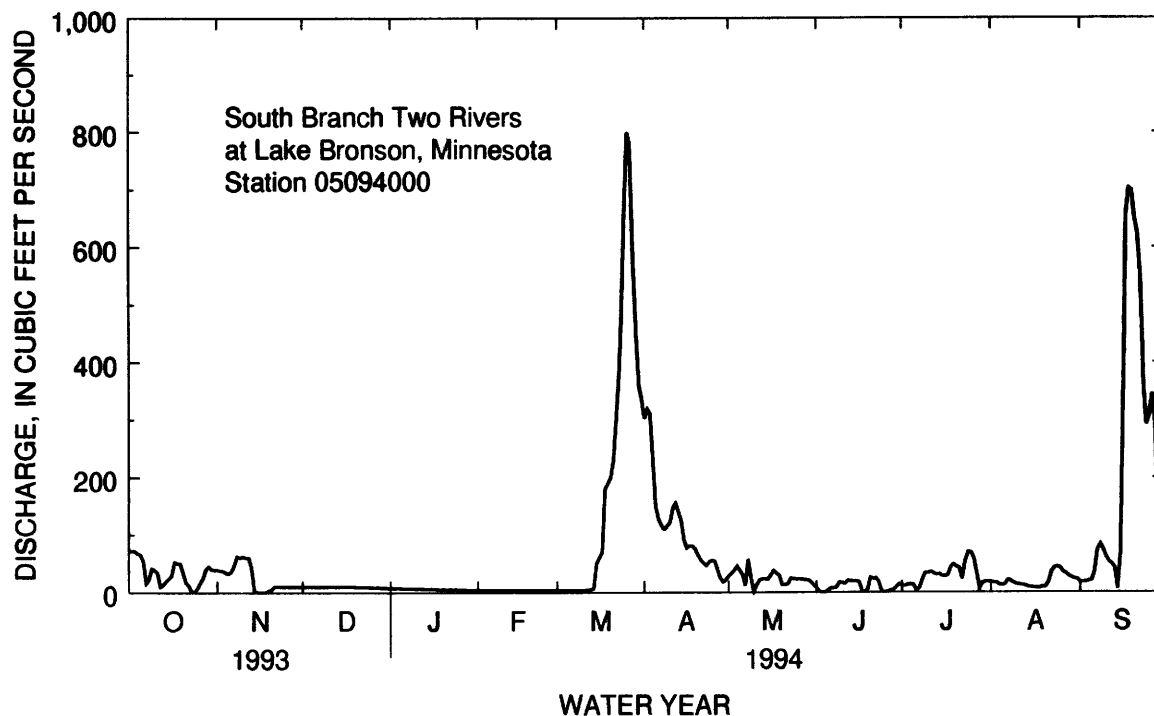
WATER YEARS 1929 - 1994

ANNUAL TOTAL	78327.77	21301.36	
ANNUAL MEAN	215	58.4	87.5 ^a
HIGHEST ANNUAL MEAN			312
LOWEST ANNUAL MEAN			2.89
HIGHEST DAILY MEAN	2840	Aug 10	800
LOWEST DAILY MEAN	.21	Mar 21	.21
ANNUAL SEVEN-DAY MINIMUM	.26	Mar 18	2.1
INSTANTANEOUS PEAK FLOW			850 ^e
INSTANTANEOUS PEAK STAGE			18.23
ANNUAL RUNOFF (AC-FT)	155400	42250	63410
ANNUAL RUNOFF (CFSM)	.48	.13	.20
ANNUAL RUNOFF (INCHES)	6.56	1.78	2.68
10 PERCENT EXCEEDS	740	126	215
50 PERCENT EXCEEDS	34	16	4.6
90 PERCENT EXCEEDS	.49	3.9	.76

a Median of annual mean discharges is 57 ft³/s.

b Many days, several years.

e Estimated.



RED RIVER OF THE NORTH BASIN

05102500 RED RIVER OF THE NORTH AT EMERSON, MANITOBA

(International gaging station)

(National stream-quality accounting network station)

LOCATION.--Lat 49°00'30", long 97°12'40", in sec.2, T.1, R.2 E., Hydrologic Unit 09020311, on right bank 1,500 ft downstream from Canadian National Railway bridge in Emerson, 0.8 mi downstream from international boundary, 3.6 mi downstream from Pembina River, and at mile 154.3.

DRAINAGE AREA.--40,200 mi², approximately, includes 3,800 mi² in closed basins.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--March to November 1902 (gage heights only), May 1912 to September 1929 (monthly discharge only, published in WSP 1308), October 1929 to current year.

GAGE.--Water-stage recorder. Datum of gage is Geodetic Survey of Canada Datum of 1929. See WSP 1728 or 1913 for history of changes prior to Apr. 10, 1953.

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

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5370	3480	e2440	e1630	e1480	e1600	e18000	7630	5120	6740	9820	2740
2	5160	3440	e2390	e1610	e1480	e1610	e19800	8160	4980	6460	8760	2680
3	4940	3410	e2340	e1580	e1470	e1620	e21700	8720	4840	6670	7730	2620
4	4730	3370	e2300	e1560	e1470	e1630	e23300	9220	4700	6990	6780	2580
5	4560	3320	e2250	e1530	e1470	e1660	e24700	9570	4590	6990	6110	2550
6	4380	3200	e2200	e1520	e1470	e1680	e25700	9820	4480	6740	5610	2500
7	4240	3070	e2200	e1510	e1460	e1700	26000	9990	4380	6320	5300	2500
8	4170	2780	e2190	e1490	e1450	e1720	26900	10100	4310	5970	5010	2510
9	4170	2330	e2190	e1470	e1450	e1740	26800	10200	4270	5970	4730	2490
10	4170	e2440	e2200	e1450	e1460	e1770	26200	10100	4270	7490	4450	2450
11	4170	e2620	e2200	e1480	e1470	e1800	25600	9780	4200	10700	4240	2430
12	4200	e2580	e2180	e1480	e1470	e1870	25000	9320	4170	13800	4170	2410
13	4270	e2630	e2140	e1480	e1470	e1950	24200	8830	4060	16700	4060	2360
14	4310	e2640	e2080	e1480	e1480	e2050	23200	8300	4030	18900	3950	2340
15	4310	e2670	e2020	e1480	e1480	e2140	22000	7770	3990	20600	3880	2420
16	4340	e2700	e2010	e1480	e1490	e2210	20400	7340	4170	21500	3850	2730
17	4340	e2750	e2010	e1480	e1490	e2260	18500	6920	4590	21400	3810	3600
18	4340	e2790	e2020	e1480	e1500	e2290	16600	6600	5300	21500	3670	4910
19	4270	e2780	e2010	e1470	e1510	e2400	14500	6390	5970	21300	3530	6780
20	4240	e2790	e1960	e1470	e1530	e2880	12800	6320	6290	20600	3400	8620
21	4170	e2660	e1930	e1470	e1540	e4200	11300	6180	6530	19500	3280	9680
22	4130	e2630	e1900	e1460	e1540	e5930	10200	6040	7310	18200	3210	9820
23	4060	e2730	e1870	e1460	e1550	e7630	9320	5900	8620	17000	3130	9680
24	3990	e2730	e1860	e1460	e1550	e9640	8720	5830	9850	15900	3150	9150
25	3920	e2630	e1840	e1470	e1570	e11400	8230	5760	10700	14800	3220	8370
26	3850	e2580	e1830	e1480	e1590	e12900	7870	5760	10900	13800	3200	7590
27	3810	e2540	e1810	e1480	e1600	e14100	7630	5690	10600	13200	3140	6890
28	3740	e2460	e1800	e1480	e1600	e15000	7450	5610	9680	12700	3060	6320
29	3670	e2430	e1780	e1480	---	e15600	7310	5510	8550	12200	2970	5900
30	3600	e2410	e1770	e1480	---	e16100	7310	5400	7520	11500	2880	5540
31	3530	---	e1760	e1480	---	e16800	---	5260	---	10800	2810	---
TOTAL	131150	83590	63480	46330	42090	167880	527240	234020	182970	412940	136910	143160
MEAN	4231	2786	2048	1495	1503	5415	17570	7549	6099	13320	4416	4772
MAX	5370	3480	2440	1630	1600	16800	26900	10200	10900	21500	9820	9820
MIN	3530	2330	1760	1450	1450	1600	7310	5260	3990	5970	2810	2340
AC-FT	260100	165800	125900	91900	83490	333000	1046000	464200	362900	819100	271600	284000

e Estimated.

RED RIVER OF THE NORTH BASIN

05102500 RED RIVER OF THE NORTH AT EMERSON, MANITOBA--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1912 - 1994, BY WATER YEAR (WY)

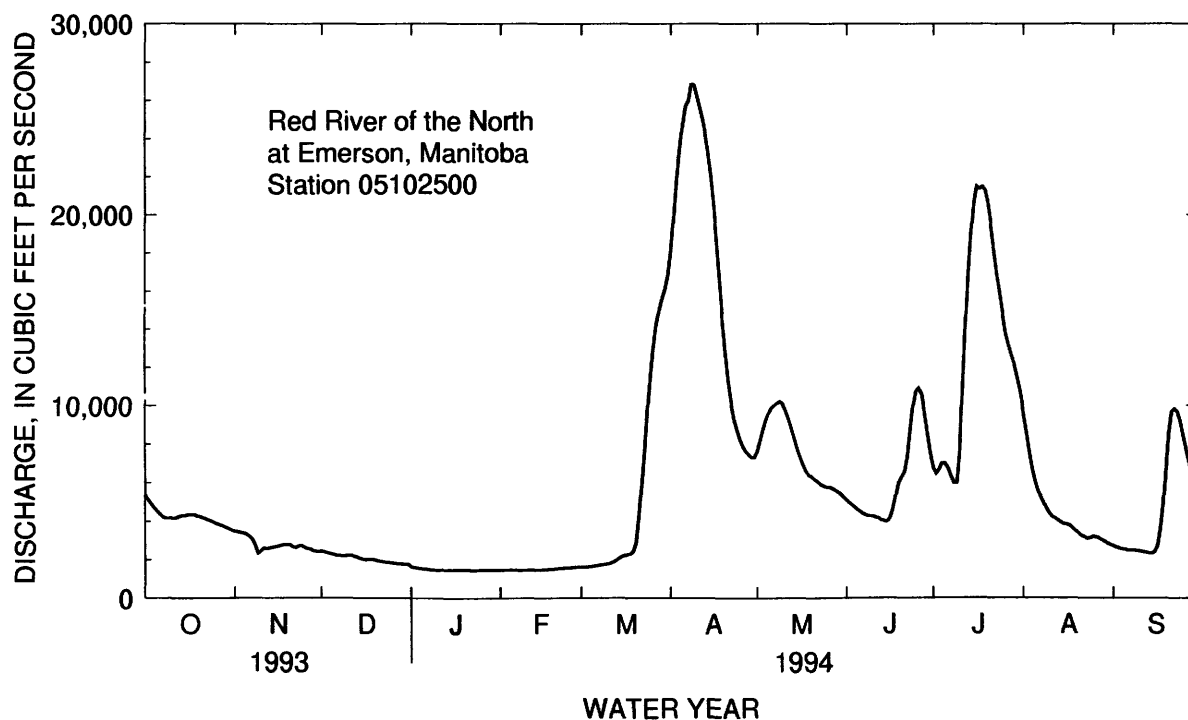
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	1458	1287	949	786	750	2055	12550	8297	4905	3922	2039	1611
MAX	4533	5163	2760	2053	1914	9361	45820	72820	25430	28020	27000	10010
(WY)	1986	1972	1966	1951	1952	1983	1966	1950	1962	1975	1993	1993
MIN	28.6	23.7	33.3	7.05	1.21	2.25	1282	663	196	121	46.6	23.6
(WY)	1937	1937	1937	1937	1937	1937	1938	1934	1934	1936	1934	1934

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1912 - 1994

ANNUAL TOTAL	2554678		2171760		3393	
ANNUAL MEAN	6999		5950			
HIGHEST ANNUAL MEAN					12100	1950
LOWEST ANNUAL MEAN					333	1934
HIGHEST DAILY MEAN	31900	Aug 17	26900	Apr 8	94400	May 13 1950
LOWEST DAILY MEAN	830	Jan 15	1450	Jan 10	.90	Feb 6 1937
ANNUAL SEVEN-DAY MINIMUM	833	Jan 13	1460	Feb 4	.97	Feb 4 1937
INSTANTANEOUS PEAK FLOW			26900	Apr 9	95500	May 13 1950
INSTANTANEOUS PEAK STAGE			777.10	Apr 6	791.19	May 1 1979
INSTANTANEOUS LOW FLOW			1450	Jan 10	.90	Feb 6 1937
ANNUAL RUNOFF (AC-FT)	5067000		4308000		2458000	
10 PERCENT EXCEEDS	22500		14300		7550	
50 PERCENT EXCEEDS	4130		3990		1390	
90 PERCENT EXCEEDS	979		1480		258	



RED RIVER OF THE NORTH BASIN

05102500 RED RIVER OF THE NORTH AT EMERSON, MANITOBA--Continued
(National stream-quality accounting network station)

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water year 1978 to current year.

PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: October 1977 to current year.

WATER TEMPERATURE: October 1977 to current year.

REMARKS.--Records of daily mean values of water temperature and specific conductance are furnished by Water Survey of Canada.

EXTREMES FOR PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: Maximum daily mean, 2,180 microsiemens, Dec. 8, 1989; minimum daily mean, 259 microsiemens, Apr. 14, 1989.

WATER TEMPERATURES: Maximum daily mean, 26.7 C, Aug. 16, 1988; minimum daily mean, 0.0 C, on many days during winter months.

EXTREMES FOR CURRENT YEAR.--

SPECIFIC CONDUCTANCE: Maximum daily mean, 980 microsiemens, May 24; minimum daily mean, 361 microsiemens, July 15.

WATER TEMPERATURES: Maximum daily mean, 24.1 C, July 16, 17, and 21; minimum daily mean, 0.0 C, on many days during the winter months.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

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)	BARO- METRIC PRES- SURE (MM OF HG) (00025)	TEMPER- ATURE AIR (DEG C) (00020)	TEMPER- ATURE WATER (DEG C) (00010)	TUR- BID- ITY (NTU) (00076)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)
OCT											
18...	1130	--	4340	767	8.4	743	5.0	7.0	18	11.4	97
NOV											
19...	0830	--	2780	727	8.3	737	0.0	0.5	5.1	9.8	70
JAN											
05...	1000	--	1530	715	7.9	743	-22.0	0.0	--	12.0	84
FEB											
10...	1220	1450	--	664	7.8	748	-7.0	0.0	2.8	13.6	95
APR											
07...	1010	25500	--	646	7.9	743	1.5	1.0	--	11.6	84
14...	1010	--	23200	690	8.0	727	8.0	4.5	--	11.2	91
MAY											
03...	0940	--	8720	76	8.1	737	19.0	9.0	65	11.0	99
11...	1025	--	9780	860	8.4	739	16.0	12.0	--	10.3	99
a11...	1440	--	--	--	--	--	--	--	--	--	--
JUN											
a06...	0905	--	--	--	--	--	--	--	--	--	--
JUL											
a05...	0900	--	--	--	--	--	--	--	--	--	--
a19...	0855	--	--	--	--	--	--	--	--	--	--
27...	0840	--	13200	696	7.7	745	18.5	22.0	54	5.9	69
AUG											
a11...	0920	--	--	--	--	--	--	--	--	--	--
SEP											
a06...	0905	--	--	--	--	--	--	--	--	--	--
a26...	0835	--	--	--	--	--	--	--	--	--	--

a Due to bridge construction at this location, water-quality samples were collected upstream on the Red River of the North at Pembina, ND (05102490).

RED RIVER OF THE NORTH BASIN

05102500 RED RIVER OF THE NORTH AT EMERSON, MANITOBA--Continued

DATE	HARD- NESS TOTAL (MG/L AS CACO3) (00900)	ALKA- LITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)	COLI- FORM, FECAL, 0.7 UM-MF (COLS/ 100 ML) (31625)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	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 PERCENT (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)
OCT 18...	330	228	K3	K11	71	36	36	19	0.9	5.2
NOV 19...	320	245	--	--	70	35	34	18	0.8	6.6
JAN 05...	290	252	--	--	64	32	26	16	0.7	5.7
FEB 10...	280	240	K5	K3	61	31	29	18	0.8	5.5
APR 07...	280	139	--	--	66	28	32	19	0.8	9.0
14...	270	153	--	--	62	27	28	18	0.7	9.4
MAY 03...	310	213	K12	K27	68	34	34	19	0.8	7.7
11...	390	214	--	--	85	43	38	17	0.8	7.7
JUL 27...	280	181	K18	240	63	29	28	17	0.7	9.1
DATE	BICAR- BONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	CAR- BONATE WATER DIS IT FIELD MG/L AS CO3 (00452)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)
OCT 18...	278	0	140	31	0.20	13	470	494	0.67	5790
NOV 19...	286	6	100	29	0.20	12	434	465	0.63	3490
JAN 05...	307	0	70	18	0.20	15	383	427	0.58	1760
FEB 10...	293	0	63	24	0.20	17	377	418	0.57	1640
APR 07...	169	0	140	19	0.20	17	421	421	0.57	29000
14...	186	0	140	26	0.20	16	415	453	0.62	28400
MAY 03...	260	0	160	27	0.20	6.0	467	503	0.68	11800
11...	233	13	200	29	0.20	7.3	540	584	0.79	15400
JUL 27...	221	0	120	25	0.20	18	404	436	0.59	15500

a Due to bridge construction at this location, water-quality samples were collected upstream on the Red River of the North at Pembina, ND (05102490). See previous station in this report.

RED RIVER OF THE NORTH BASIN

05102500 RED RIVER OF THE NORTH AT EMERSON, MANITOBA--Continued

DATE	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NITRATE DIS- SOLVED (MG/L AS N) (00618)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITRO- GEN, ORGANIC DIS- SOLVED (MG/L AS N) (00607)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO- GEN,AM- MONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITRO- GEN, TOTAL (MG/L AS N) (00600)
OCT 18...	<0.010	--	0.120	0.120	0.030	0.97	--	1.0	--	1.1
NOV 19...	<0.010	--	--	<0.050	0.020	0.58	--	0.60	--	0.60
JAN 05...	<0.010	--	0.280	0.280	0.130	0.77	0.57	0.90	0.70	1.2
FEB 10...	<0.010	--	0.360	0.360	0.140	0.66	--	0.80	--	1.2
APR 07...	0.240	5.56	5.80	5.80	0.370	1.2	1.1	1.6	1.5	7.4
14...	0.130	2.97	3.10	3.10	0.160	0.84	0.84	1.0	1.0	4.1
MAY 03...	0.010	0.380	0.390	0.390	0.030	0.87	--	0.90	--	1.3
11...	<0.010	--	0.330	0.330	0.030	1.2	0.87	1.2	0.90	1.5
JUL 27...	<0.010	--	0.370	0.370	0.030	1.2	--	1.2	--	1.6
DATE	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)	ALUM- INUM, DIS- SOLVED (UG/L AS AL) (01106)	BARIUM, DIS- SOLVED (UG/L AS BA) (01005)	COBALT, DIS- SOLVED (UG/L AS CO) (01035)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	LITHIUM DIS- SOLVED (UG/L AS LI) (01130)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)
OCT 18...	0.180	0.080	0.070	10	55	<3	8	38	4	<10
NOV 19...	0.060	0.040	0.040	--	--	--	--	--	--	--
JAN 05...	0.060	0.060	0.050	--	--	--	11	--	31	--
FEB 10...	0.070	0.060	0.050	10	61	<3	7	25	31	<10
APR 07...	0.490	0.240	0.220	--	--	--	18	--	3	--
14...	0.210	0.190	0.170	--	--	--	30	--	25	--
MAY 03...	0.150	0.050	0.040	20	50	<3	31	39	5	10
11...	0.200	0.040	0.040	--	--	--	<3	--	<1	--
JUL 27...	0.310	0.180	0.190	<10	57	<3	18	26	3	<10

RED RIVER OF THE NORTH BASIN

05102500 RED RIVER OF THE NORTH AT EMERSON, MANITOBA--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DATE	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, DIS- SOLVED (UG/L AS AG) (01075)	TRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)	VANA- DIUM, DIS- SOLVED (UG/L AS V) (01085)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS- PENDED TOTAL (MG/L AS C) (00689)	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 18...	3	<1	<1.0	280	<6	13	1.2	74	867	100
NOV 19...	--	--	--	--	--	11	1.1	25	188	100
JAN 05...	--	--	--	--	--	--	--	10	41	100
FEB 10...	2	<1	<1.0	220	<6	--	0.4	7	27	98
APR 07...	--	--	--	--	--	11	1.7	268	18500	99
APR 14...	--	--	--	--	--	11	2.0	220	13800	100
MAY 03...	3	<1	<1.0	270	<6	--	--	318	7490	100
MAY 11...	--	--	--	--	--	12	2.3	175	4620	99
JUL 27...	5	<1	<1.0	230	<6	--	--	167	5950	100

RED RIVER OF THE NORTH BASIN

05102500 RED RIVER OF THE NORTH AT EMERSON, MANITOBA--Continued

SPECIFIC CONDUCTANCE, US/CM @ 25 DEGREES CENTIGRADE, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	723	765	709	654	678	621	595	787	914	718	622	680
2	723	761	698	650	673	635	595	780	913	718	632	682
3	743	722	683	650	677	621	600	770	917	715	640	675
4	737	707	650	651	678	641	604	765	909	686	656	673
5	742	704	651	664	635	654	629	804	884	641	672	657
6	683	713	698	667	638	657	634	817	803	645	675	657
7	663	735	673	659	664	679	641	827	822	670	695	660
8	717	710	645	631	665	679	647	860	814	684	693	660
9	752	722	647	636	667	686	649	877	804	660	692	639
10	755	808	633	655	662	702	662	868	792	653	695	625
11	764	739	592	644	664	707	671	883	803	623	683	625
12	744	719	577	632	662	709	677	897	792	495	696	626
13	716	700	585	631	660	717	680	892	798	419	696	619
14	614	706	614	667	660	710	697	887	800	368	691	611
15	661	707	598	669	656	690	715	891	807	361	691	616
16	684	715	588	673	658	666	731	887	797	376	707	663
17	652	720	561	665	660	656	754	904	791	439	693	650
18	625	724	576	674	666	652	768	912	749	460	653	607
19	662	734	591	673	671	756	794	916	735	519	665	590
20	646	734	599	663	672	759	825	922	706	562	690	600
21	637	715	601	667	650	736	818	925	626	554	690	505
22	571	711	602	682	650	876	813	929	692	661	693	437
23	678	687	603	676	660	760	814	967	655	670	727	445
24	699	688	600	671	625	651	801	980	558	679	723	501
25	673	683	589	668	618	678	808	973	486	642	709	528
26	659	689	601	670	627	659	818	970	490	643	700	594
27	672	712	599	668	630	637	814	968	536	662	700	623
28	649	765	596	672	624	624	808	958	575	667	690	625
29	655	761	652	658	---	625	814	965	657	666	695	618
30	615	744	642	657	---	606	804	929	695	644	700	632
31	696	---	643	659	---	599	---	921	---	623	682	---
MEAN	684	723	622	660	655	679	723	891	744	598	685	611

RED RIVER OF THE NORTH BASIN

05102500 RED RIVER OF THE NORTH AT EMERSON, MANITOBA--Continued

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.9	1.3	.0	.0	.0	.0	.0	11.8	22.5	20.0	21.6	19.5
2	9.3	1.5	.0	.0	.0	.1	.0	12.4	22.3	19.8	21.9	19.5
3	9.3	1.6	.0	.0	.0	.1	.3	12.8	22.6	19.6	22.4	19.3
4	8.5	1.5	.0	.0	.0	.2	.4	12.4	23.1	19.6	22.0	18.9
5	8.1	.7	.0	.0	.0	.4	.7	12.2	23.5	19.5	21.7	19.0
6	7.5	.1	.0	.0	.0	.4	1.4	12.4	22.9	20.3	21.6	19.1
7	6.1	.0	.0	.0	.0	.4	2.2	12.8	21.9	20.9	20.4	19.3
8	5.3	.0	.0	.0	.0	.4	3.3	13.5	21.7	20.5	20.2	19.9
9	4.8	.0	.0	.0	.0	.4	3.8	13.8	21.2	20.3	20.1	20.6
10	4.6	.0	.0	.0	.0	.3	5.1	13.7	20.9	20.6	19.9	21.2
11	4.5	.0	.0	.0	.0	.5	5.7	13.8	20.5	21.2	19.9	20.9
12	5.2	.0	.0	.0	.0	.6	6.8	14.3	21.1	21.7	19.6	19.8
13	3.5	.0	.0	.0	.0	.2	7.5	15.2	21.4	21.6	19.6	19.6
14	2.9	.0	.0	.0	.0	.2	8.2	15.8	20.8	23.8	19.3	19.9
15	1.9	.0	.0	.0	.0	.2	8.9	16.0	19.9	24.0	19.4	20.3
16	3.6	.0	.0	.0	.0	.2	9.2	16.2	19.3	24.1	19.8	19.0
17	3.1	.0	.0	.0	.0	.2	9.9	16.5	20.6	24.1	19.8	19.4
18	2.4	.0	.0	.0	.0	.2	10.7	17.6	19.2	23.8	20.1	19.9
19	2.3	.0	.0	.0	.0	.2	11.1	18.7	20.0	23.9	20.1	20.3
20	2.5	.0	.0	.0	.0	.2	11.4	19.0	20.7	23.9	19.9	20.6
21	2.8	.0	.0	.0	.0	.1	11.9	19.8	20.4	24.1	20.0	19.0
22	2.9	.0	.0	.0	.0	.1	12.3	20.3	20.6	24.0	20.3	18.6
23	3.0	.0	.0	.0	.0	.1	12.3	20.8	21.1	23.3	20.5	16.7
24	2.5	.0	.0	.0	.0	.0	13.9	21.6	21.3	22.2	22.0	15.6
25	1.2	.0	.0	.0	.0	.0	13.5	21.5	21.3	21.5	23.0	15.5
26	.9	.0	.0	.0	.0	.0	12.6	21.4	22.0	21.0	22.6	15.2
27	1.0	.0	.0	.0	.0	.0	11.3	21.8	21.8	21.0	21.8	14.6
28	1.2	.0	.0	.0	.0	.0	10.7	21.8	21.4	21.3	20.5	13.8
29	1.4	.0	.0	.0	---	.0	11.0	22.3	20.6	21.8	19.9	13.3
30	1.5	.0	.0	.0	---	.0	11.3	22.5	20.3	21.9	19.7	13.2
31	1.7	---	.0	.0	---	.0	---	22.4	---	21.7	19.8	---
MEAN	4.0	.2	.0	.0	.0	.2	7.6	17.0	21.2	21.8	20.6	18.4

RED RIVER OF THE NORTH BASIN

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.--573 mi².

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

REVISED RECORDS.--WSP 2113:1948, 1950, 1951, 1956(M), 1957(M), 1962(M).

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 ft³/s. These records include any flow in the overflow channel.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	56	58	25	e15	7.8	6.0	e110	146	68	73	87	90
2	61	55	25	e15	e7.8	6.4	e115	149	62	79	79	82
3	57	53	25	e15	e7.8	6.6	e120	145	54	86	75	77
4	53	53	25	e14	7.8	7.1	e115	140	49	96	70	75
5	50	50	25	e14	7.5	7.6	e110	140	44	98	67	77
6	48	e44	24	e14	7.5	8.4	e110	150	40	94	66	78
7	48	e43	24	e13	e7.4	8.4	e102	152	36	88	68	78
8	43	e42	24	e13	e7.3	e8.6	e102	145	35	90	70	78
9	40	e41	24	e13	e7.2	e9.5	e102	134	34	218	71	78
10	41	40	24	e13	e7.2	e11	e108	122	32	420	68	81
11	41	39	23	e12	e7.2	e12	e135	112	31	525	63	100
12	40	37	23	e12	e7.2	e13	173	108	32	569	62	113
13	41	37	23	e12	e7.2	e15	214	101	34	607	59	112
14	41	36	23	e12	7.2	e18	230	106	35	627	55	339
15	41	34	23	e11	7.2	e22	232	128	34	596	50	1580
16	41	34	e23	e11	7.4	e27	230	145	37	555	46	2540
17	38	34	e22	e11	7.4	e33	216	148	38	512	43	1980
18	39	34	e22	e11	7.7	e43	196	140	42	484	42	1330
19	44	33	e22	e10	e7.8	e53	181	130	43	475	263	1020
20	48	31	e21	e10	e7.8	e66	164	126	45	449	454	817
21	54	31	e20	e10	7.8	e90	150	116	48	432	276	623
22	50	28	e19	e9.8	7.8	e120	163	103	50	e390	219	499
23	50	27	e19	e9.6	7.5	e115	151	97	51	e350	197	379
24	46	26	e18	e9.4	7.2	e100	131	97	49	e290	184	293
25	45	25	e18	e9.2	7.0	e94	122	99	44	e240	166	239
26	46	25	e17	e9.0	6.7	e85	116	101	43	e210	158	203
27	41	25	e17	e8.8	6.3	e78	112	103	43	e180	149	186
28	47	25	e17	e8.6	6.0	e70	114	95	47	161	130	171
29	49	25	e16	e8.5	---	e66	120	90	54	143	117	156
30	50	24	e16	e8.2	---	e60	135	82	66	118	109	143
31	53	---	e16	e8.0	---	e76	---	73	---	94	99	---
TOTAL	1442	1089	663	350.1	205.7	1335.6	4379	3723	1320	9349	3662	13617
MEAN	46.5	36.3	21.4	11.3	7.35	43.1	146	120	44.0	302	118	454
MAX	61	58	25	15	7.8	120	232	152	68	627	454	2540
MIN	38	24	16	8.0	6.0	6.0	102	73	31	73	42	75
AC-FT	2860	2160	1320	694	408	2650	8690	7380	2620	18540	7260	27010
CFSM	.08	.06	.04	.02	.01	.08	.25	.21	.08	.53	.21	.79
IN.	.09	.07	.04	.02	.01	.09	.28	.24	.09	.61	.24	.88

e Estimated.

RED RIVER OF THE NORTH BASIN

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

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1947 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	67.2	44.1	14.5	7.11	5.29	55.8	583	297	221	156	63.8	85.5
MAX	351	229	51.1	21.0	14.4	345	2035	1589	1140	1152	585	710
(WY)	1983	1957	1978	1966	1986	1986	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 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

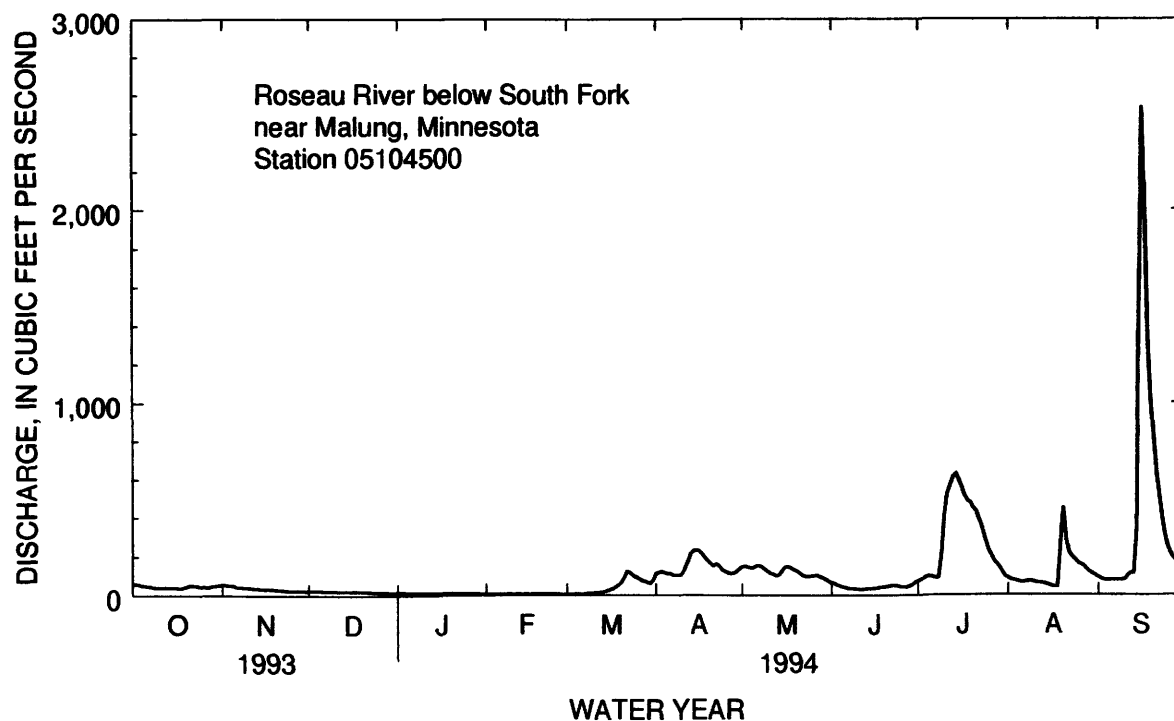
WATER YEARS 1947 - 1994

ANNUAL TOTAL	57654.6	41135.4	
ANNUAL MEAN	158	113	133 ^a
HIGHEST ANNUAL MEAN			304
LOWEST ANNUAL MEAN			7.28
HIGHEST DAILY MEAN	2100	Sep 1	5670
LOWEST DAILY MEAN	2.8	Feb 27	.00 ^b
ANNUAL SEVEN-DAY MINIMUM	3.0	Feb 22	.00
INSTANTANEOUS PEAK FLOW		2630	Sep 16
INSTANTANEOUS PEAK STAGE		15.81	Sep 16
INSTANTANEOUS LOW FLOW		5.8	Feb 28, Mar 1, 2
ANNUAL RUNOFF (AC-FT)	114400	81590	96500
ANNUAL RUNOFF (CFSM)	.28	.20	.23
ANNUAL RUNOFF (INCHES)	3.74	2.67	3.16
10 PERCENT EXCEEDS	354	217	307
50 PERCENT EXCEEDS	56	50	17
90 PERCENT EXCEEDS	6.9	8.4	1.4

a Median of annual mean discharges is 113 ft³/s.

b Many days, several years.

c Backwater from ice.



RED RIVER OF THE NORTH BASIN

05112000 ROSEAU RIVER BELOW STATE DITCH 51, NEAR CARIBOU, MN
(International gaging station)

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.--1.570 mi², approximately.

WATER-DISCHARGE RECORDS

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 poor. Satellite telemeter at station. Occasionally, at high stages, there is some natural diversion of flow above station to headwaters of Two Rivers.

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

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 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	341	358	e91	e44	e28	e18	e860	271	174	146	237	208
2	290	360	e88	e43	e28	e18	e950	275	153	182	186	188
3	270	405	e84	e42	e28	e18	e1050	281	133	182	157	167
4	301	439	e80	e41	e27	e19	1000	290	120	188	146	230
5	259	428	e77	e40	e26	e20	884	297	108	188	167	318
6	224	483	e74	e39	e24	e22	770	301	94	192	191	351
7	201	594	e71	e39	e22	e24	659	316	87	196	197	373
8	178	650	e69	e38	e20	e26	572	333	82	208	194	397
9	163	655	e67	e38	e19	e27	529	319	80	212	222	427
10	151	666	e66	e37	e18	e29	527	308	80	246	241	396
11	151	479	e65	e36	e18	e33	543	292	82	358	242	357
12	142	280	e64	e36	e17	e40	583	273	84	472	240	352
13	136	278	e64	e35	e17	e48	626	260	83	554	251	369
14	132	232	e63	e35	e17	e60	666	250	92	608	242	417
15	126	186	e62	e34	e17	e75	686	248	103	636	224	547
16	124	204	e61	e34	e17	e90	715	258	109	672	192	793
17	124	216	e60	e33	e17	e100	722	273	113	679	164	1030
18	126	197	e59	e33	e17	e120	701	281	108	672	132	1140
19	140	119	e58	e32	e17	e150	681	286	101	665	113	1170
20	143	183	e57	e32	e17	e180	657	287	99	657	102	1200
21	152	228	e56	e32	e17	e210	616	275	93	656	188	1240
22	163	145	e55	e31	e18	e270	549	269	94	649	374	1260
23	172	e140	e54	e31	e18	e350	472	263	90	642	399	1270
24	170	e130	e52	e31	e18	e390	443	251	86	649	362	1290
25	163	e122	e51	e30	e18	e420	397	246	84	636	331	1290
26	153	e115	e50	e30	e18	e440	350	249	84	607	315	1300
27	154	e110	e49	e30	e18	e480	315	249	79	554	299	1300
28	164	e105	e48	e29	e18	e520	297	244	80	479	279	1290
29	177	e100	e47	e29	---	e600	282	232	96	399	266	1290
30	293	e95	e46	e29	---	e680	271	217	120	330	249	1270
31	388	---	e45	e28	---	e760	---	190	---	280	229	---
TOTAL	5871	8702	1933	1071	554	6237	18373	8384	2991	13794	7131	23230
MEAN	189	290	62.4	34.5	19.8	201	612	270	99.7	445	230	774
MAX	388	666	91	44	28	760	1050	333	174	679	399	1300
MIN	124	95	45	28	17	18	271	190	79	146	102	167
AC-FT	11650	17260	3830	2120	1100	12370	36440	16630	5930	27360	14140	46080
CFSM	.12	.18	.04	.02	.01	.13	.39	.17	.06	.28	.15	.49
IN.	.14	.21	.05	.03	.01	.15	.44	.20	.07	.33	.17	.55

RED RIVER OF THE NORTH BASIN

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

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1917 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	163	113	45.0	24.2	19.2	103	798	906	563	391	160	183
MAX	1302	382	226	134	75.1	446	2167	3029	2588	1653	1582	1451
(WY)	1942	1927	1927	1927	1927	1946	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 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

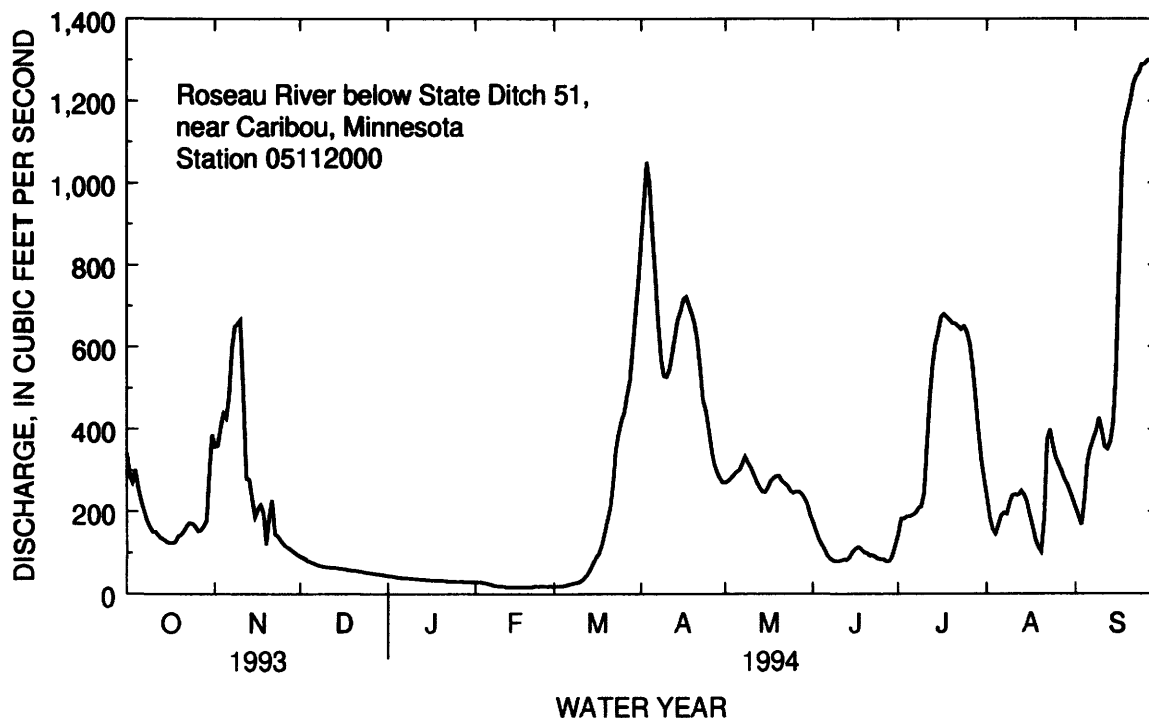
WATER YEARS 1917 - 1994

ANNUAL TOTAL	189291	98271	285	
ANNUAL MEAN	519	269	683	1927
HIGHEST ANNUAL MEAN			35.9	1977
LOWEST ANNUAL MEAN			4020	May 19 1950
HIGHEST DAILY MEAN	1710	Aug 23	1300	Sep 26,27
LOWEST DAILY MEAN	18	Mar 3	17	Feb 12-21
ANNUAL SEVEN-DAY MINIMUM	18	Mar 3	17	Feb 12
INSTANTANEOUS PEAK FLOW			1300	Sep 25-28
INSTANTANEOUS PEAK STAGE			9.03 _b	Apr 1
INSTANTANEOUS LOW FLOW				.00 _c
ANNUAL RUNOFF (AC-FT)	375500	194900	206600	
ANNUAL RUNOFF (CFSM)	.33	.17	.18	
ANNUAL RUNOFF (INCHES)	4.49	2.33	2.47	
10 PERCENT EXCEEDS	1560	657	1190	
50 PERCENT EXCEEDS	235	182	75	
90 PERCENT EXCEEDS	22	28	8.4	

a Also occurred Sep 15-17, 1990.

b Backwater from ice.

c Also occurred Sep 15-17, 1990 and parts of each day Oct 12,13, and Nov 13, 1990.



RED RIVER OF THE NORTH BASIN

05112000 ROSEAU RIVER BELOW STATE DITCH 51, NEAR CARIBOU, MN--Continued
(National Water Quality Assessment Station)

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

REMARKS.--Letter K indicates non-ideal colony count.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DATE	TIME	DIS- CHARGE, IN CUBIC FEET PER SECOND (00060)	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)	TEMPER- ATURE AIR (DEG C) (00020)	BARO- METRIC PRES- SURE (MM OF HG) (00025)
OCT 13...	1020	--	134	460	470	8.1	7.8	5.0	7.5	735
DEC 14...	0915	--	63	534	556	7.3	7.7	0.0	-5.0	740
FEB 01...	0930	--	28	699	699	7.3	7.5	0.0	-20.0	--
MAR 08...	0905	--	26	712	692	7.2	8.2	0.0	-13.5	--
30...	0830	680	--	339	344	7.3	7.2	0.0	0.0	746
APR 13...	0845	--	619	339	342	7.8	7.2	3.5	2.5	723
JUN 28...	0730	--	80	350	350	7.0	7.8	19.5	20.5	727
JUL 14...	1005	--	605	364	336	8.0	7.8	20.0	18.5	736
SEP 02...	0830	--	190	398	354	8.1	7.8	15.5	10.5	746
23...	1005	--	1270	371	365	7.6	7.7	12.5	15.5	735

DATE	CALCIUM OXYGEN, DIS- SOLVED (MG/L) (00300)	MAGNE- SIUM, DIS- SOLVED (MG/L AS CA) (00915)	SODIUM, DIS- SOLVED (MG/L AS MG) (00925)	POTAS- SIUM, DIS- SOLVED (MG/L AS NA) (00930)	ALKA- LINITY WAT DIS DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY TOT IT FIELD MG/L AS CACO3 (39086)	CAR- BONATE WATER LAB (MG/L AS CACO3) (90410)	BICAR- BONATE WATER DIS IT FIELD MG/L AS CO3 (00452)	DIS IT FIELD MG/L AS HCO3 (00453)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)
OCT 13...	11.3	59	23	6.3	2.2	215	231	0	262	22
DEC 14...	8.8	67	27	8.5	2.4	262	285	0	320	18
FEB 01...	--	85	34	11	3.2	333	368	0	406	17
MAR 08...	0.8	86	35	13	3.5	339	366	0	413	17
30...	12.2	37	14	3.5	9.8	132	134	0	161	20
APR 13...	9.8	42	16	3.9	6.2	148	152	0	181	17
JUN 28...	7.4	43	17	5.4	1.9	182	180	0	222	8.7
JUL 14...	7.8	48	16	3.6	1.4	160	171	0	196	7.7
SEP 02...	7.5	51	18	4.2	1.9	161	179	0	197	8.5
23...	5.5	49	16	3.4	4.1	160	181	0	195	12

RED RIVER OF THE NORTH BASIN

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

SOLIDS, CHLO- RIDE, DIS- SOLVED DATE AS CL) (00940)	NITRO- FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)	NITRO- SILICA, DIS- SOLVED (MG/L SIO2) (00955)	NITRO- RESIDUE AT 180 DEG. C DIS- AS (MG/L) (70300)	NITRO- GEN, NITRITE DIS- SOLVED SOLVED AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	GEN,AM- MONIA + ORGANIC DIS. (MG/L AS N) (00623)	GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	(MG/L)
OCT 13...	4.0	0.10	14	305	<0.010	<0.050	0.080	0.90	1.0
DEC 14...	3.9	0.10	17	368	0.010	0.160	0.150	1.0	1.1
FEB 01...	5.5	0.20	24	458	0.020	<0.050	0.530	1.5	1.8
MAR 08...	8.7	0.20	25	414	<0.010	<0.050	0.690	1.6	1.9
30...	8.9	0.10	9.6	217	0.070	0.510	0.430	1.6	1.7
APR 13...	5.2	0.10	8.9	219	0.020	0.110	0.050	0.80	0.90
JUN 28...	2.1	0.20	8.1	240	--	--	--	--	--
JUL 14...	1.5	0.10	13	242	<0.010	<0.050	0.020	1.0	1.2
SEP 02...	2.3	0.10	15	249	<0.010	0.081	0.030	1.0	1.2
23...	3.7	0.10	19	263	<0.010	<0.050	0.030	1.0	1.3
DATE	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)	SEDI- MENT, SUS- PENDE (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS- PENDE TOTAL (MG/L AS C) (00689)
OCT 13...	0.060	0.020	0.010	25	100	91	60	23	0.8
DEC 14...	0.040	0.040	0.030	7	91	230	200	--	--
FEB 01...	0.130	0.080	0.070	8	100	640	850	--	--
MAR 08...	0.100	0.040	0.040	53	86	510	810	21	0.9
30...	0.420	0.400	0.370	27	92	170	84	--	--
APR 13...	0.110	0.080	0.060	18	96	180	67	15	0.7
JUN 28...	--	--	--	30	100	67	32	--	--
JUL 14...	0.100	0.040	0.030	36	100	75	7	23	0.9
SEP 02...	0.070	0.050	0.040	17	98	84	13	23	0.8
23...	0.100	0.070	0.070	18	99	130	20	22	0.6

LAKE OF THE WOODS BASIN

05124480 KAWISHIWI RIVER NEAR ELY, MN

(Hydrologic bench-mark station)

LOCATION.--Lat 47°55'22", long 91°32'06", in SE 1/4 SE 1/4 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.--253 mi².

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, except for estimated periods, which are fair.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	150	92	103	96	68	51	e47	e630	635	633	206	87
2	143	92	106	93	68	50	e47	e740	617	603	197	80
3	139	91	106	91	67	50	e47	e840	598	573	193	75
4	136	91	106	93	65	49	e48	853	580	543	188	69
5	132	91	108	90	65	49	e48	869	564	515	178	70
6	130	89	112	89	64	49	e48	890	551	492	172	72
7	127	88	112	87	63	47	e49	900	535	462	173	e72
8	133	88	109	88	63	47	e49	903	511	441	173	e70
9	129	88	108	87	63	47	e50	887	492	433	163	e68
10	125	88	108	86	62	46	e56	871	471	412	156	e65
11	121	89	107	86	62	45	e64	855	458	399	151	e62
12	117	89	106	86	62	45	e74	829	460	382	145	e59
13	115	95	106	85	62	45	e84	809	440	363	137	e58
14	114	98	106	83	61	44	e96	804	435	347	129	e70
15	110	96	106	82	60	43	e110	799	485	332	124	e90
16	108	94	107	82	60	43	e130	781	524	324	120	e110
17	106	94	108	81	59	42	e145	768	786	331	118	e125
18	103	93	108	80	58	42	e170	747	921	321	114	e130
19	100	91	107	79	59	42	e180	721	999	310	111	112
20	100	91	106	78	61	42	e190	696	1010	315	106	110
21	105	91	105	77	59	44	e200	672	968	311	102	109
22	103	91	104	77	58	44	e210	669	913	300	99	114
23	101	95	102	77	57	44	e220	649	861	288	95	117
24	98	98	101	76	56	47	e235	652	813	277	93	117
25	95	99	97	74	55	47	e250	664	776	264	91	117
26	92	104	96	72	54	47	e300	676	749	258	88	111
27	90	110	95	72	53	47	e345	675	713	249	87	109
28	93	110	94	72	52	47	e400	673	690	240	86	112
29	94	106	95	72	---	e47	e460	670	688	232	84	111
30	94	104	98	71	---	e47	e560	659	662	222	85	110
31	94	---	96	69	---	e47	---	651	---	215	89	---
TOTAL	3497	2836	3228	2531	1696	1426	4912	23502	19905	11387	4053	2781
MEAN	113	94.5	104	81.6	60.6	46.0	164	758	663	367	131	92.7
MAX	150	110	112	96	68	51	560	903	1010	633	206	130
MIN	90	88	94	69	52	42	47	630	435	215	84	58
AC-FT	6940	5630	6400	5020	3360	2830	9740	46620	39480	22590	8040	5520
CFSM	.45	.37	.41	.32	.24	.18	.65	3.00	2.62	1.45	.52	.37
IN.	.51	.42	.47	.37	.25	.21	.72	3.46	2.93	1.67	.60	.41

e Estimated.

LAKE OF THE WOODS BASIN

05124480 KAWISHIWI RIVER NEAR ELY, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1966 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	158	168	134	92.0	67.6	55.9	241	668	396	205	148	148
MAX	881	684	345	163	107	85.2	785	1133	1069	467	758	698
(WY)	1978	1971	1983	1984	1971	1969	1976	1979	1970	1968	1988	1988
MIN	12.1	9.43	7.25	5.32	4.77	5.87	8.95	13.3	115	74.5	46.7	18.5
(WY)	1977	1977	1977	1977	1977	1977	1977	1977	1977	1980	1976	1976

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

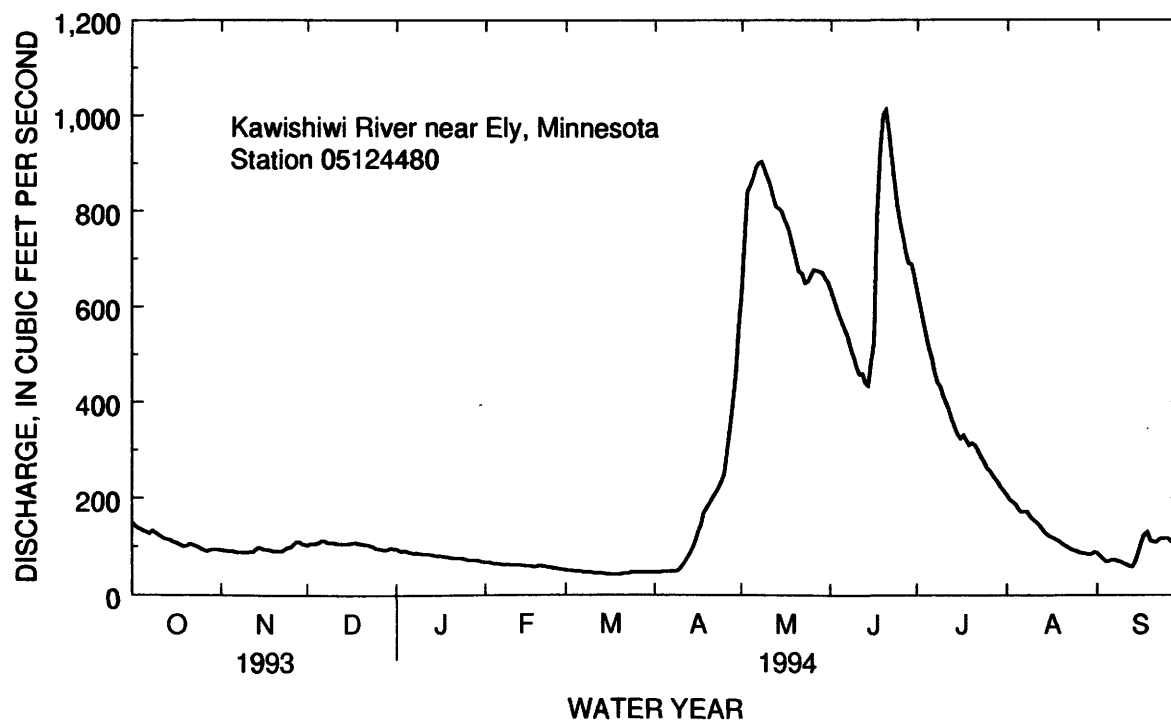
FOR 1994 WATER YEAR

WATER YEARS 1966 - 1994

ANNUAL TOTAL	65278	81754	
ANNUAL MEAN	179	224	208
HIGHEST ANNUAL MEAN			313
LOWEST ANNUAL MEAN			94.5
HIGHEST DAILY MEAN	582	May 11	1010
LOWEST DAILY MEAN	42	Mar 22	42
ANNUAL SEVEN-DAY MINIMUM	42	Mar 19	43
INSTANTANEOUS PEAK FLOW			1020
INSTANTANEOUS PEAK STAGE			5.29
INSTANTANEOUS LOW FLOW			41
ANNUAL RUNOFF (AC-FT)	129500	162200	150500
ANNUAL RUNOFF (CFSM)	.71	.89	.82
ANNUAL RUNOFF (INCHES)	9.60	12.02	11.15
10 PERCENT EXCEEDS	361	671	530
50 PERCENT EXCEEDS	108	105	107
90 PERCENT EXCEEDS	51	50	38

a Occurred Jan 31 to Feb 2, 1977.

b Occurred Jan 30 to Feb 2, 1977.



LAKE OF THE WOODS BASIN

05124480 KAWISHIWI RIVER NEAR ELY, MN--Continued
(Hydrologic bench-mark station)

WATER QUALITY RECORDS

PERIOD OF RECORD.--Water years 1966 to current year.

REMARKS.--Letter K indicates non-ideal colony count.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

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)	TUR-BID-ITY (NTU) (00076)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)
OCT 27...	1045	91	21	31	6.9	7.7	5.5	0.80	720	11.6
JAN 13...	1130	83	29	35	7.0	7.1	0.0	0.50	723	10.0
MAY 04...	1200	860	21	32	6.6	6.6	6.0	1.1	721	11.4
AUG 09...	1100	162	30	31	7.0	6.7	20.0	1.1	729	4.7
DATE	COLI-FORM, FECAL, 0.7 UM-MF (COLS/ 100 ML) (31625)	STREP-TOCOCCI, FECAL, KF AGAR (COLS. PER 100 ML) (31673)	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)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)	CAR-BONATE WATER DIS IT FIELD MG/L AS CO3 (00452)	BICAR-BONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)
OCT 27...	60	130	3.0	1.3	1.0	0.30	10	13	0	12
JAN 13...	<1	<1	3.2	1.5	1.1	0.30	11	12	0	13
MAY 04...	<1	K3	2.8	1.3	0.90	0.30	12	11	0	15
AUG 09...	K5	K1300	2.9	1.4	0.90	0.30	10	11	0	13
DATE	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)
OCT 27...	2.5	0.50	0.20	2.5	38	<0.010	<0.050	0.020	0.40	<0.010
JAN 13...	2.4	0.30	<0.10	3.1	28	0.020	0.072	0.070	0.30	0.040
MAY 04...	2.2	0.30	<0.10	3.6	31	<0.010	0.060	0.010	0.40	<0.010
AUG 09...	1.9	0.20	<0.10	3.3	41	<0.010	<0.050	0.020	0.40	0.020

LAKE OF THE WOODS BASIN

05124480 KAWISHWI RIVER NEAR ELY, MN--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DATE	PHOS- PHORUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	SEDI- MENT, SUS- PENDE (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)	ALUM- INUM, DIS- SOLVED (UG/L AS AL) (01106)	BARIUM, DIS- SOLVED (UG/L AS BA) (01005)	COBALT, DIS- SOLVED (UG/L AS CO) (01035)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	LITHIUM DIS- SOLVED (UG/L AS LI) (01130)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)
OCT 27...	<0.010	<0.010	1	100	40	4	<3	230	<4	3
JAN 13...	0.020	0.010	2	92	20	3	<3	190	<4	6
MAY 04...	<0.010	<0.010	3	83	50	4	<3	210	<4	13
AUG 09...	<0.010	<0.010	3	86	30	4	<3	190	<4	2

DATE	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, DIS- SOLVED (UG/L AS AG) (01075)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)	VANA- DIUM, DIS- SOLVED (UG/L AS V) (01085)	226, DIS- SOLVED, RADON METHOD (PCI/L) (09511)	RADIUM URANIUM RA-226 2 SIGMA WATER, DISS, (PCI/L) (76001)	URANIUM NATURAL DIS- SOLVED (UG/L AS U) (22703)	NATURAL 2 SIGMA WATER, DISS, (UG/L) (75990)
OCT 27...	<10	<1	<1	<1.0	12	<6	0.03	0.010	<0.01	<1.0
JAN 13...	<10	1	<1	<1.0	13	<6	--	--	--	--
MAY 04...	<10	<1	<1	<1.0	10	<6	0.03	0.010	<0.01	<1.0
AUG 09...	<10	<1	<1	<1.0	12	<6	--	--	--	--

LAKE OF THE WOODS BASIN

05127000 KAWISHIWI RIVER NEAR WINTON, MN

LOCATION.--Lat 47°56'05", long 91°45'50", in NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec.20, T.63 N., R.11 W., Lake County, Hydrologic Unit 09030001, Superior National Forest, at powerplant of Minnesota Power Co., just upstream from Fall Lake, and 1.8 mi east of Winton.

DRAINAGE AREA.--1,229 mi².

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 powerplant records. Flow regulated by powerplant 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 Geological Survey, in connection with a Federal Power Commission project.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	663	399	464	397	397	397	480	3620	2960	3210	1220	484
2	397	399	443	397	397	397	480	4230	2720	2650	1070	459
3	397	414	664	397	397	397	480	4130	2400	2730	959	446
4	545	422	399	398	397	397	480	4320	2100	2400	960	446
5	524	422	391	398	397	397	480	4380	2100	2320	960	446
6	532	422	684	398	397	397	479	4340	2130	2340	796	446
7	529	422	797	398	397	397	479	4300	2120	2000	795	79
8	398	422	797	398	397	397	479	4300	2090	1870	796	267
9	398	436	796	398	397	397	479	3330	2030	1880	795	295
10	398	444	778	398	397	397	479	2690	1960	1860	795	270
11	539	469	399	398	397	397	479	3020	1870	1950	795	163
12	531	482	399	398	397	397	479	2570	1880	2040	581	108
13	682	482	684	398	397	397	701	2590	1880	1310	480	324
14	531	482	798	531	397	397	792	2650	1880	959	480	647
15	532	482	798	796	397	397	900	2650	1890	957	434	831
16	397	482	797	797	397	397	954	2620	1910	1010	399	881
17	396	600	777	531	396	397	955	2570	4110	1610	399	883
18	536	797	398	796	364	397	1370	2600	4820	2200	399	883
19	531	698	398	528	.00	397	1850	2530	5220	1900	399	883
20	680	398	679	397	.00	397	2120	2550	6080	1910	399	875
21	645	398	795	397	281	397	2240	2550	5860	1910	399	822
22	398	681	794	397	397	319	2260	2550	5920	1910	399	806
23	398	796	794	397	397	411	2260	2550	5820	1900	399	627
24	398	645	530	397	397	431	2280	2480	5680	1760	399	693
25	398	398	397	398	397	441	2290	2330	5750	1690	400	710
26	398	434	397	398	397	442	2290	2350	5370	1690	400	639
27	398	481	397	398	397	442	2290	2460	4680	1590	388	704
28	398	481	679	398	397	467	2290	2630	4290	1320	116	673
29	398	481	794	397	---	340	2690	2640	3860	1220	312	876
30	398	481	794	397	---	480	3020	2610	3620	1220	484	876
31	399	---	795	397	---	480	---	2690	---	1220	484	---
TOTAL	14762	14850	19506	3918	10172.00	12590	39305	93830	105000	56536	18091	17542
MEAN	476	495	629	449	363	406	1310	3027	3500	1824	584	585
MAX	682	797	798	797	397	480	3020	4380	6080	3210	1220	883
MIN	396	398	391	397	.00	319	479	2330	1870	957	116	79
+	-17.7	39.8	-12.5	-109	-112	-179	496	82.2	-29	25	-45.8	39.8
MEAN ‡	458	535	504	340	251	227	1806	3109	3471	1849	538	625
CFSM ‡	.37	.44	.41	.28	.20	.18	1.47	2.53	2.82	1.50	.44	.51
IN. ‡	.43	.49	.47	.32	.21	.21	1.64	2.92	3.15	1.73	.51	.57
CAL YR 1993 TOTAL	365335	MEAN 1001	MAX 3430	MIN 374	MEAN ‡ 998	CFSM ‡ .81	IN. ‡ 11.03					
WTR YR 1994 TOTAL	416302	MEAN 1140	MAX 6080	MIN 0.0	MEAN ‡ 1145	CFSM ‡ .93	IN. ‡ 12.65					

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

‡ Adjusted for change in reservoir content.

LAKE OF THE WOODS BASIN

05127000 KAWISHIWI RIVER NEAR WINTON, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1905 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	892	746	587	449	344	370	1184	3120	1968	1148	696	756
MAX	4277	3572	1422	862	770	844	5020	9278	5661	2748	3775	3149
(WY)	1947	1971	1983	1978	1927	1945	1945	1950	1968	1944	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

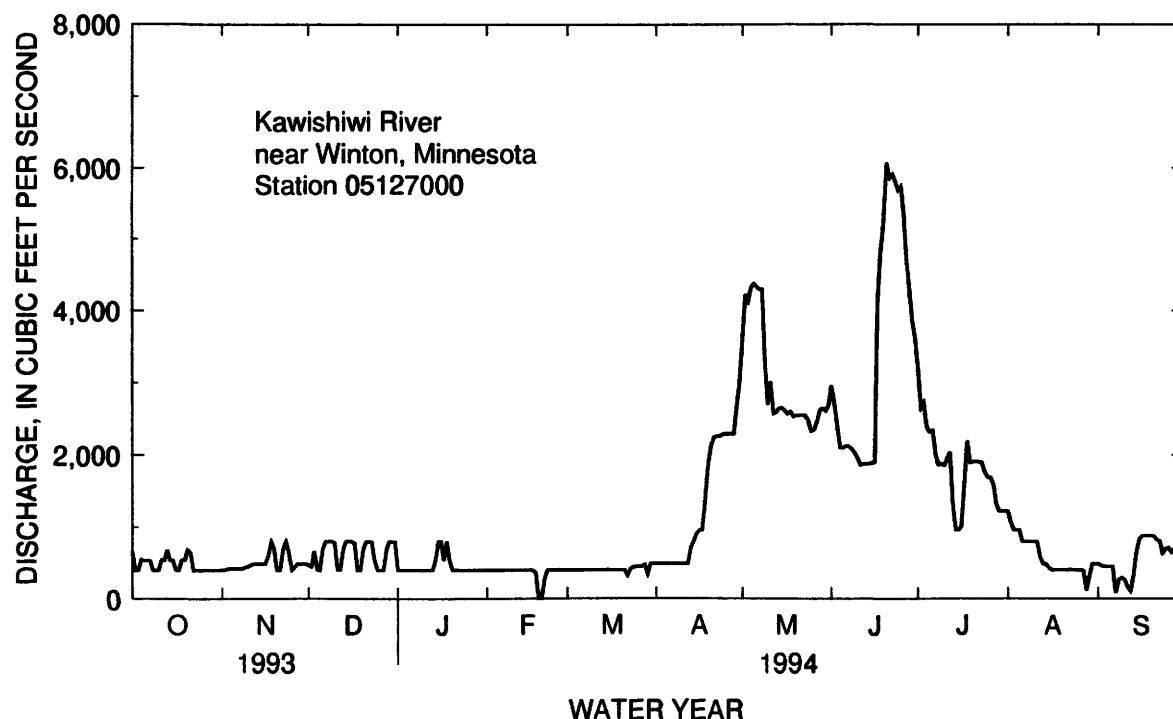
SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1905 - 1994

ANNUAL TOTAL	365335	416102.00	
ANNUAL MEAN	1001	1140	1033
HIGHEST ANNUAL MEAN			1967
LOWEST ANNUAL MEAN			240
			1950
HIGHEST DAILY MEAN	3430	May 10	6080
LOWEST DAILY MEAN	374	Mar 23	.00
ANNUAL SEVEN-DAY MINIMUM	391	Mar 22	215
			Feb 19, 20
ANNUAL RUNOFF (AC-FT)	724600		825300
ANNUAL RUNOFF (CFSM)	.81		.93
ANNUAL RUNOFF (INCHES)	11.06		12.59
10 PERCENT EXCEEDS	2080		2630
50 PERCENT EXCEEDS	791		529
90 PERCENT EXCEEDS	398		397

a Many days, several years.



LAKE OF THE WOODS BASIN

05127500 BASSWOOD RIVER NEAR WINTON, MN

(International gaging station)

LOCATION.--Lat 48°04'57", long 91°39'09", in SE 1/4 SE 1/4 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 mi², 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 except those for estimated daily discharges, which are fair. Satellite telemeter at station. Some regulation by powerplant 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 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1190	808	831	e860	691	545	604	3400	3770	5360	2190	868
2	1170	788	831	e850	681	544	618	3600	3740	5160	2120	848
3	1140	777	831	e840	676	544	627	3850	3710	4950	2090	838
4	1100	786	831	e840	674	544	622	4080	3650	4720	2030	825
5	1080	764	828	e830	668	544	625	4260	3570	4530	1940	811
6	1060	756	840	e830	657	544	625	4440	3510	4370	1860	795
7	1060	747	840	e830	651	543	625	4600	3470	4200	1880	776
8	1070	735	850	e820	646	543	633	4690	3350	4040	1870	757
9	1040	730	861	e820	642	543	645	4740	3240	3980	1800	742
10	1020	730	869	e810	642	538	659	4770	3130	3830	1750	726
11	992	732	870	e810	637	540	669	4730	3040	3730	1700	701
12	964	733	879	802	640	536	681	4680	2970	3610	1650	689
13	951	752	885	802	642	537	706	4620	2900	3500	1590	686
14	933	756	886	802	638	537	739	4590	2860	3330	1510	669
15	922	756	897	802	626	536	860	4570	2820	3170	1450	781
16	912	750	907	788	625	536	1040	4510	2840	3080	1400	851
17	902	742	912	775	617	538	1160	4440	3070	2990	1350	893
18	885	746	927	775	617	542	1260	4350	3280	2910	1290	931
19	873	736	925	775	626	543	1360	4250	3630	2900	1250	965
20	878	762	915	775	611	546	1470	4170	4040	2900	1200	1000
21	883	761	910	775	597	560	1600	4100	4420	2840	1160	1030
22	883	766	908	775	580	555	1740	4080	4790	2770	1130	1090
23	874	791	e898	772	571	558	1880	4020	5090	2740	1090	1130
24	868	795	e898	761	565	584	2010	4020	5330	2700	1050	1140
25	861	806	e888	753	557	586	2140	4070	5530	2640	1020	1160
26	837	827	e888	742	552	592	2450	4050	5720	2590	974	1140
27	838	840	e878	727	552	600	2720	3990	5760	2530	977	1130
28	839	837	e878	718	547	600	2870	3940	5760	2480	966	1130
29	831	831	e869	711	---	602	3060	3880	5690	2420	931	1130
30	830	832	e869	708	---	604	3220	3860	5580	2340	907	1140
31	815	---	e859	698	---	600	---	3770	---	2260	888	---
TOTAL	29501	23172	27158	24376	17428	17264	39918	131120	120260	105570	45013	27372
MEAN	952	772	876	786	622	557	1331	4230	4009	3405	1452	912
MAX	1190	840	927	860	691	604	3220	4770	5760	5360	2190	1160
MIN	815	730	828	698	547	536	604	3400	2820	2260	888	669
AC-FT	58520	45960	53870	48350	34570	34240	79180	260100	238500	209400	89280	54290
CFSM	.55	.44	.50	.45	.36	.32	.76	2.43	2.30	1.96	.83	.52
IN.	.63	.50	.58	.52	.37	.37	.85	2.80	2.57	2.26	.96	.59

e Estimated.

LAKE OF THE WOODS BASIN

05127500 BASSWOOD RIVER NEAR WINTON, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 1994, BY WATER YEAR (WY)

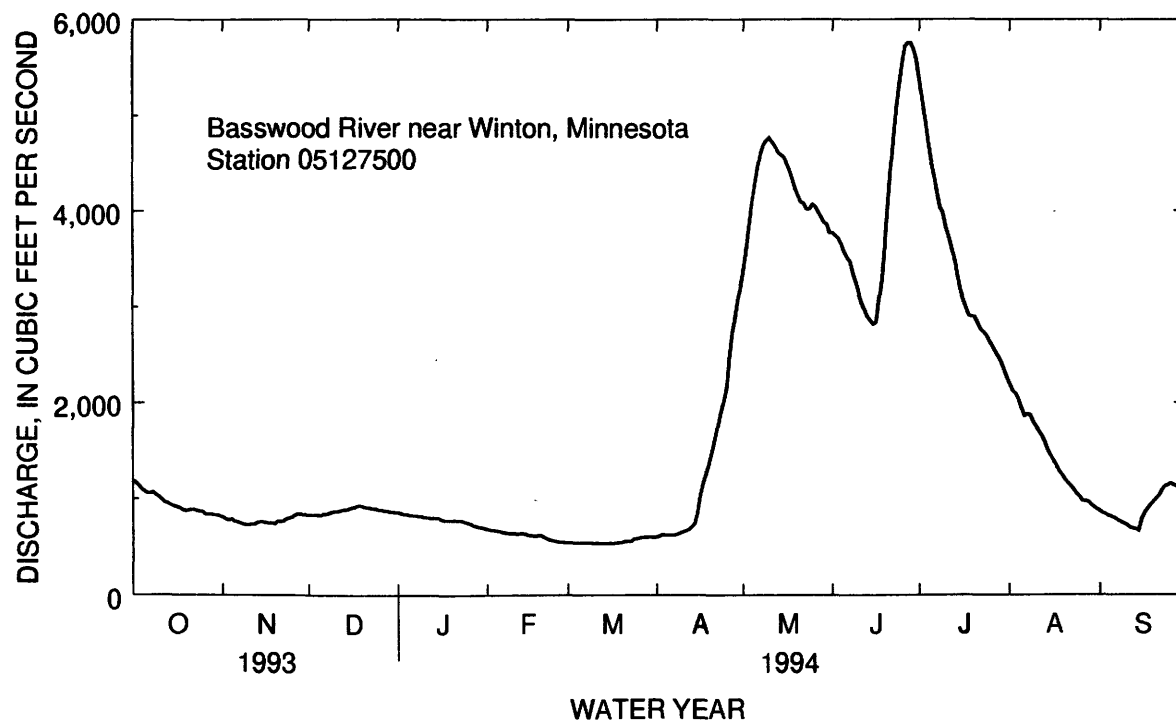
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	1091	1000	862	718	592	565	1203	3759	2914	1834	1121	1013
MAX	5320	3879	2510	1475	1229	1143	5069	9114	7332	4453	3487	5034
(WY)	1978	1971	1983	1966	1966	1966	1945	1950	1950	1944	1944	1988
MIN	65.1	60.2	76.2	86.2	95.0	135	269	225	696	512	323	120
(WY)	1977	1977	1977	1977	1977	1977	1977	1977	1980	1980	1980	1976

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1931 - 1994

ANNUAL TOTAL	508409	608152	
ANNUAL MEAN	1393	1666	1399
HIGHEST ANNUAL MEAN			2643
LOWEST ANNUAL MEAN			557
HIGHEST DAILY MEAN	3290	5760	15200
LOWEST DAILY MEAN	506	536	58
ANNUAL SEVEN-DAY MINIMUM	509	537	58
INSTANTANEOUS PEAK FLOW		5810	15600
INSTANTANEOUS PEAK STAGE		6.36	9.94 ^a
INSTANTANEOUS LOW FLOW		536	55
ANNUAL RUNOFF (AC-FT)	1008000	1206000	1014000
ANNUAL RUNOFF (CFSM)	.80	.96	.80
ANNUAL RUNOFF (INCHES)	10.87	13.00	10.92
10 PERCENT EXCEEDS	2620	4070	3270
50 PERCENT EXCEEDS	933	885	858
90 PERCENT EXCEEDS	529	600	379

^a Present datum.

LAKE OF THE WOODS BASIN

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 mi².

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 good. 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 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4520	3090	2610	2430	2100	1770	1540	5260	10400	12400	7910	3960
2	4410	3020	2590	2430	2090	1730	1560	5690	10300	12600	7730	3880
3	4380	3010	2570	2420	2080	1730	1560	6140	10100	12700	7630	3810
4	4270	3010	2560	2420	2060	1710	1550	6530	9960	12700	7450	3740
5	4270	2960	2550	2410	2050	1710	1550	6990	9850	12700	7240	3670
6	4200	2930	2580	2400	2030	1700	1550	7420	9680	12700	7060	3600
7	4130	2900	2580	2400	2020	1680	1550	7800	9610	12600	6960	3510
8	4060	2860	2570	2400	2010	1680	1550	8090	9460	12500	6850	3450
9	3990	2840	2560	2390	2000	1670	1560	8400	9290	12400	6710	3410
10	3960	2820	2560	2390	1990	1650	1570	8790	9150	12300	6530	3330
11	3880	2810	2560	2380	1970	1640	1580	9040	9010	12000	6430	3250
12	3780	2800	2550	2380	1980	1620	1600	9320	8860	11800	6250	3190
13	3740	2790	2550	2360	1970	1610	1610	9640	8790	11500	6040	3140
14	3670	2790	2550	2340	1960	1590	1640	9920	8720	11400	5900	3090
15	3640	2770	2560	2330	1940	1590	1730	10200	8550	11200	5830	3100
16	3600	2730	2540	2330	1930	1580	1910	10400	8550	11000	5720	3040
17	3520	2710	2520	2320	1910	1580	2040	10600	8760	10800	5620	3000
18	3480	2690	2520	2300	1910	1570	2190	10700	8860	10700	5440	2970
19	3430	2590	2520	2280	1900	1560	2340	10700	9040	10500	5330	2940
20	3440	2660	2520	2270	1890	1560	2520	10700	9180	10300	5230	2930
21	3370	2640	2510	2260	1880	1560	2670	10700	9360	10100	5090	2940
22	3390	2610	2510	2250	1860	1560	2820	10700	9610	9890	5010	2960
23	3350	2610	2500	2240	1840	1550	2960	10700	9820	9610	4870	2990
24	3310	2600	2490	2220	1830	1550	3100	10700	10100	9360	4730	2980
25	3290	2590	2460	2210	1820	1550	3260	10800	10300	9110	4630	2980
26	3160	2600	2460	2210	1800	1540	3570	10800	10700	8900	4520	2940
27	3170	2610	2450	2200	1790	1540	3850	10700	11000	8720	4410	2910
28	3110	2610	2430	2180	1780	1540	4130	10700	11400	8510	4270	2890
29	3110	2610	2420	2160	---	1540	4480	10600	11800	8330	4200	2880
30	3130	2610	2420	2140	---	1540	4840	10600	12200	8160	4130	2880
31	3100	---	2430	2120	---	1540	---	10400	---	8090	4030	---
TOTAL	113860	82870	78200	71570	54390	49940	70380	289730	292410	335580	179750	96360
MEAN	3673	2762	2523	2309	1942	1611	2346	9346	9747	10830	5798	3212
MAX	4520	3090	2610	2430	2100	1770	4840	10800	12200	12700	7910	3960
MIN	3100	2590	2420	2120	1780	1540	1540	5260	8550	8090	4030	2880
AC-FT	225800	164400	155100	142000	107900	99060	139600	574700	580000	665600	356500	191100
CFSM	.71	.53	.49	.45	.38	.31	.45	1.81	1.89	2.09	1.12	.62
IN.	.82	.60	.56	.51	.39	.36	.51	2.08	2.10	2.41	1.29	.69

e Estimated.

LAKE OF THE WOODS BASIN

05128000 NAMAKAN RIVER AT OUTLET OF LAC LA CROIX, ONTARIO--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1921 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	3090	2884	2564	2171	1874	1662	2541	7692	8056	6181	4064	3210
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	835	624	567	547	540	535	614	899	1475	1263	1141	1223
(WY)	1977	1977	1977	1977	1924	1924	1977	1977	1924	1924	1980	1933

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

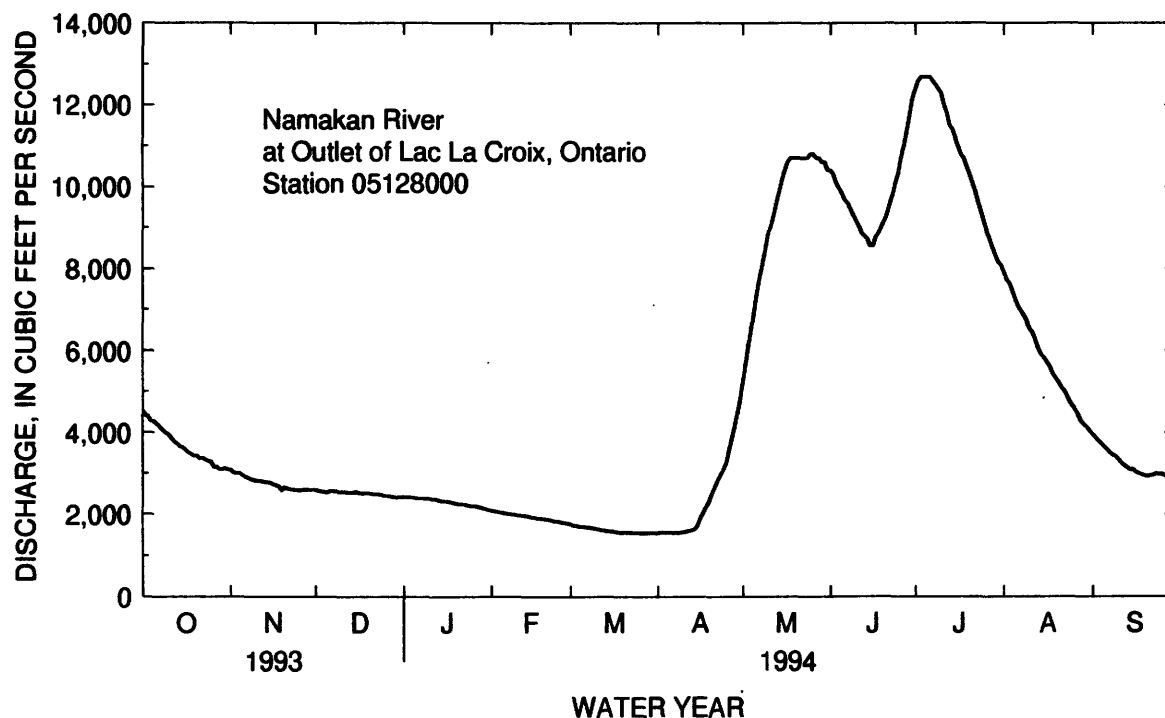
FOR 1994 WATER YEAR

WATER YEARS 1921 - 1994

ANNUAL TOTAL	1520920	1715040	
ANNUAL MEAN	4167	4699	3851
HIGHEST ANNUAL MEAN			7270 1950
LOWEST ANNUAL MEAN			964 1924
HIGHEST DAILY MEAN	8720 Aug 6	12700 Jul 3-6	28200 May 31 1950
LOWEST DAILY MEAN	1560 Mar 25	1540 Mar 26 to Apr 1	535 Feb 4 1924
ANNUAL SEVEN-DAY MINIMUM	1570 Mar 23	1540 Mar 26	535 Feb 4 1924
INSTANTANEOUS PEAK FLOW		12900 Jul 5	28200 ^a May 31 1950
INSTANTANEOUS PEAK STAGE		1188.37 Jul 5	1193.30 ^a May 31 1950
INSTANTANEOUS LOW FLOW		1530 Mar 31	535 ^b Feb 1 1924
ANNUAL RUNOFF (AC-FT)	3017000	3402000	2790000
ANNUAL RUNOFF (CFSM)	.81	.91	.74
ANNUAL RUNOFF (INCHES)	10.94	12.34	10.12
10 PERCENT EXCEEDS	7270	10600	8380
50 PERCENT EXCEEDS	3160	2990	2660
90 PERCENT EXCEEDS	1750	1660	1180

a Occurred May 31 to June 2, 1950.

b Occurred at times in Feb, Mar, and Apr, 1924.



LAKE OF THE WOODS BASIN

05129115 VERMILION RIVER NEAR CRANE LAKE, MN

LOCATION.--Lat 48°15'53", long 92°33'57", in NE $\frac{1}{4}$ NE $\frac{1}{4}$ 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.

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 ft³/s.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	829	719	500	e360	e263	e230	351	2150	1170	1820	1180	590
2	787	727	502	e360	e260	e230	400	2260	1120	1830	1160	578
3	759	711	502	e360	e258	e230	415	2310	1080	1800	1160	550
4	733	692	499	e355	e255	e235	423	2300	1030	1720	1140	537
5	714	677	495	e351	e255	e240	421	2250	985	1650	1120	559
6	707	652	499	e350	e253	e240	415	2170	953	1600	1080	558
7	685	636	493	e342	e250	e245	408	2090	915	1520	1080	538
8	701	619	493	e340	e250	e240	433	2020	880	1460	1090	511
9	721	610	495	e333	e250	e240	497	1920	845	1510	1060	493
10	721	616	494	e328	e250	e235	566	1830	820	1560	1010	476
11	713	597	481	e323	e250	e235	663	1760	791	1570	955	464
12	690	581	e477	e320	e250	e230	792	1710	773	1540	902	456
13	675	576	e470	e319	e250	e230	926	1670	738	1480	859	506
14	662	576	e462	e316	e250	e235	1070	1680	733	1450	804	550
15	647	572	e458	e311	e250	e240	1230	1710	727	1460	778	749
16	643	567	e450	e308	e250	e240	1500	1710	720	1470	748	1360
17	629	564	e445	e302	e250	e240	1730	1690	918	1530	720	1550
18	623	554	e440	e300	e245	e240	1830	1660	1320	1600	700	1560
19	615	547	e431	e298	e250	e240	1830	1610	1560	1630	688	1450
20	629	511	e428	e296	e255	e245	1740	1560	1690	1840	696	1250
21	695	541	e420	e292	e260	e250	1640	1490	1730	1940	686	1080
22	723	518	e417	e295	e255	e265	1530	1420	1700	1940	660	983
23	730	511	e409	e295	e250	e273	1460	1350	1640	1870	645	957
24	720	503	e398	e294	e240	e295	1380	1340	1580	1750	635	947
25	714	500	e390	e293	e235	310	1330	1340	1500	1610	603	910
26	695	507	e380	e290	e230	311	1390	1360	1450	1500	587	877
27	675	512	e370	e285	e230	313	1610	1380	1410	1410	578	851
28	696	507	e361	e280	e230	311	1750	1360	1540	1300	613	820
29	703	505	e359	e274	---	308	1890	1330	1680	1280	614	790
30	712	503	e357	e270	---	306	2010	1280	1770	1210	606	773
31	720	---	e359	e267	---	315	---	1240	---	1160	595	---
TOTAL	21666	17411	13734	9707	6974	7997	33630	52950	35768	49010	25752	24273
MEAN	699	580	443	313	249	258	1121	1708	1192	1581	831	809
MAX	829	727	502	360	263	315	2010	2310	1770	1940	1180	1560
MIN	615	500	357	267	230	230	351	1240	720	1160	578	456
AC-FT	42970	34530	27240	19250	13830	15860	66710	105000	70950	97210	51080	48150

e Estimated.

LAKE OF THE WOODS BASIN

05129115 VERMILION RIVER NEAR CRANE LAKE, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1979 - 1994, BY WATER YEAR (WY)

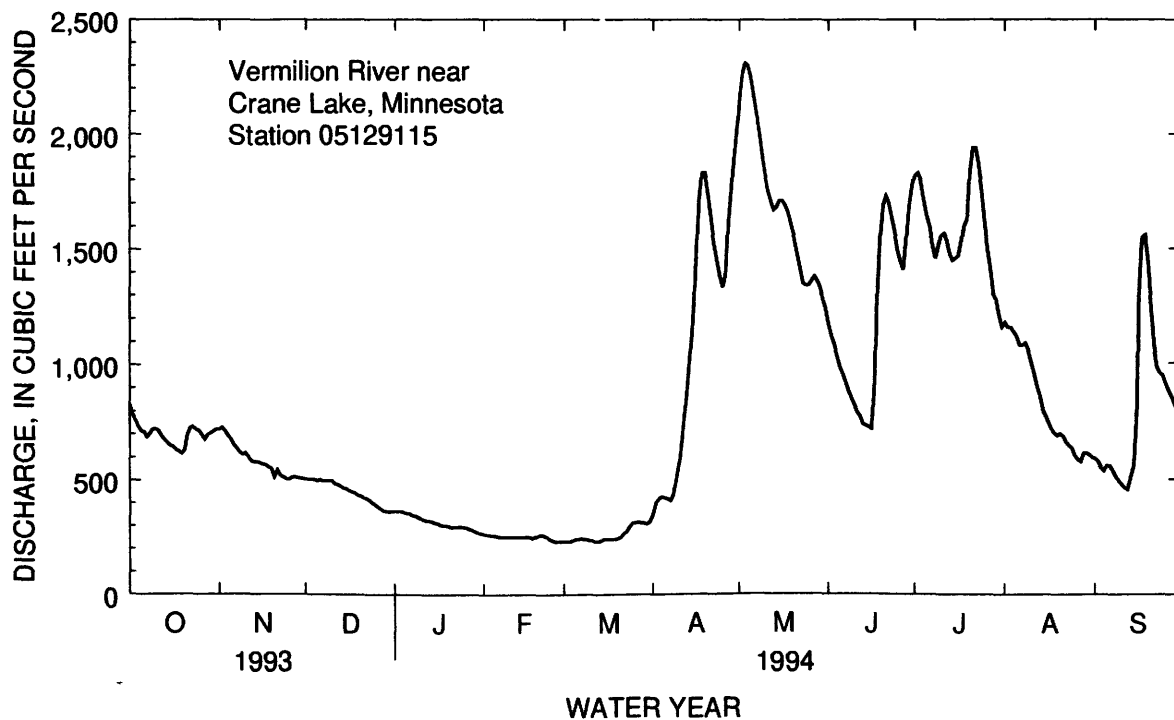
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	562	502	401	282	232	270	1118	1404	1009	847	530	541
MAX	1175	1138	872	460	368	465	1641	2249	1840	1609	1612	1880
(WY)	1986	1983	1983	1984	1984	1987	1986	1982	1985	1985	1988	1988
MIN	181	152	116	97.8	94.1	89.5	627	507	205	113	60.0	103
(WY)	1980	1988	1988	1988	1988	1988	1987	1980	1980	1980	1980	1984

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1979 - 1994

ANNUAL TOTAL	282998	298872	
ANNUAL MEAN	775	819	645
HIGHEST ANNUAL MEAN			819 1994
LOWEST ANNUAL MEAN			326 1980
HIGHEST DAILY MEAN	1940 Jul 30	2310 May 3	4300 Apr 25 1985
LOWEST DAILY MEAN	151 Mar 17	230 ^a Feb 26	38 Aug 13 1980
ANNUAL SEVEN-DAY MINIMUM	154 Mar 11	231 Feb 25	40 Aug 10 1980
INSTANTANEOUS PEAK FLOW		2320 May 3	4360 Apr 25 1985
INSTANTANEOUS PEAK STAGE		11.89 May 3	15.20 Apr 25 1985
INSTANTANEOUS LOW FLOW			38 Aug 13 1980
ANNUAL RUNOFF (AC-FT)	561300	592800	467300
10 PERCENT EXCEEDS	1490	1680	1450
50 PERCENT EXCEEDS	714	645	430
90 PERCENT EXCEEDS	187	250	164

^a Occurred Feb 26 to Mar 3, 12, 13.

LAKE OF THE WOODS BASIN

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.

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.

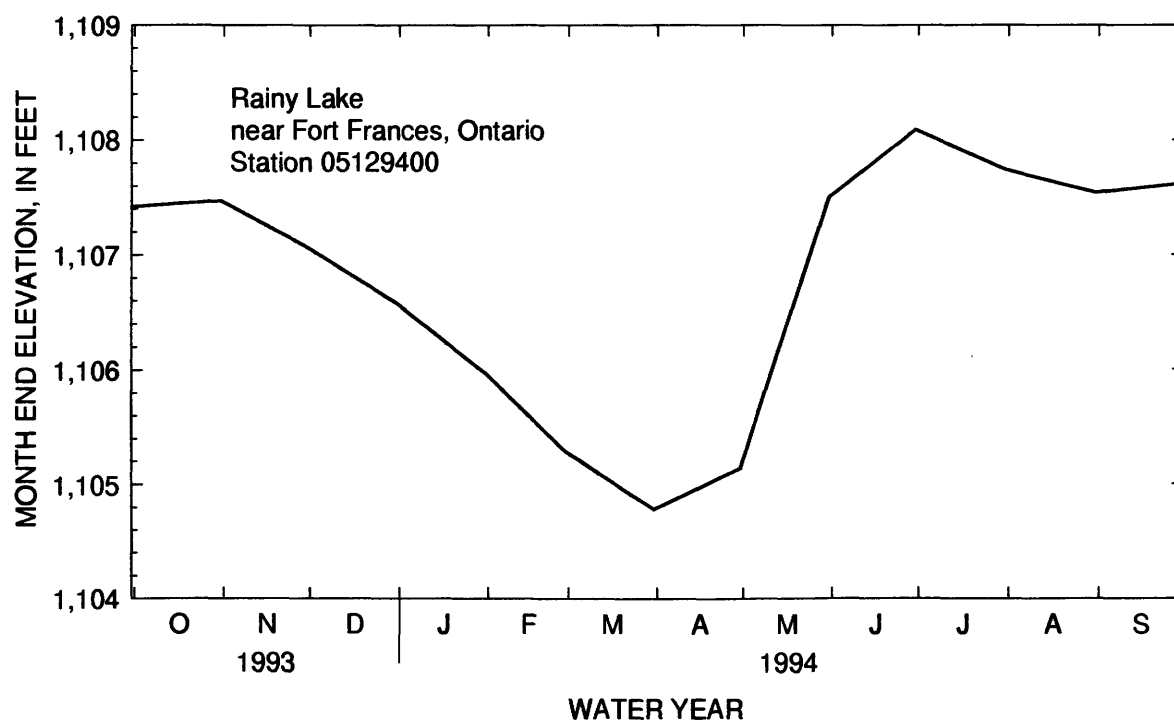
EXTREMES FOR CURRENT YEAR.--Maximum elevation, 1,108.23 ft, July 8; maximum daily elevation, 1,108.19 ft, July 8; minimum, 1,104.71 ft, Apr. 9; minimum daily, 1,104.72 ft, Apr. 9.

MONTHEND ELEVATION, IN SEA LEVEL, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

Oct. 31	1107.47	Feb. 28	1105.28	June 30	1108.09
Nov. 30	1107.07	Mar. 31	1104.78	July 31	1107.74
Dec. 31	1106.58	Apr. 30	1105.14	Aug. 31	1107.54
Jan. 31	1105.97	May 31	1107.50	Sept. 30	1107.62

NOTE.--Elevations other than those shown are available.

LAKE OF THE WOODS BASIN
05129400 RAINY LAKE NEAR FORT FRANCES, ONTARIO--Continued



LAKE OF THE WOODS BASIN

05130500 STURGEON RIVER NEAR CHISHOLM, MN

LOCATION.--Lat 47°40'25", long 92°54'00", in NE 1/4 NW 1/4 sec.20, T.60 N., R.20 W., St. Louis County, Hydrologic Unit 09030005, on left bank 1,000 ft upstream from highway bridge, 0.6 mi downstream from East Branch Sturgeon River, and 11.5 mi north of Chisholm.

DRAINAGE AREA.--187 mi².

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 discharge greater than base of 500 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Apr. 17	1500	621	4.23	June 29	1900	594	4.17
*June 19	1200	*1390	*5.47	Sep 13	2100	1020	4.94

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	98	95	e60	e45	e33	e30	e98	440	118	506	195	155
2	94	94	e59	e44	e33	e30	e110	451	104	438	189	147
3	92	91	e59	e44	e33	e31	e148	431	93	379	189	141
4	91	90	e59	e43	e32	e32	e150	393	84	331	183	136
5	89	e89	e58	e43	e32	e33	e147	353	141	299	175	136
6	85	e88	e58	e43	e32	e36	e142	317	157	278	168	129
7	82	e86	e58	e42	e31	e39	e135	288	158	251	162	126
8	85	e85	e57	e42	e31	e39	e140	265	143	273	158	118
9	85	e84	e57	e41	e31	e38	e150	241	123	283	146	109
10	87	e83	e56	e41	e30	e37	e170	226	107	271	134	102
11	83	e82	e56	e40	e30	e36	e220	213	99	259	130	102
12	80	e82	e56	e40	e29	e36	e280	203	95	237	125	163
13	79	e81	e56	e40	e29	e37	360	203	85	224	120	834
14	78	e80	e55	e39	e29	e41	390	225	106	217	114	965
15	77	e80	e55	e39	e29	e51	438	259	126	206	108	963
16	76	e79	e54	e38	e29	e56	540	277	170	211	104	800
17	78	e77	e54	e38	e29	e55	608	277	534	224	98	570
18	79	e75	e53	e38	e29	e54	584	263	928	218	96	422
19	78	e74	e52	e38	e30	e55	497	238	1360	215	95	340
20	92	e61	e52	e37	e32	e56	412	220	1180	232	94	290
21	124	e62	e51	e37	e33	e58	349	202	765	259	91	262
22	132	e63	e51	e36	e33	e65	303	187	495	280	90	247
23	133	e63	e50	e36	e32	e77	268	172	382	280	92	239
24	127	e62	e49	e36	e31	e92	244	163	316	260	92	230
25	119	e62	e49	e35	e31	e115	232	170	282	239	90	221
26	113	e61	e48	e35	e30	e110	273	183	291	223	89	210
27	109	e61	e47	e34	e30	e100	338	173	312	202	105	199
28	108	e61	e47	e34	e30	e95	374	163	421	190	127	193
29	107	e60	e46	e34	---	e90	388	154	570	190	121	187
30	102	e60	e45	e34	---	e88	409	147	566	177	139	185
31	98	---	e45	e34	---	e90	---	134	---	213	158	---
TOTAL	2960	2271	1652	1200	863	1802	8897	7631	10311	8065	3977	8921
MEAN	95.5	75.7	53.3	38.7	30.8	58.1	297	246	344	260	128	297
MAX	133	95	60	45	33	115	608	451	1360	506	195	965
MIN	76	60	45	34	29	30	98	134	84	177	89	102
AC-FT	5870	4500	3280	2380	1710	3570	17650	15140	20450	16000	7890	17690
CFSM	.51	.40	.28	.21	.16	.31	1.59	1.32	1.84	1.39	.69	1.59
IN.	.59	.45	.33	.24	.17	.36	1.77	1.52	2.05	1.60	.79	1.77

e Estimated.

LAKE OF THE WOODS BASIN

05130500 STURGEON RIVER NEAR CHISHOLM, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1942 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	111	88.6	45.9	28.1	22.6	48.6	365	304	188	117	71.9	95.3
MAX	369	264	115	66.0	47.7	337	868	1451	528	623	268	424
(WY)	1974	1978	1978	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 1993 CALENDAR YEAR

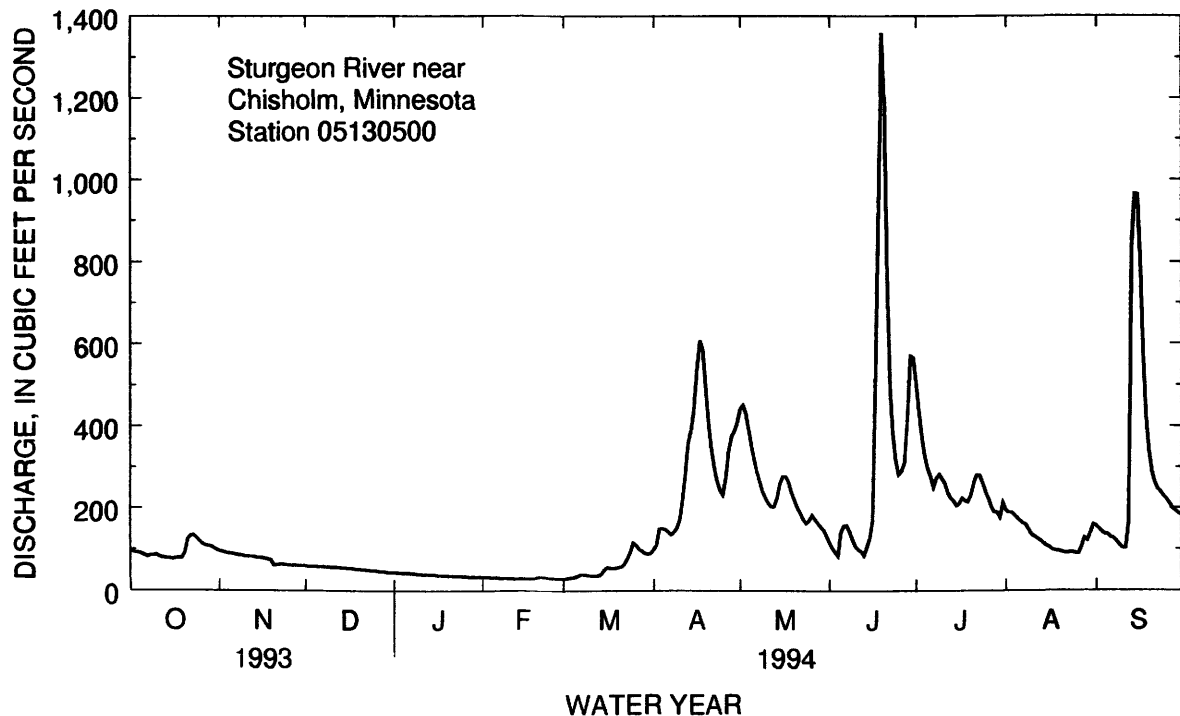
FOR 1994 WATER YEAR

WATER YEARS 1942 - 1994

ANNUAL TOTAL	57966	58550	
ANNUAL MEAN	159	160	124
HIGHEST ANNUAL MEAN			208
LOWEST ANNUAL MEAN			63.1
HIGHEST DAILY MEAN	1750	1360	3530
LOWEST DAILY MEAN	25	29	2.5
ANNUAL SEVEN-DAY MINIMUM	25	29	3.0
INSTANTANEOUS PEAK FLOW		1390	3630 ^a
INSTANTANEOUS PEAK STAGE		5.47	7.41 ^b
ANNUAL RUNOFF (AC-FT)	115000	116100	89900
ANNUAL RUNOFF (CFSM)	.85	.86	.66
ANNUAL RUNOFF (INCHES)	11.53	11.65	9.02
10 PERCENT EXCEEDS	316	344	296
50 PERCENT EXCEEDS	105	98	57
90 PERCENT EXCEEDS	30	34	17

a From rating curve extended above 1600 ft³/s, on basis of slope-area measurement of peak flow.

b Present datum.



LAKE OF THE WOODS BASIN

05131500 LITTLE FORK RIVER AT LITTLEFORK, MN

LOCATION.--Lat 48°23'45", long 93°32'57", in NE¼,SE¼, 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.--1,730 mi², approximately.

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 Mar. 4, 1917, nonrecording gage and July 21, 1937, to Oct. 23, 1979, water-stage recorder at site 1.2 mi downstream at datum 10.53 ft lower; Mar. 5 to Sept. 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 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	778	978	e445	e340	e148	e155	e560	4620	1070	6230	2130	587
2	788	954	e445	e330	e144	e140	e600	4750	968	5150	1940	590
3	792	941	e445	e320	e140	e135	e720	4560	890	4060	1590	597
4	753	918	e445	e310	e137	e140	e990	4290	798	3190	1460	597
5	720	906	e445	e300	e133	e150	e1010	3930	731	2520	1700	583
6	691	e840	e445	e295	e130	e160	e1010	3540	672	2200	1490	602
7	674	e730	e445	e285	e127	e190	e940	3250	647	1930	1240	608
8	662	e710	e445	e280	e122	e220	e840	2970	711	1910	1050	583
9	718	e705	e445	e270	e120	e250	e840	2910	770	2250	954	550
10	764	e700	e445	e265	e117	e260	e1000	2700	730	3450	864	516
11	740	e690	e445	e260	e117	e250	e1500	2430	680	3910	796	489
12	726	e680	e445	e250	e117	e240	e2000	2260	641	3370	730	484
13	696	e675	e445	e245	e117	e230	e2900	2140	625	2690	642	499
14	668	e670	e445	e240	e117	e220	e3900	2130	581	2130	605	676
15	638	e660	e445	e230	e118	e210	e4050	2310	626	2370	575	1610
16	626	e655	e445	e225	e120	e240	4250	2480	635	2570	541	3390
17	612	e645	e445	e220	e122	e280	4610	2520	695	2330	510	3700
18	593	e640	e445	e215	e128	e350	4660	2470	2020	2290	481	3270
19	578	e620	e445	e210	e133	e335	4550	2300	3880	2060	482	2690
20	579	e580	e445	e205	e140	e310	4220	2060	4410	1840	514	2150
21	605	e540	e445	e200	e150	e300	3760	1810	4920	2940	552	1790
22	782	e500	e440	e195	e160	e330	3260	1610	4730	2890	529	1560
23	987	e445	e430	e190	e180	e545	2790	1490	4180	2430	491	1450
24	1090	e445	e420	e185	e195	e660	2370	1450	3330	2060	468	1420
25	1080	e445	e410	e180	e200	e740	2080	1510	2610	1720	435	1340
26	1040	e445	e395	e175	e195	e720	2010	1510	2080	1500	414	1260
27	958	e445	e385	e170	e185	e700	2590	1450	1780	1330	403	1180
28	892	e445	e375	e165	e170	e650	3620	1450	2050	1220	424	1130
29	888	e445	e365	e160	---	e600	4200	1340	5310	1110	559	1060
30	920	e445	e355	e155	---	e570	4420	1260	6810	1020	534	1010
31	954	---	e345	e150	---	e560	---	1150	---	994	578	---
TOTAL	23992	19497	13265	7220	3982	10840	76250	76650	60580	77664	25681	37971
MEAN	774	650	428	233	142	350	2542	2473	2019	2505	828	1266
MAX	1090	978	445	340	200	740	4660	4750	6810	6230	2130	3700
MIN	578	445	345	150	117	135	560	1150	581	994	403	484
AC-FT	47590	38670	26310	14320	7900	21500	151200	152000	120200	154000	50940	75320
CFSM	.45	.38	.25	.13	.08	.20	1.47	1.43	1.17	1.45	.48	.73
IN.	.52	.42	.29	.16	.09	.23	1.64	1.65	1.30	1.67	.55	.82

e Estimated.

LAKE OF THE WOODS BASIN

05131500 LITTLE FORK RIVER AT LITTLEFORK, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	856	677	302	144	109	270	3170	2879	1801	977	557	756
MAX	3320	3044	972	477	270	3022	8421	12190	5490	3643	2679	5189
(WY)	1947	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

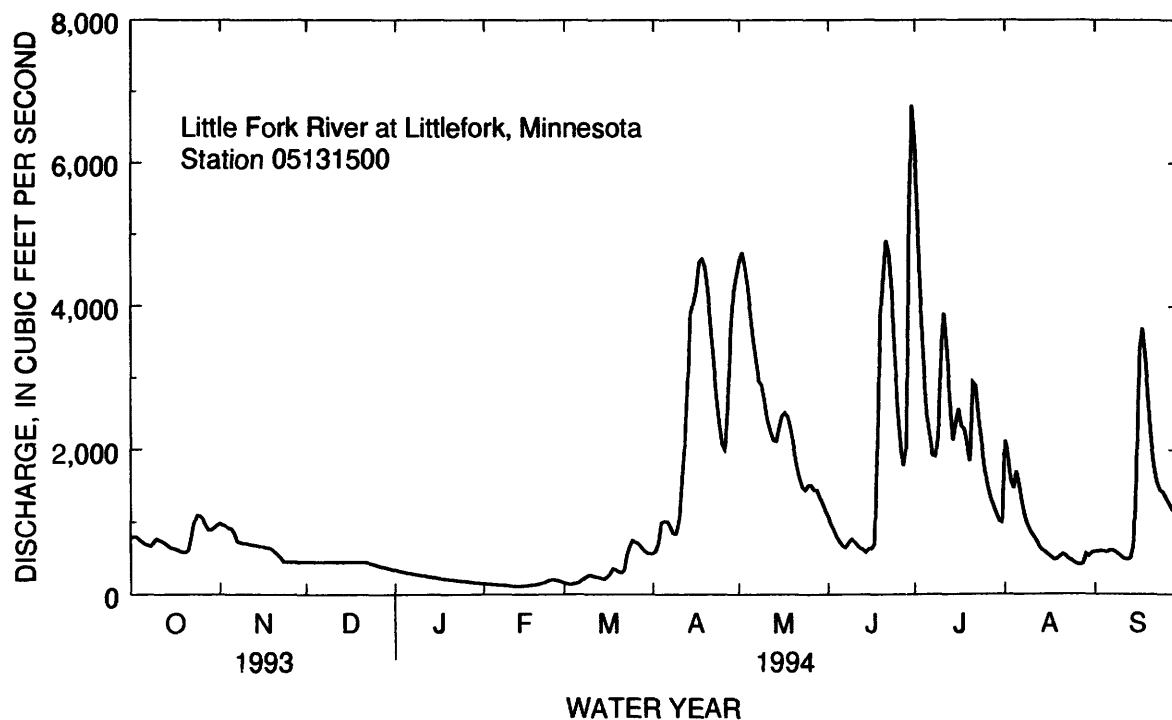
SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1909 - 1994

ANNUAL TOTAL	442567	433592	
ANNUAL MEAN	1213	1188	1057
HIGHEST ANNUAL MEAN			1912
LOWEST ANNUAL MEAN			306
HIGHEST DAILY MEAN	6470	Jul 8	6810
LOWEST DAILY MEAN	110	Feb 19	117
ANNUAL SEVEN-DAY MINIMUM	110	Feb 19	118
INSTANTANEOUS PEAK FLOW			6900
INSTANTANEOUS PEAK STAGE			9.88
ANNUAL RUNOFF (AC-FT)	877800	860000	765800
ANNUAL RUNOFF (CFSM)	.70	.69	.61
ANNUAL RUNOFF (INCHES)	9.52	9.32	8.30
10 PERCENT EXCEEDS	3020	3210	2800
50 PERCENT EXCEEDS	781	668	359
90 PERCENT EXCEEDS	123	180	85

a Occurred Apr. 18, 1916 and May 11, 1950; site and datum then in use.



LAKE OF THE WOODS BASIN

05133500 RAINY RIVER AT MANITOU RAPIDS, MN

(International gaging station)

LOCATION.--Lat 48°38'04", long 93°54'47", in NW 1/4 SE 1/4 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 mi², approximately.

WATER-DISCHARGE RECORDS

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 powerplant 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 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16200	11100	e13600	e8500	e9770	e8510	6720	13200	18100	32000	25600	15700
2	16400	13600	e13500	e8290	e9560	e7640	5950	13900	18100	31900	26100	14500
3	16300	14200	e13400	e8500	e9440	e7590	5840	14800	17000	30800	24800	13200
4	16200	14300	e13700	e9840	e9580	e6590	6290	14600	16400	29400	23900	12900
5	16100	14200	e10900	e11200	e9270	e7070	7470	14200	16100	28200	23400	12300
6	14700	13600	e11000	e11100	e6970	e4630	8040	13500	15900	27600	21100	10400
7	13800	11600	e13600	e11200	e6760	e4690	8240	12600	15800	27200	19600	12400
8	13500	11500	e13400	e9170	e9570	e7210	7810	11400	15700	28300	19000	13000
9	13000	13100	e13400	e7250	e8800	e7170	7440	11200	15700	32300	18100	13000
10	11400	13600	e12500	e7160	e8760	e7000	6900	11400	15300	34400	17000	12800
11	11400	13700	e12500	e9370	e8820	e6940	7120	11000	14400	35500	16300	12900
12	12700	13900	e9980	e9390	e8730	e7110	7950	10900	14500	35300	16100	13100
13	13400	13300	e10200	e9330	e6360	e4870	8810	10700	14500	34400	15500	13000
14	13500	11700	e12500	e9500	e6330	e4810	10200	10500	14600	33700	15200	13000
15	13100	11700	e12600	e9220	e8750	e7320	12200	10400	14300	33600	14800	14500
16	12200	13300	e12600	e7070	e8780	e7340	12900	10800	14900	33500	14500	18000
17	10400	13800	e12600	e7100	e8800	e7400	13100	11500	15800	33100	14300	20000
18	10300	13900	e13200	e9570	e8830	e7360	13500	11500	15900	32500	14000	19900
19	12100	13900	e10200	e9600	e8770	e7350	14300	11400	17400	32000	14500	19000
20	12400	13500	e10000	e9660	e5910	e5480	14200	11500	19200	31500	15000	18100
21	12400	11400	e11100	e9490	e5890	e5430	13300	12100	20500	31700	15300	16900
22	12600	11500	e9590	e9260	e8600	e6740	12300	12000	21400	32600	15400	16100
23	12200	12400	e9310	e7040	e9240	e6040	11000	12100	21100	32700	15200	15600
24	10700	e13700	e8510	e7120	e8050	e6670	9500	13400	20100	32300	15400	14500
25	10800	e13700	e8490	e9100	e9160	e6840	9340	14200	19200	31600	15500	13600
26	12500	e13700	e8260	e9080	e8880	6980	9670	15500	18500	31000	15500	13700
27	12900	e13700	e8240	e9330	e5470	6270	9860	17400	18000	30500	15400	13800
28	12800	e10800	e8240	e9510	e5440	6210	10700	17900	18200	29400	15400	13100
29	12900	e10900	e8510	e9480	---	6780	12000	17800	21900	28300	15400	12300
30	12500	e13500	e8500	e6930	---	6860	12900	17600	29200	26300	15500	12000
31	10800	---	e8500	e6570	---	6820	---	17300	---	25500	15600	---
TOTAL	402200	388800	342630	274930	229290	205720	295550	408300	527700	969100	538400	433300
MEAN	12970	12960	11050	8869	8189	6636	9852	13170	17590	31260	17370	14440
MAX	16400	14300	13700	11200	9770	8510	14300	17900	29200	35500	26100	20000
MIN	10300	10800	8240	6570	5440	4630	5840	10400	14300	25500	14000	10400
AC-FT	797800	771200	679600	545300	454800	408000	586200	809900	1047000	1922000	1068000	859500
CFSM	.67	.67	.57	.46	.42	.34	.51	.68	.91	1.61	.90	.74
IN.	.77	.75	.66	.53	.44	.39	.57	.78	1.01	1.86	1.03	.83

e Estimated.

LAKE OF THE WOODS BASIN

05133500 RAINY RIVER AT MANITOU RAPIDS, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1929 - 1994, BY WATER YEAR (WY)

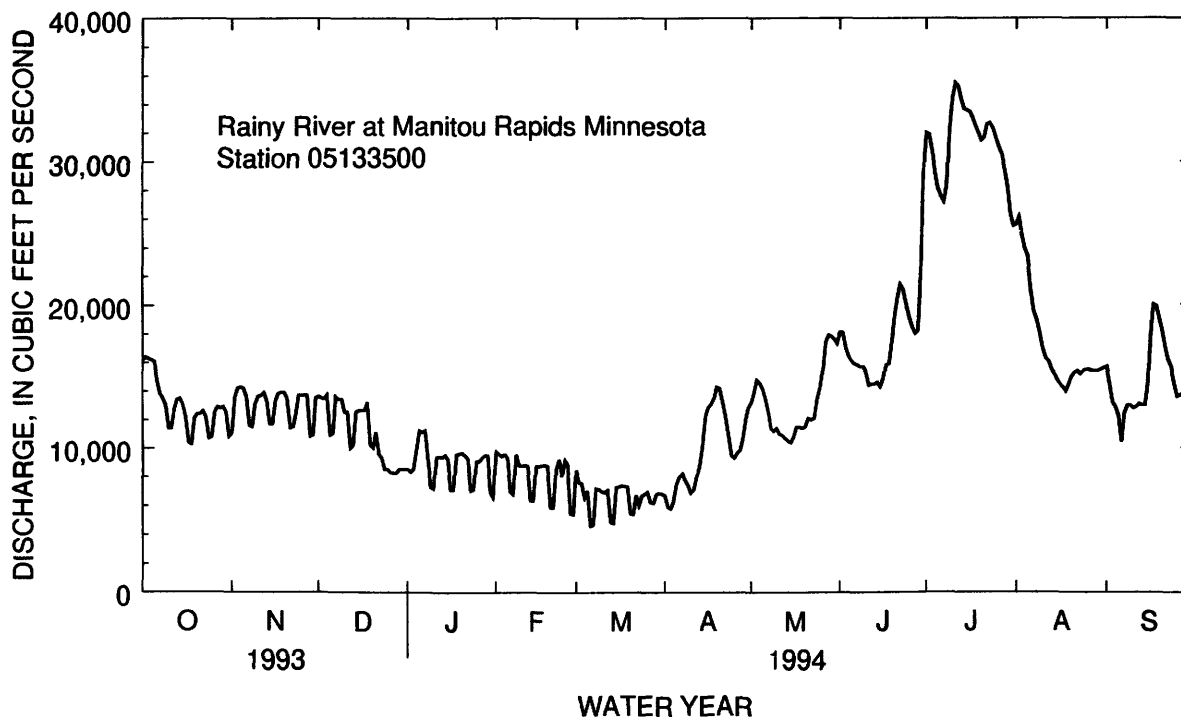
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	11890	11120	10040	9085	8740	8957	15350	19480	20120	16670	11520	11320
MAX	42410	37280	27790	18430	17240	16640	38100	52880	49480	47970	33700	30620
(WY)	1942	1972	1972	1972	1969	1945	1966	1950	1950	1950	1944	1988
MIN	4728	3796	3190	2900	3129	2926	4378	4106	3676	3483	3422	4168
(WY)	1981	1977	1930	1931	1931	1931	1977	1977	1980	1980	1980	1958

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1929 - 1994

ANNUAL TOTAL	5202900	5015920	
ANNUAL MEAN	14250	13740	12870
HIGHEST ANNUAL MEAN			23260
LOWEST ANNUAL MEAN			4470
HIGHEST DAILY MEAN	36400	Jul 31	35500
LOWEST DAILY MEAN	4500	Mar 28	4630
ANNUAL SEVEN-DAY MINIMUM	6600	Mar 23	6310
INSTANTANEOUS PEAK FLOW			35700
INSTANTANEOUS PEAK STAGE			13.36
ANNUAL RUNOFF (AC-FT)	10320000	9949000	9324000
ANNUAL RUNOFF (CFSM)	.73	.71	.66
ANNUAL RUNOFF (INCHES)	9.98	9.62	9.01
10 PERCENT EXCEEDS	24400	23600	25300
50 PERCENT EXCEEDS	12900	12600	10300
90 PERCENT EXCEEDS	8220	7070	5010



LAKE OF THE WOODS BASIN

05133500 RAINY RIVER AT MANITOU RAPIDS, MN--Continued
(National stream-quality accounting network station)

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1968-70, 1978 to current year.

REMARKS.--Letter K indicates non-ideal colony count.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

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)	TUR- BID- ITY (NTU) (00076)	BARO- METRIC PRES- SURE (MM OF HG) (00025)	OXYGEN, DIS- SOLVED (MG/L) 100 ML (00300)	COLI- FORM, FECAL, UM-MF (COLS./ 100 ML) (31625)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100ML) (31673)
OCT												
18...	1315	9940	78	87	7.5	7.5	7.0	1.2	731	11.0	25	46
NOV												
30...	1200	28200	46	69	7.4	7.8	0.0	1.0	735	12.7	190	K22
FEB												
01...	1300	14600	71	79	7.1	7.2	0.0	0.90	729	10.3	100	150
APR												
26...	1445	9550	102	110	7.7	7.4	6.0	2.2	723	10.2	K240	170
MAY												
31...	1330	17200	80	81	7.0	7.2	15.0	0.60	731	6.6	K6	K6
AUG												
16...	1330	14800	100	80	7.4	7.1	20.0	0.60	729	8.5	23	190

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)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)	ALKA- LITY LAB (MG/L AS CACO3) (90410)	CAR- BONATE WATER DIS IT FIELD MG/L AS CO3 (00452)	BICAR- BONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)	SILICA, DIS- SOLVED (MG/L AS SiO2) (00955)
OCT												
18...	9.1	2.9	4.0	0.70	28	31	0	34	5.6	3.1	0.20	3.4
NOV												
30...	6.6	2.0	3.6	0.70	22	22	0	26	5.3	2.5	<0.10	3.0
FEB												
01...	7.2	1.9	5.7	0.80	21	34	0	26	7.1	3.2	<0.10	2.8
APR												
26...	11	3.6	4.9	1.3	39	43	0	49	6.8	3.4	<0.10	4.3
MAY												
31...	9.5	3.1	2.7	0.50	28	34	0	34	8.5	4.7	<0.10	3.1
AUG												
16...	8.9	2.6	3.0	0.70	29	30	0	35	4.4	2.1	0.30	2.9

LAKE OF THE WOODS BASIN

05133500 RAINY RIVER AT MANITOU RAPIDS, MN--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DATE	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	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)	SEDI- MENT, SUS- PENDEED (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)	ALUM- INUM, DIS- SOLVED (UG/L AS AL) (01106)
OCT 18...	57	<0.010	0.050	0.040	0.40	0.010	<0.010	0.010	4	100	40
NOV 30...	57	<0.010	0.086	0.050	0.40	<0.010	0.030	0.020	2	80	--
FEB 01...	69	0.010	0.080	0.010	0.40	0.020	0.030	0.020	4	67	50
APR 26...	84	<0.010	<0.050	0.020	0.60	0.040	0.010	<0.010	23	98	70
MAY 31...	102	<0.010	<0.050	0.010	0.50	0.030	<0.010	<0.010	17	72	40
AUG 16...	63	<0.010	0.150	0.030	0.90	0.070	0.040	0.010	8	80	30

DATE	BARIUM, DIS- SOLVED (UG/L AS BA) (01005)	COBALT, DIS- SOLVED (UG/L AS CO) (01035)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	LITHIUM DIS- SOLVED (UG/L AS LI) (01130)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, DIS- SOLVED (UG/L AS AG) (01075)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)	VANA- DIUM, DIS- SOLVED (UG/L AS V) (01085)
OCT 18...	11	<3	120	<4	6	<10	<1	<1	<1.0	25	<6
NOV 30...	--	--	--	--	--	--	--	--	--	--	--
FEB 01...	9	<3	86	<4	6	<10	1	<1	<1.0	23	<6
APR 26...	13	<3	190	<4	8	<10	1	<1	<1.0	26	<6
MAY 31...	10	<3	120	<4	8	<10	2	<1	<1.0	25	<6
AUG 16...	10	<3	110	<4	6	<10	<1	<1	<1.0	24	<6

LAKE OF THE WOODS BASIN

05140520 LAKE OF THE WOODS AT WARROAD, MN

(International gaging station)

LOCATION.--Lat 48°54'15", long 95°18'57", in SW 1/4 SE 1/4 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, 1,000 ft downstream from bridge on State Highway 11, and 4,000 ft upstream from mouth of Warroad River.

DRAINAGE AREA.--27,200 mi².

PERIOD OF RECORD.--April to September 1978 (monthend elevations only), October 1978 to current year. Records collected prior to April 1978 are in reports of the Water Survey of Canada.

GAGE.--Water-stage recorder. Datum of 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 obtained at this station. Water level subject to fluctuation caused by change in direction and velocity of wind and 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 15, 1989; maximum daily, 61.84 ft, Sept. 12, 1978; minimum gage height recorded, 55.94 ft, Sept. 4, 1980; minimum daily recorded, 56.52 ft, Apr. 15, 1981.

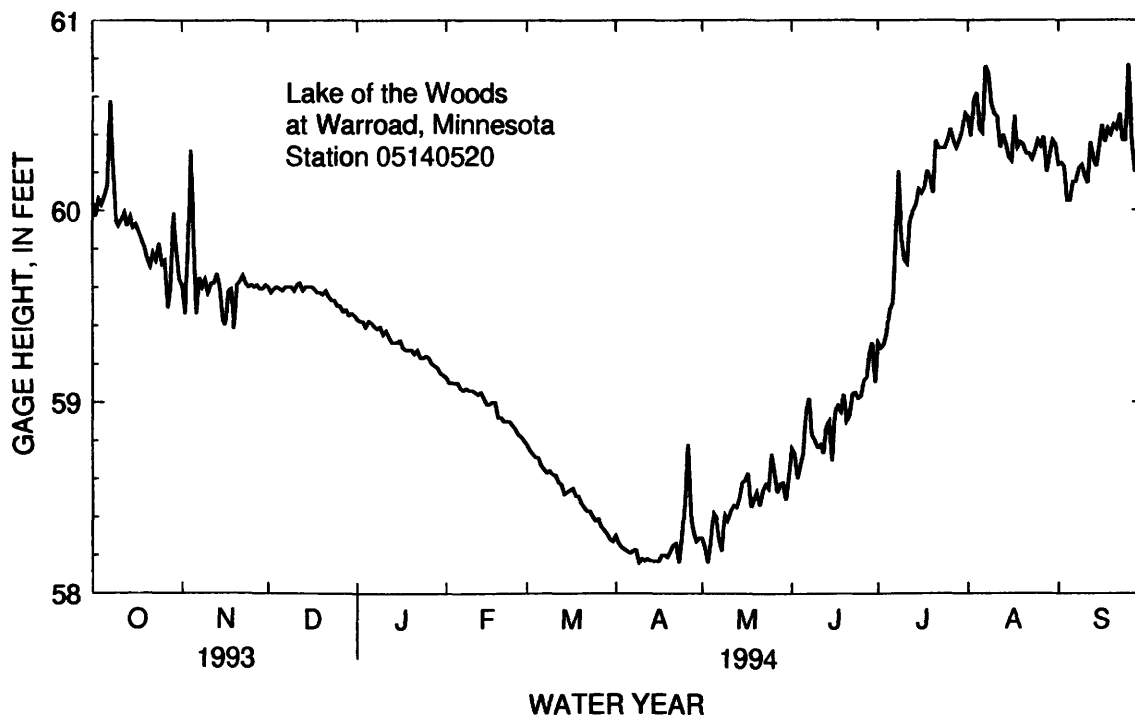
EXTREMES FOR CURRENT YEAR.--Maximum gage height, 61.16 ft, Aug. 7; maximum daily, 60.77 ft, Sept. 25; minimum, 57.82 ft, May 8; minimum daily, 58.16 ft, Apr. 9, 23, May 3.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	60.04	59.61	59.60	59.43	59.13	58.78	58.30	58.29	58.76	59.31	60.49	60.24
2	59.97	59.46	59.57	59.42	59.10	58.75	58.26	58.24	58.73	59.28	60.39	60.25
3	60.06	59.79	59.59	59.42	59.10	58.73	58.24	58.16	58.60	59.30	60.58	60.23
4	60.03	60.32	59.60	59.39	59.10	58.71	58.23	58.27	58.67	59.36	60.62	60.05
5	60.07	59.87	59.59	59.42	59.10	58.71	58.22	58.42	58.73	59.48	60.43	60.05
6	60.13	59.46	59.58	59.41	59.07	58.67	58.21	58.40	58.95	59.52	60.41	60.15
7	60.58	59.65	59.60	59.39	59.06	58.65	58.22	58.28	59.02	59.82	60.76	60.15
8	60.25	59.60	59.60	59.38	59.07	58.63	58.23	58.22	58.83	60.21	60.72	60.22
9	59.96	59.64	59.60	59.39	59.06	58.64	58.16	58.41	58.80	59.86	60.56	60.24
10	59.92	59.57	59.58	59.35	59.06	58.62	58.18	58.38	58.76	59.74	60.51	60.18
11	59.95	59.62	59.61	59.37	59.05	58.62	58.17	58.43	58.78	59.72	60.49	60.14
12	59.99	59.62	59.62	59.34	59.04	58.58	58.18	58.46	58.73	59.95	60.33	60.36
13	59.92	59.67	59.58	59.31	59.05	58.57	58.17	58.45	58.87	60.00	60.40	60.27
14	59.97	59.60	59.60	59.31	59.02	58.52	58.17	58.50	58.90	60.03	60.35	60.23
15	59.91	59.44	59.60	59.31	58.99	58.53	58.17	58.58	58.69	60.11	60.28	60.34
16	59.93	59.40	59.60	59.32	58.99	58.54	58.17	58.59	58.95	60.09	60.26	60.45
17	59.89	59.58	59.59	59.28	59.00	58.55	58.20	58.63	58.98	60.12	60.50	60.36
18	59.85	59.59	59.57	59.27	59.00	58.51	58.20	58.45	58.95	60.21	60.33	60.43
19	59.81	59.38	59.57	59.27	58.92	58.51	58.19	58.49	59.04	60.17	60.36	60.40
20	59.75	59.61	59.56	59.27	58.92	58.47	58.22	58.53	58.90	60.09	60.35	60.45
21	59.71	59.63	59.58	59.25	58.90	58.45	58.25	58.46	58.93	60.37	60.30	60.43
22	59.78	59.66	59.55	59.27	58.90	58.43	58.26	58.54	59.04	60.33	60.30	60.51
23	59.74	59.62	59.53	59.23	58.90	58.43	58.16	58.57	59.05	60.33	60.27	60.37
24	59.83	59.60	59.53	59.23	58.88	58.40	58.30	58.55	59.02	60.33	60.31	60.37
25	59.72	59.61	59.50	59.24	58.86	58.38	58.49	58.73	59.03	60.37	60.37	60.77
26	59.74	59.60	59.50	59.23	58.83	58.39	58.78	58.64	59.11	60.43	60.34	60.39
27	59.49	59.61	59.47	59.20	58.82	58.35	58.41	58.53	59.13	60.37	60.39	60.20
28	59.60	59.59	59.48	59.19	58.80	58.33	58.33	58.57	59.25	60.33	60.20	60.30
29	59.99	59.59	59.45	59.18	---	58.31	58.27	58.58	59.31	60.37	60.29	60.28
30	59.79	59.61	59.46	59.15	---	58.28	58.29	58.49	59.10	60.42	60.37	60.39
31	59.64	---	59.45	59.14	---	58.27	---	58.61	---	60.51	60.35	---
MEAN	59.90	59.62	59.56	59.30	58.99	58.53	58.25	58.47	58.92	60.02	60.41	60.31
MAX	60.58	60.32	59.62	59.43	59.13	58.78	58.78	58.73	59.31	60.51	60.76	60.77
MIN	59.49	59.38	59.45	59.14	58.80	58.27	58.16	58.16	58.60	59.28	60.20	60.05

LAKE OF THE WOODS BASIN
05140520 LAKE OF THE WOODS AT WARROAD, MN



LAKE OF THE WOODS BASIN

05140521 LAKE OF THE WOODS AT SPRINGSTEEL ISLAND NEAR WARROAD, MN

LOCATION.--Lat 48°56'45", long 95°18'24", in SW¹/₄SW¹/₄ 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 mi².

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 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.

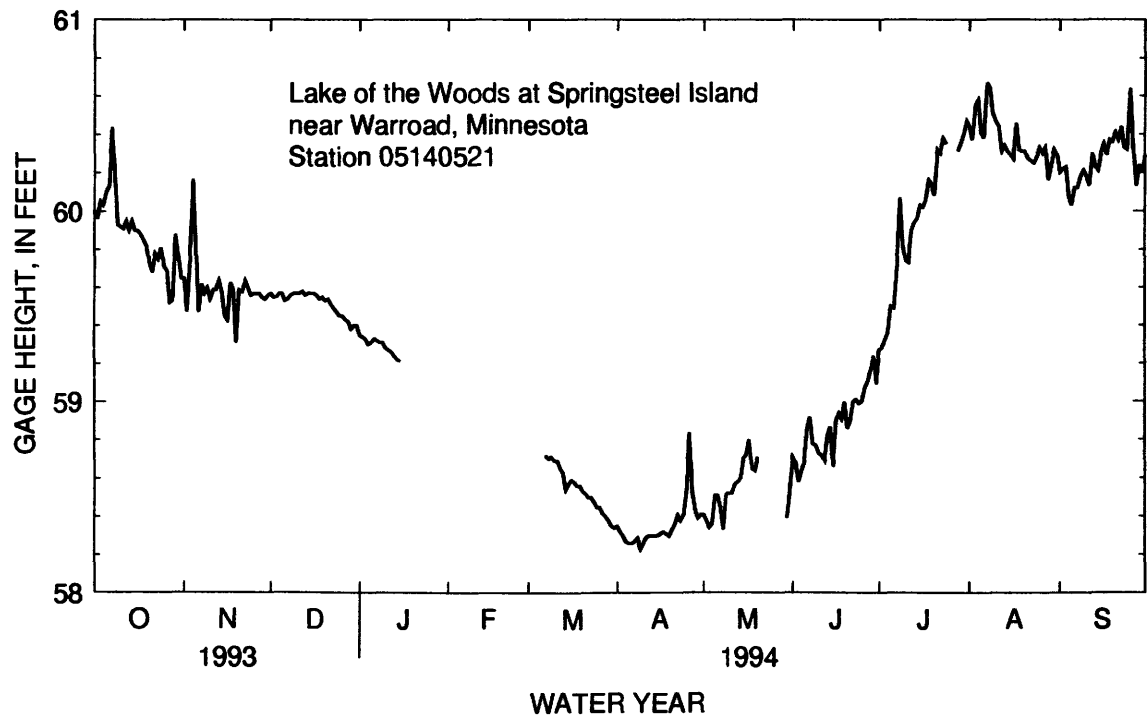
EXTREMES FOR CURRENT YEAR.--Maximum gage height, 60.94 ft, Aug. 7, maximum daily, 60.67 ft, Aug. 7; minimum, 58.05 ft, May 8; minimum daily, 58.23 ft, Apr. 9.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	60.00	59.65	59.57	59.35	---	---	58.35	58.41	58.71	59.27	60.44	60.20
2	59.96	59.47	59.55	59.34	59.11	---	58.32	58.38	58.68	59.28	60.37	60.22
3	60.05	59.75	59.55	59.33	---	---	58.30	58.34	58.58	59.32	60.55	60.23
4	60.03	60.17	59.57	59.30	---	---	58.27	58.36	58.64	59.36	60.58	60.08
5	60.10	59.83	59.57	59.31	---	---	58.26	58.51	58.68	59.50	60.41	60.03
6	60.13	59.47	59.53	59.33	---	---	58.26	58.51	58.86	59.49	60.38	60.12
7	60.44	59.62	59.54	59.32	---	58.72	58.27	58.44	58.92	59.72	60.67	60.12
8	60.17	59.57	59.56	59.31	---	58.70	58.29	58.33	58.78	60.07	60.64	60.18
9	59.93	59.60	59.57	59.31	---	58.71	58.23	58.52	58.77	59.83	60.51	60.21
10	59.92	59.54	59.57	59.28	---	58.69	58.26	58.52	58.73	59.74	60.47	60.18
11	59.91	59.59	59.57	59.27	59.03	58.69	58.29	58.52	58.72	59.73	60.44	60.13
12	59.95	59.59	59.58	59.26	---	58.65	58.30	58.57	58.69	59.90	60.31	60.30
13	59.90	59.64	59.56	59.24	---	58.63	58.30	58.58	58.82	59.94	60.34	60.23
14	59.95	59.58	59.57	59.22	---	58.54	58.30	58.60	58.87	59.96	60.31	60.21
15	59.90	59.45	59.57	59.21	---	58.57	58.30	58.70	58.66	60.03	60.29	60.30
16	59.90	59.43	59.57	---	---	58.59	58.31	58.72	58.90	60.02	60.27	60.35
17	59.88	59.63	59.56	---	---	58.58	58.32	58.80	58.94	60.06	60.46	60.29
18	59.85	59.59	59.54	---	---	58.56	58.31	58.65	58.91	60.16	60.32	60.37
19	59.82	59.31	59.55	---	---	58.56	58.30	58.64	59.00	60.14	60.31	60.36
20	59.73	59.59	59.53	---	---	58.53	58.33	58.71	58.86	60.08	60.31	60.41
21	59.68	59.58	59.54	---	---	58.52	58.36	---	58.90	60.32	60.27	60.37
22	59.78	59.64	59.51	---	---	58.50	58.41	---	59.00	60.30	60.26	60.44
23	59.75	59.60	59.49	---	---	58.50	58.38	---	59.01	60.38	60.25	60.33
24	59.81	59.56	59.47	---	---	58.48	58.41	---	58.99	60.35	60.28	60.32
25	59.71	59.57	59.45	---	---	58.45	58.53	---	59.00	---	60.33	60.64
26	59.69	59.57	59.45	---	---	58.45	58.84	---	59.07	---	60.30	60.33
27	59.52	59.57	59.43	---	---	58.42	58.53	---	59.11	---	60.33	60.13
28	59.53	59.55	59.42	---	---	58.40	58.44	---	59.17	60.31	60.16	60.24
29	59.88	59.54	59.38	---	---	58.38	58.39	---	59.24	60.35	60.24	60.20
30	59.77	59.56	59.40	---	---	58.35	58.41	58.39	59.09	60.40	60.32	60.29
31	59.65	---	59.40	59.13	---	58.34	---	58.54	---	60.47	60.29	---
MEAN	59.88	59.59	59.52	---	---	---	58.35	---	58.88	---	60.37	60.26
MAX	60.44	60.17	59.58	---	---	---	58.84	---	59.24	---	60.67	60.64
MIN	59.52	59.31	59.38	---	---	---	58.23	---	58.58	---	60.16	60.03

LAKE OF THE WOODS BASIN
05140521 LAKE OF THE WOODS AT SPRINGSTEEL ISLAND NEAR WARROAD, MN



MISSISSIPPI RIVER MAIN STEM

05200510 MISSISSIPPI RIVER NEAR BEMIDJI, MN

LOCATION.--Lat 47°29'00", long 94°43'40", in SE $\frac{1}{4}$ SW $\frac{1}{4}$ 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 mi², 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. Regulated by Stump Lake dam upstream from station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	302	---	---	---	---	---	370	321	363	299	395	171
2	303	---	---	---	---	---	370	320	355	293	395	165
3	302	---	---	---	---	---	370	323	339	291	392	165
4	300	---	---	---	---	---	369	333	271	291	391	165
5	302	---	---	---	---	---	367	335	274	291	391	165
6	303	---	---	---	---	---	367	336	275	293	391	156
7	300	---	---	---	---	---	367	341	254	294	391	111
8	300	---	---	---	---	---	362	343	221	295	391	87
9	301	---	---	---	---	---	363	374	205	297	391	87
10	301	---	---	---	---	---	363	401	221	297	391	89
11	290	---	---	---	---	---	363	405	219	297	391	98
12	291	---	---	---	---	---	363	401	218	297	391	118
13	287	---	---	---	---	---	363	400	174	297	392	182
14	270	---	---	---	---	---	363	406	113	299	391	236
15	173	---	---	---	---	---	363	406	131	300	391	278
16	124	---	---	---	---	---	362	402	128	300	391	359
17	124	---	---	---	---	---	360	412	130	298	391	384
18	121	---	---	---	---	310	348	425	152	317	388	374
19	120	---	---	---	---	310	334	422	141	334	388	365
20	120	---	---	---	---	310	331	410	171	346	387	367
21	121	---	---	---	---	310	333	407	214	348	384	368
22	120	---	---	---	---	311	336	403	310	349	327	375
23	120	---	---	---	---	310	336	400	357	349	288	377
24	120	---	---	---	---	311	336	402	354	349	288	376
25	121	---	---	---	---	317	335	396	321	348	288	370
26	124	---	---	---	---	332	334	391	251	379	288	351
27	122	---	---	---	---	333	336	386	286	392	287	314
28	129	---	---	---	---	333	336	379	307	388	284	313
29	---	---	---	---	---	329	338	385	305	389	280	313
30	---	---	---	---	---	345	322	382	301	370	268	313
31	---	---	---	---	---	370	---	385	---	345	218	---
TOTAL	5911	---	---	---	---	4531	10560	11832	7361	10032	11020	7592
MEAN	211	---	---	---	---	324	352	382	245	324	355	253
MAX	303	---	---	---	---	370	370	425	363	392	395	384
MIN	120	---	---	---	---	310	322	320	113	291	218	87
AC-FT	11720	---	---	---	---	8990	20950	23470	14600	19900	21860	15060
CFSM	.35	---	---	---	---	.53	.58	.63	.40	.53	.58	.41
IN.	.36	---	---	---	---	.28	.64	.72	.45	.61	.67	.46

e Estimated.

MISSISSIPPI RIVER MAIN STEM

05200510 MISSISSIPPI RIVER NEAR BEMIDJI, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1987 - 1994, BY WATER YEAR (WY)

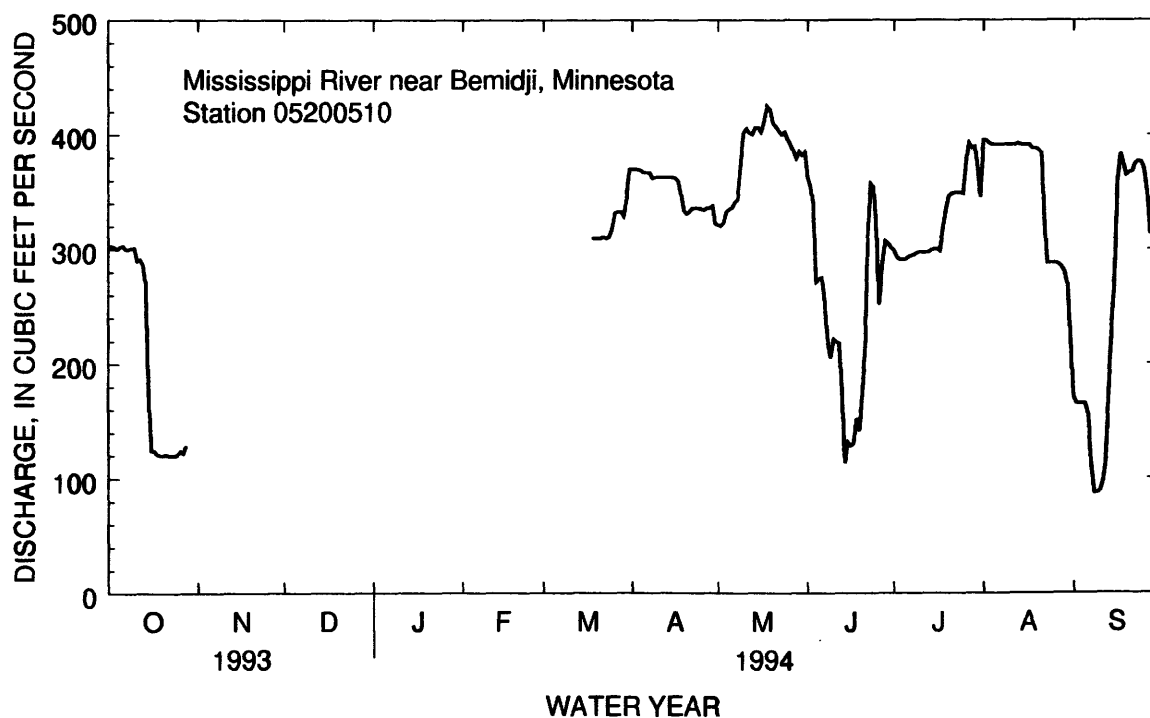
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	152	---	---	---	---	---	267	350	226	215	193	202
MAX	263	---	---	---	---	---	399	479	329	363	471	401
(WY)	1989	---	---	---	---	---	1989	1989	1993	1993	1993	1993
MIN	75.5	---	---	---	---	---	148	181	104	62.2	61.9	62.3
(WY)	1991	---	---	---	---	---	1992	1992	1988	1988	1989	1990

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1987 - 1994

HIGHEST DAILY MEAN	734	May 8	425	May 18	771	Apr 28 1989
LOWEST DAILY MEAN	97	Apr 5	87	Sep 8	22	Jul 12 1988
INSTANTANEOUS PEAK FLOW			651	May 17	938	May 7 1993
INSTANTANEOUS PEAK STAGE			4.36	May 17	4.93	May 7 1993



MISSISSIPPI RIVER MAIN STEM

05201000 WINNIBIGOSHISH LAKE NEAR DEER RIVER, MN

LOCATION.--Lat 47°25'42", long 94°03'00", in sec.25, T.146 N., R.27 W., Itasca County, Hydrologic Unit 07010101, on Leech Lake Indian Reservation, at dam on Mississippi River, 1 mi northwest of Little Winnibigoshish Lake, 14 mi northwest of city of Deer River, and at mile 1.248 upstream from Ohio River.

DRAINAGE AREA.--1,442 mi².

PERIOD OF RECORD.--April 1884 to current year. Prior to October 1941 monthend contents only, published in WSP 1308. Published as Winnibigoshish Reservoir near Deer River October 1941 to September 1956.

REVISED RECORDS.--WSP 1308: 1905(M).

GAGE.--Water-stage recorder. Datum of gage is in mean sea level (levels by U.S. Army Corps of Engineers). Prior to July 8, 1949, nonrecording gage at same site, and July 9, 1949, to July 10, 1973, water-stage recorder at same site and at datum of 1,288.94 ft above mean sea level.

REMARKS.--Reservoir is formed by Winnibigoshish Lake and several other natural lakes controlled by a concrete and timber dam, completed in 1884; storage began in 1884. Capacity between elevations 1,294.94 ft and 1,303.14 ft (maximum allowable range) is 668,737 acre-ft of which 439,636 acre-ft is controlled storage between elevations 1,294.94 ft and 1,300.94 ft (normal operating range). Contents shown herein are contents above elevation 1,286.00 ft. Prior to September 1978, published contents as contents above elevation 1,288.94 ft. Water is used to benefit navigation on Mississippi River below Minneapolis.

COOPERATION.--Records were provided by U.S. Army Corps of Engineers.

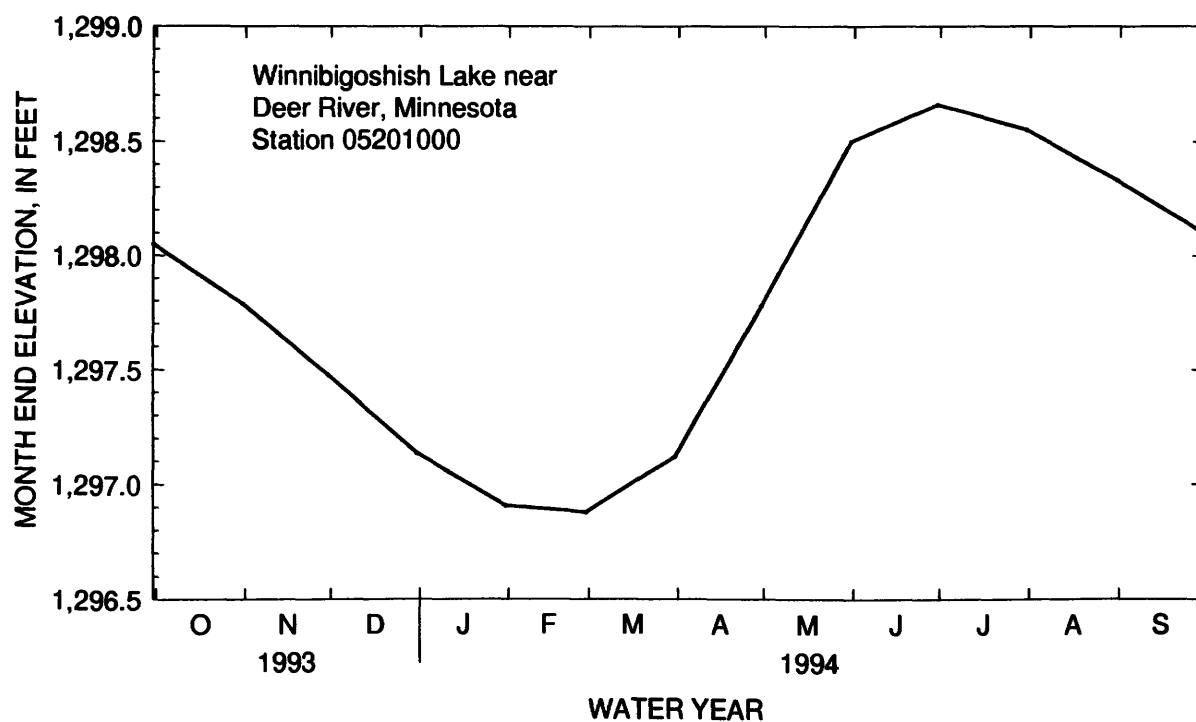
EXTREMES FOR PERIOD OF RECORD.--Maximum contents observed, 996,500 acre-ft, capacity table then in use, July 30, 1905, elevation, 1,303.39 ft; minimum observed, 33,680 acre-ft, below zero of capacity table then in use, Oct. 20, 1931, elevation, 1,288.25 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 736,620 acre-ft, July 1, elevation, 1,298.75 ft; minimum, 612,020 acre-ft, Mar. 2, elevation, 1,296.85 ft.

MONTHEND ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30	1298.05	690670	
Oct. 31	1297.79	673600	-17070
Nov. 30	1297.48	653240	-20360
Dec. 31	1297.14	630930	-22310
CAL YR 1993			-7220
Jan. 31	1296.91	615860	-15070
Feb. 28	1296.88	613930	-1930
Mar. 31	1297.12	629620	+15690
Apr. 30	1297.78	672940	+43320
May 31	1298.50	720210	+47270
June 30	1298.66	730710	+10500
July 31	1298.55	723490	-7220
Aug. 31	1298.33	709050	-14440
Sept. 30	1298.10	693950	-15100
WTY YR 1994			+3280

MISSISSIPPI RIVER MAIN STEM
05201000 WINNIBIGOSHISH LAKE NEAR DEER RIVER, MN--Continued



MISSISSIPPI RIVER MAIN STEM

05201500 MISSISSIPPI RIVER AT WINNIBIGOSHISH DAM NEAR DEER RIVER, MN

LOCATION.--Lat 47°25'42", long 94°03'00", in SW 1/4 sec.25, T.146 N., R.27 W., Itasca County, Hydrologic Unit 07010101, on Leech Lake Indian Reservation, at dam 1 mi northwest of Little Winnibigoshish Lake, 14 mi northwest of city of Deer River, and at mile 1,248 upstream from Ohio River.

DRAINAGE AREA.--1,442 mi².

PERIOD OF RECORD.--May 1884 to current year. Monthly discharge only for some periods, published in WSP 1308.

GAGE.--Water-stage recorder on headwater and nonrecording gage on tailwater. Datum of gage is above mean sea level (levels by U. S. Army Corps of Engineers). Prior to June 30, 1973, gages at same sites with datum at 1,289.47 ft, adjustment of 1912. Prior to July 8, 1949, nonrecording headwater gage at same site and datum in use.

REMARKS.--Daily discharge is computed on the basis of modified weir formula and corrected to conform with discharge measurements, the head being determined from readings of headwater and tailwater gages. Flow completely regulated by Winnibigoshish Lake (station 05201000).

COOPERATION.--Daily discharge computed by U. S. Army Corps of Engineers.

AVERAGE DISCHARGE (unadjusted).--110 years, 422 ft³/s, 3.98 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 4,370 ft³/s, Aug. 6, 1905; no flow at times in several years.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	640	920	875	860	525	395	100	100	600	1160	1240	350
2	640	920	875	860	525	395	100	101	600	1160	1240	400
3	640	920	875	860	525	395	100	101	600	1160	1240	400
4	640	920	875	815	525	395	100	100	600	1160	1240	400
5	640	920	875	815	525	345	100	100	600	1160	1240	400
6	640	920	875	815	525	345	100	100	600	1250	1240	400
7	640	920	875	815	525	345	100	100	700	1250	1240	400
8	640	920	875	765	475	300	100	100	800	1250	1240	400
9	640	920	875	765	475	300	100	100	900	1250	1150	400
10	640	920	875	765	475	300	100	100	900	1240	1050	400
11	640	920	875	715	475	300	100	100	835	1250	964	400
12	640	920	875	715	445	250	100	100	790	1250	964	400
13	640	920	875	715	445	250	100	100	790	1250	812	500
14	640	920	875	715	445	250	100	100	790	1250	730	600
15	640	920	875	715	445	250	100	100	880	1250	635	700
16	640	875	875	715	445	200	100	100	980	1250	545	700
17	640	875	875	715	445	150	100	150	1080	1250	545	795
18	640	875	875	715	445	150	100	200	1160	1250	495	885
19	640	875	875	715	445	101	100	200	1150	1250	445	980
20	640	875	875	670	445	101	100	200	1190	1250	400	980
21	640	875	875	670	445	101	100	200	1160	1250	400	980
22	640	875	875	620	445	101	200	200	1160	1250	400	1070
23	740	875	875	620	445	101	300	200	1160	1250	350	1160
24	740	875	870	620	445	100	300	200	1160	1240	300	1160
25	740	875	870	570	445	100	300	250	1160	1240	300	1160
26	840	875	870	570	445	100	300	300	1160	1240	300	1160
27	930	875	870	525	445	100	200	400	1160	1250	300	1160
28	930	875	870	525	445	100	200	500	1160	1250	300	1160
29	930	875	870	525	---	100	100	600	1160	1250	300	1160
30	920	875	870	525	---	100	100	600	1160	1250	300	1160
31	920	---	870	525	---	100	---	600	---	1250	300	---
TOTAL	21770	26925	27085	21535	13140	6620	4100	6402	28145	38260	22205	22220
MEAN	702	897	874	695	469	214	137	207	938	1234	716	741
MAX	930	920	875	860	525	395	300	600	1190	1250	1240	1160
MIN	640	875	870	525	445	100	100	100	600	1160	300	350
AC-FT	43180	53410	53720	42710	26060	13130	8130	12700	55830	75890	44040	44070
CFSM	.49	.62	.61	.48	.33	.15	.09	.14	.65	.86	.50	.51
IN	.56	.69	.70	.56	.34	.17	.11	.17	.73	.99	.57	.57

e Estimated.

MISSISSIPPI RIVER MAIN STEM

05201500 MISSISSIPPI RIVER AT WINNIBIGOSHISH DAM NEAR DEER RIVER, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1887 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	498	466	466	478	469	327	179	248	413	490	532	486
MAX	1231	1436	1237	1269	1586	1172	712	1180	1982	2492	2437	1494
(WY)	1986	1954	1951	1945	1945	1971	1901	1945	1962	1950	1950	1950
MIN	50.2	.000	.000	39.6	17.6	.000	.000	.000	.000	.000	50.9	21.0
(WY)	1905	1892	1893	1896	1891	1891	1890	1891	1893	1901	1961	1934

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

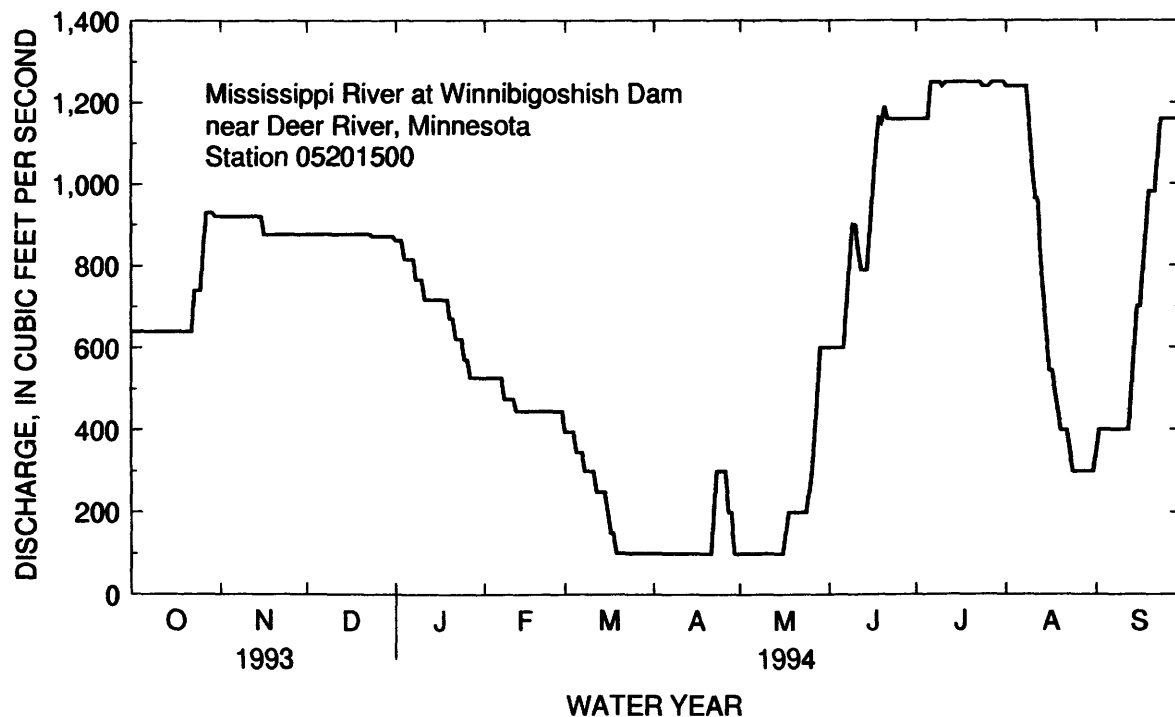
FOR 1994 WATER YEAR

WATER YEARS 1887 - 1994

ANNUAL TOTAL	214011	238407	
ANNUAL MEAN	586	653	422
HIGHEST ANNUAL MEAN			1135
LOWEST ANNUAL MEAN			64.5
HIGHEST DAILY MEAN	1100	1250	2660
LOWEST DAILY MEAN	100	100	.00
ANNUAL SEVEN-DAY MINIMUM	100	100	.00
ANNUAL RUNOFF (AC-FT)	424500	472900	305800
ANNUAL RUNOFF (CFSM)	.41	.45	.29
ANNUAL RUNOFF (INCHES)	5.52	6.15	3.98
10 PERCENT EXCEEDS	920	1160	981
50 PERCENT EXCEEDS	636	640	294
90 PERCENT EXCEEDS	100	100	48

a July 6-9,11-23,27-31.

b Many day in winter period.



LEECH LAKE RIVER BASIN

05202000 WILLIAMS LAKE NEAR AKELEY, MN

LOCATION.--Lat 46°57'24", long 94°40'26", in SE $\frac{1}{4}$ NW $\frac{1}{4}$ sec.12, T.140 N., R.32 W., Hubbard County. Hydrologic Unit 07010102, on northwest shore of Williams lake, 4 mi southeast of Akeley.

DRAINAGE AREA--0.88 mi².

PERIOD OF RECORD--October 1988 to current year. August 1977 to September 1988, in files of the U.S. Geological Survey's Hydrology of Lakes Section in Denver, Colorado.

GAGE--Water-stage recorder. Datum of gage is 1,379.09 ft above sea level. Prior to Oct. 1, 1990, at datum 2.00 ft higher.

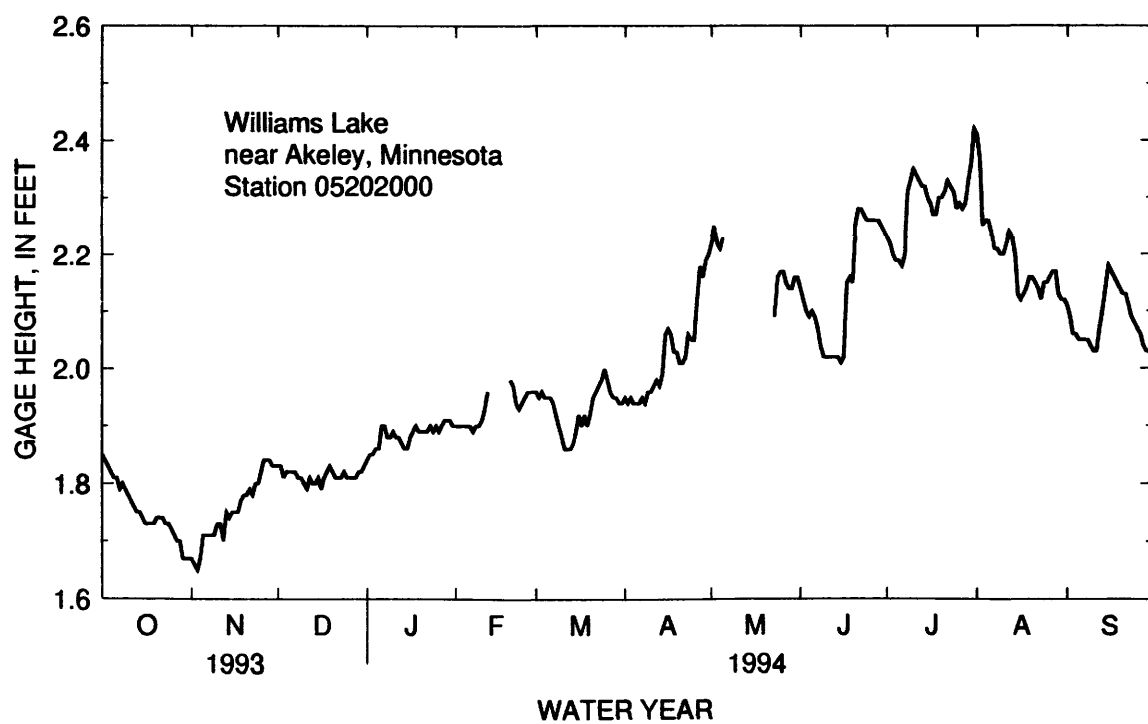
EXTREMES FOR PERIOD OF RECORD--Maximum gage height, 3.33 ft, present datum, June 25, 1989; minimum, 1.32 ft, Dec. 13, 1992.

EXTREMES FOR CURRENT YEAR--Maximum gage height, 2.44 ft, Aug. 2; minimum, 1.64 ft, Nov. 2-4.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES												
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.85	1.67	1.83	1.84	1.90	1.96	1.95	2.22	2.14	2.23	2.41	2.11
2	1.84	1.66	1.83	1.85	1.90	1.95	1.94	2.25	2.12	2.22	2.37	2.09
3	1.83	1.65	1.81	1.85	1.90	1.96	1.95	2.22	2.10	2.20	2.25	2.06
4	1.82	1.67	1.82	1.86	1.90	1.95	1.94	2.21	2.09	2.19	2.26	2.06
5	1.81	1.71	1.82	1.86	1.90	1.95	1.94	2.23	2.10	2.19	2.26	2.05
6	1.81	1.71	1.82	1.90	1.90	1.95	1.94	---	2.09	2.18	2.24	2.05
7	1.79	1.71	1.82	1.90	1.89	1.94	1.95	---	2.07	2.20	2.21	2.05
8	1.80	1.71	1.81	1.88	1.90	1.92	1.94	---	2.04	2.31	2.21	2.05
9	1.79	1.71	1.81	1.88	1.90	1.90	1.96	---	2.02	2.33	2.20	2.04
10	1.78	1.73	1.80	1.89	1.91	1.88	1.96	---	2.02	2.35	2.20	2.03
11	1.77	1.73	1.79	1.88	1.93	1.86	1.97	---	2.02	2.34	2.22	2.03
12	1.76	1.70	1.81	1.88	1.96	1.86	1.98	---	2.02	2.33	2.24	2.07
13	1.75	1.75	1.80	1.87	---	1.86	1.97	---	2.02	2.32	2.23	2.10
14	1.75	1.74	1.80	1.86	---	1.87	1.99	---	2.02	2.32	2.20	2.14
15	1.74	1.75	1.81	1.86	---	1.89	2.06	---	2.01	2.30	2.13	2.18
16	1.73	1.75	1.79	1.88	---	1.92	2.07	---	2.02	2.29	2.12	2.17
17	1.73	1.75	1.81	1.89	---	1.90	2.06	---	2.15	2.27	2.13	2.16
18	1.73	1.77	1.82	1.90	---	1.92	2.03	---	2.16	2.27	2.14	2.15
19	1.73	1.78	1.83	1.89	---	1.90	2.03	---	2.15	2.30	2.16	2.14
20	1.74	1.78	1.82	1.89	1.98	1.92	2.01	---	2.25	2.30	2.16	2.13
21	1.74	1.79	1.81	1.89	1.97	1.95	2.01	---	2.28	2.31	2.15	2.13
22	1.74	1.78	1.81	1.89	1.94	1.96	2.02	---	2.28	2.33	2.14	2.11
23	1.73	1.80	1.81	1.90	1.93	1.97	2.06	2.09	2.27	2.32	2.12	2.09
24	1.73	1.80	1.82	1.89	1.94	1.98	2.05	2.16	2.26	2.31	2.15	2.08
25	1.72	1.82	1.81	1.90	1.95	2.00	2.05	2.17	2.26	2.28	2.15	2.07
26	1.71	1.84	1.81	1.89	1.96	1.98	2.12	2.17	2.26	2.29	2.16	2.06
27	1.70	1.84	1.81	1.90	1.96	1.96	2.18	2.15	2.26	2.28	2.17	2.04
28	1.70	1.84	1.81	1.91	1.96	1.95	2.16	2.14	2.26	2.29	2.17	2.03
29	1.67	1.83	1.82	1.91	---	1.95	2.19	2.14	2.25	2.33	2.13	2.03
30	1.67	1.83	1.82	1.91	---	1.94	2.20	2.16	2.24	2.36	2.12	2.02
31	1.67	---	1.83	1.90	---	1.94	---	2.16	---	2.42	2.12	---
MEAN	1.75	1.75	1.81	1.88	---	1.93	2.02	---	2.14	2.29	2.19	2.08
MAX	1.85	1.84	1.83	1.91	---	2.00	2.20	---	2.28	2.42	2.41	2.18
MIN	1.67	1.65	1.79	1.84	---	1.86	1.94	---	2.01	2.18	2.12	2.02

LEECH LAKE RIVER BASIN
05202000 WILLIAMS LAKE NEAR AKELEY, MN --Continued



LEECH LAKE RIVER BASIN

05206000 LEECH LAKE AT FEDERAL DAM, MN

LOCATION (REVISED).--Lat 47°10'14", long 94°17'12", in SE¼,SE¼, sec.25, T.143 N., R.29 W., Cass County, Hydrologic Unit 07010102, on Leech Lake Indian Reservation, at head of Leech Lake River, 1 mi. northeast of Battle Point, 6 mi southwest of town of Federal Dam.

DRAINAGE AREA.--1,163 mi².

PERIOD OF RECORD.--April 1884 to current year. Monthend contents only for some periods, published in WSP 1308. Prior to October 1956, published as "Leech Lake Reservoir."

GAGE.--Water-stage recorder. Datum of gage is in mean sea level (levels by U.S. Army Corps of Engineers). Prior to Dec. 31, 1884, nonrecording gage 0.5 mi north of outlet to Leech Lake River at datum 98.47 ft higher. Dec. 31, 1884, to May 24, 1931, nonrecording gage 0.5 mi north of outlet to Leech Lake River and May 25, 1931, to July 10, 1973, water-stage recorder at same site and at datum 92.70 ft higher.

REMARKS.--Reservoir is formed by Leech Lake and several other natural lakes controlled by concrete and timber dam; storage began in 1884; original timber structure completed in 1884, replaced by present dam in 1902. Capacity between elevation 1,292.70 ft and 1,297.94 ft (maximum allowable range) is 688,985 acre-ft of which 352,637 acre-ft is controlled storage between elevations 1,292.70 ft and 1,295.70 ft (normal operating range). Contents shown herein are contents above elevation 1,290.00 ft. Prior to September 1978, published contents as contents above elevation 1,292.20 ft. Water is used to benefit navigation on Mississippi River below Minneapolis.

COOPERATION.--Records were provided by U.S. Army Corps of Engineers.

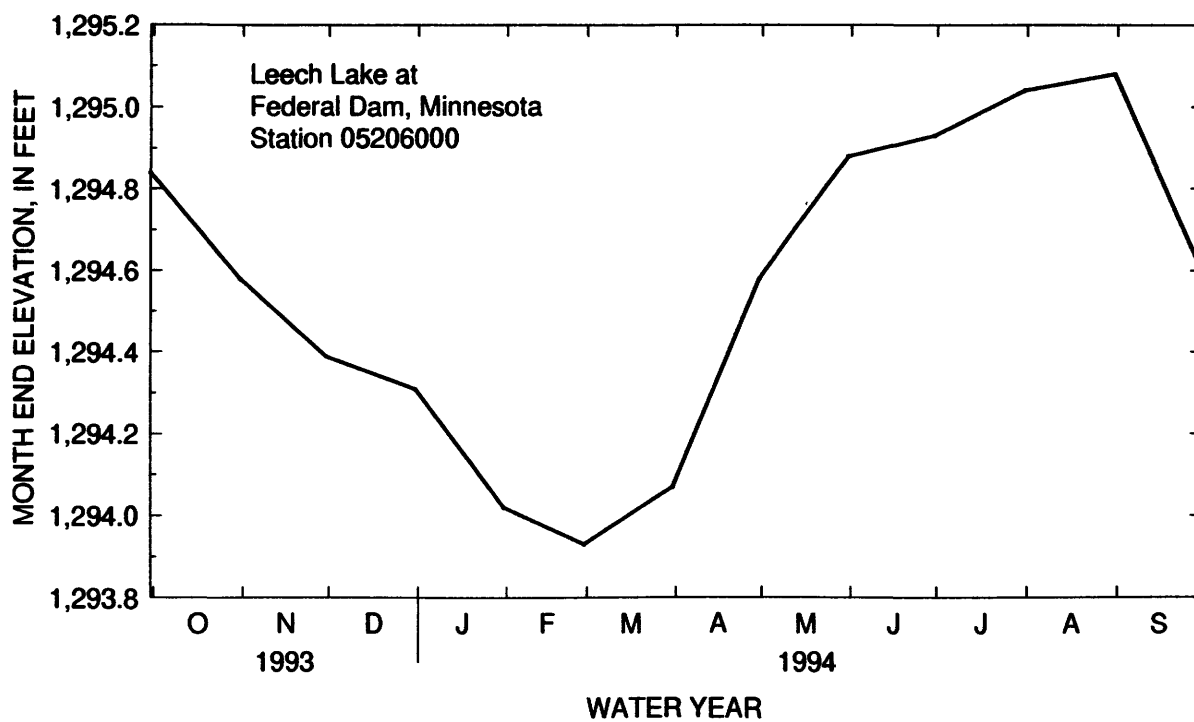
EXTREMES FOR PERIOD OF RECORD.--Maximum contents observed, 734,300 acre-ft, capacity table then in use, June 30, 1916, elevation, 1,297.88 ft; minimum, 51,380 acre-ft, capacity table then in use, Dec. 8, 24, 1976, elevation, 1,292.69 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 636,890 acre-ft, Sept. 5, elevation, 1295.12 ft; minimum, 478,960 acre-ft, Mar. 17, elevation, 1,293.86 ft.

MONTHEND ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

Date	Elevation	Contents	Change in contents
Sept. 30	1294.84	601490	
Oct. 31	1294.58	568610	-32880
Nov. 30	1294.39	544580	-24030
Dec. 31	1294.31	534480	-10100
CAL YR 1993			+27840
Jan. 31	1294.02	497800	-36680
Feb. 28	1293.93	486910	-10890
Mar. 31	1294.07	504110	+17200
Apr. 30	1294.58	568610	+64500
May 31	1294.88	606550	+37940
June 30	1294.93	612880	+6330
July 31	1295.04	626790	+13910
Aug. 31	1295.08	631830	+5040
Sept. 30	1294.60	571140	-60690
WTR YR 1994			-30350

LEECH LAKE RIVER BASIN
05206000 LEECH LAKE AT FEDERAL DAM, MN--Continued



LEECH LAKE RIVER BASIN

05206500 LEECH LAKE RIVER AT FEDERAL DAM, MN

LOCATION.--Lat 47°14'45", long 94°13'12", in sec. 34, T. 144 N., R. 28 W., Cass County, Hydrologic Unit 07010102, on Leech Lake Indian Reservation, on right bank at dam on Leech Lake River at city of Federal Dam, 2 mi downstream from natural outlet of Leech Lake.

DRAINAGE AREA.--1,163 mi².

PERIOD OF RECORD.--May 1884 to current year. Monthly discharge only for some periods, published in WSP 1308.

GAGE.--Water-stage recorder, headwater gage, and nonrecording tailwater gage. Datum of gage is in mean sea level (levels by U. S. Army Corps of Engineers). Prior to June 30, 1973, gages (nonrecording headwater gage prior to July 3, 1948) at same sites with datum at 1,293.23 ft, adjustment of 1912. May 27 to Nov. 30, 1929, nonrecording gage at site 600 ft downstream at different datum.

REMARKS.--Discharge computed on basis of modified weir formula, the head being obtained from readings on tailwater gage and mean gage height from recording headwater gage. Flow completely regulated by Leech Lake (station 05206000).

COOPERATION.--Computations of daily discharge were provided by U.S. Army Corps of Engineers.

AVERAGE DISCHARGE (unadjusted).--110 years, 350 ft³/s, 4.08 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 2,520 ft³/s, June 7, 1957 (result of dam failure); no flow at times.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	840	308	800	680	640	800	110	335	513	820	250	400
2	840	325	820	680	660	800	110	335	513	800	250	400
3	840	308	820	680	640	800	110	335	513	800	250	445
4	840	297	820	680	640	800	110	335	459	800	250	494
5	840	308	820	680	640	735	112	352	392	800	250	539
6	840	308	820	660	640	735	112	335	354	800	250	600
7	840	308	800	660	640	735	112	335	336	800	234	600
8	840	308	800	640	640	645	112	352	336	800	225	588
9	840	405	800	660	640	594	122	352	336	800	234	588
10	840	510	800	660	640	594	118	335	354	800	234	588
11	840	612	780	660	640	594	118	352	406	800	234	600
12	840	610	780	660	640	594	118	335	399	800	234	600
13	840	610	780	660	640	594	118	335	392	672	234	612
14	840	610	780	640	640	594	118	386	385	607	234	612
15	840	610	780	640	660	524	122	386	398	490	234	612
16	840	700	800	640	660	446	224	386	398	455	234	612
17	840	700	800	640	660	360	224	415	459	464	224	612
18	840	800	800	620	640	269	302	503	500	464	224	612
19	840	860	800	640	700	185	308	513	560	406	234	612
20	840	820	800	640	720	135	302	513	625	363	234	612
21	840	840	800	640	740	135	302	513	700	288	234	625
22	840	840	800	640	660	110	302	513	774	250	234	612
23	840	820	780	640	660	110	302	513	840	250	234	720
24	840	820	740	640	660	110	302	513	840	250	310	840
25	840	820	700	640	660	110	302	513	820	250	310	820
26	840	800	700	660	660	110	302	513	820	250	310	820
27	840	800	700	660	660	110	308	513	820	250	310	698
28	530	820	680	660	660	110	308	513	820	250	310	586
29	413	820	680	660	---	110	325	513	820	250	310	586
30	308	800	680	640	---	110	325	513	820	250	350	575
31	308	---	680	660	---	110	---	523	---	250	400	---
TOTAL	24239	18497	23940	20260	18380	12768	6160	13178	16702	16329	8059	18220
MEAN	782	617	772	654	656	412	205	425	557	527	260	607
MAX	840	860	820	680	740	800	325	523	840	820	400	840
MIN	308	297	680	620	640	110	110	335	336	250	224	400
AC-FT	48080	36690	47480	40190	36460	25330	12220	26140	33130	32390	15990	36140
CFSM	.67	.53	.66	.56	.56	.35	.18	.37	.48	.45	.22	.52
IN.	.78	.59	.77	.65	.59	.41	.20	.42	.53	.52	.26	.58

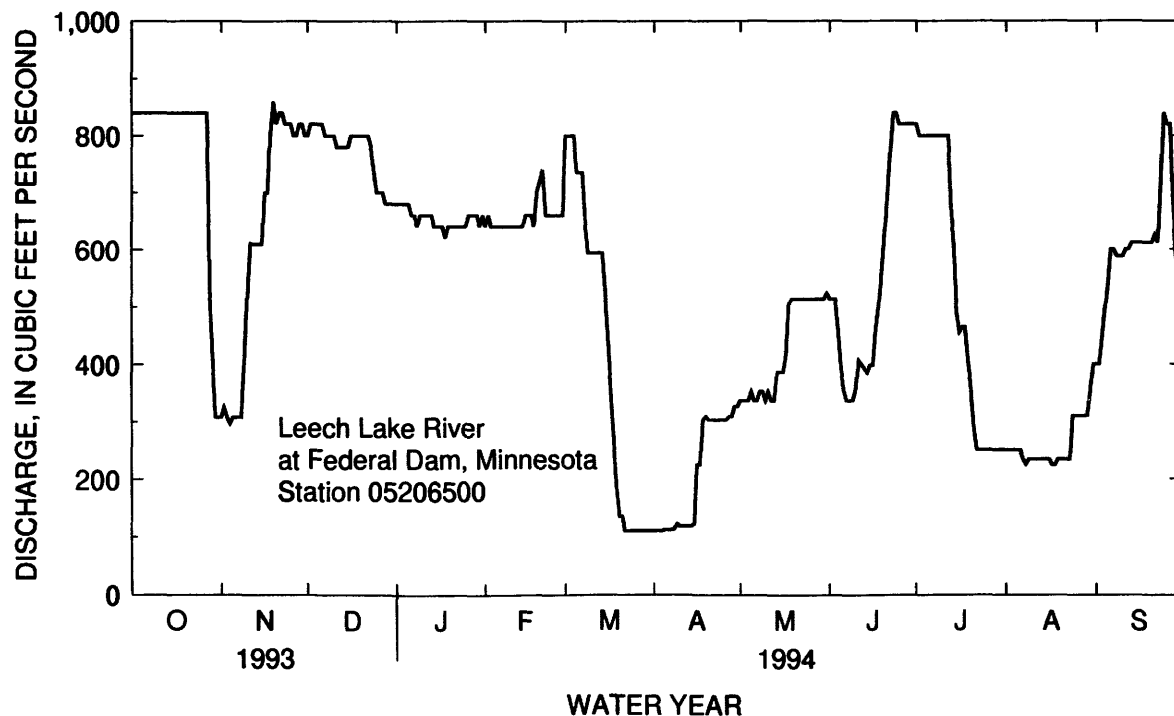
LEECH LAKE RIVER BASIN

05206500 LEECH LAKE RIVER AT FEDERAL DAM, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1885 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	416	399	406	391	377	296	168	270	340	365	369	396
MAX	1190	1100	1042	986	1001	868	674	935	1000	920	954	901
(WY)	1979	1983	1983	1983	1980	1945	1974	1974	1985	1985	1975	1900
MIN	24.6	24.0	25.2	25.6	5.00	5.00	13.8	14.3	3.00	25.8	26.4	21.1
(WY)	1937	1937	1937	1936	1934	1934	1936	1936	1932	1935	1935	1885

SUMMARY STATISTICS	FOR 1993 CALENDAR YEAR		FOR 1994 WATER YEAR		WATER YEARS 1885 - 1994	
ANNUAL TOTAL	185460		196732			
ANNUAL MEAN	508		539		350	
HIGHEST ANNUAL MEAN					712	
LOWEST ANNUAL MEAN					27.7	
HIGHEST DAILY MEAN	860	Nov 19	860	Nov 19	1300	May 17 1982
LOWEST DAILY MEAN	96	May 23	110	Mar 22-Apr 4	.00	May 21 1887
ANNUAL SEVEN-DAY MINIMUM	112	Apr 10	110	Mar 22	3.0	May 9 1932
ANNUAL RUNOFF (AC-FT)	367900		390200		253300	
ANNUAL RUNOFF (CFSM)	.44		.46		.30	
ANNUAL RUNOFF (INCHES)	5.93		6.29		4.08	
10 PERCENT EXCEEDS	840		820		800	
50 PERCENT EXCEEDS	496		610		243	
90 PERCENT EXCEEDS	152		234		65	



MISSISSIPPI RIVER MAIN STEM

05210500 POKEGAMA LAKE NEAR GRAND RAPIDS, MN

LOCATION.--Lat 47°10'00", long 93°33'20", in NW¼ sec. 17, T.54 N., R.25 W., Itasca County, Hydrologic Unit 07010101, at narrows on U.S. Highway 169, 4 mi south of Grand Rapids and at mile 1.184 upstream from Ohio River.

DRAINAGE AREA.--3,265 mi².

PERIOD OF RECORD.--April 1884 to current year. Prior to October 1941 monthend contents only, published in WSP 1308. Published as Pokegama Reservoir near Grand Rapids. October 1941 to September 1956.

REVISED RECORDS.--WSP 1914: 1897(M).

GAGE.--Water-stage recorder. Datum of gage is in mean sea level (levels by U.S. Army Corps of Engineers). Prior to May 30, 1949, nonrecording gage at Pooles Arm of Pokegama Lake 5 mi northwest, and May 31, 1949, to July 12, 1973, water-stage recorder at same site and at datum 64.42 ft higher.

REMARKS.--Reservoir is formed by Pokegama Lake and several other natural lakes controlled by concrete dam; storage began in 1884; original timber dam completed in 1884, replaced by present structure in 1888-89. Capacity between elevation 1,270.42 ft and 1,276.42 ft (maximum allowable range) is 80,126 acre-ft of which 52,483 acre-ft is controlled storage between elevations 1,270.42 ft and 1,274.42 ft (normal operating range). Contents shown herein are contents above elevation 1,267.00 ft. Prior to September 1978, published contents as contents above elevation 1,268.92 ft. Water is used to benefit navigation on Mississippi River below Minneapolis.

COOPERATION.--Records were provided by U.S. Army Corps of Engineers.

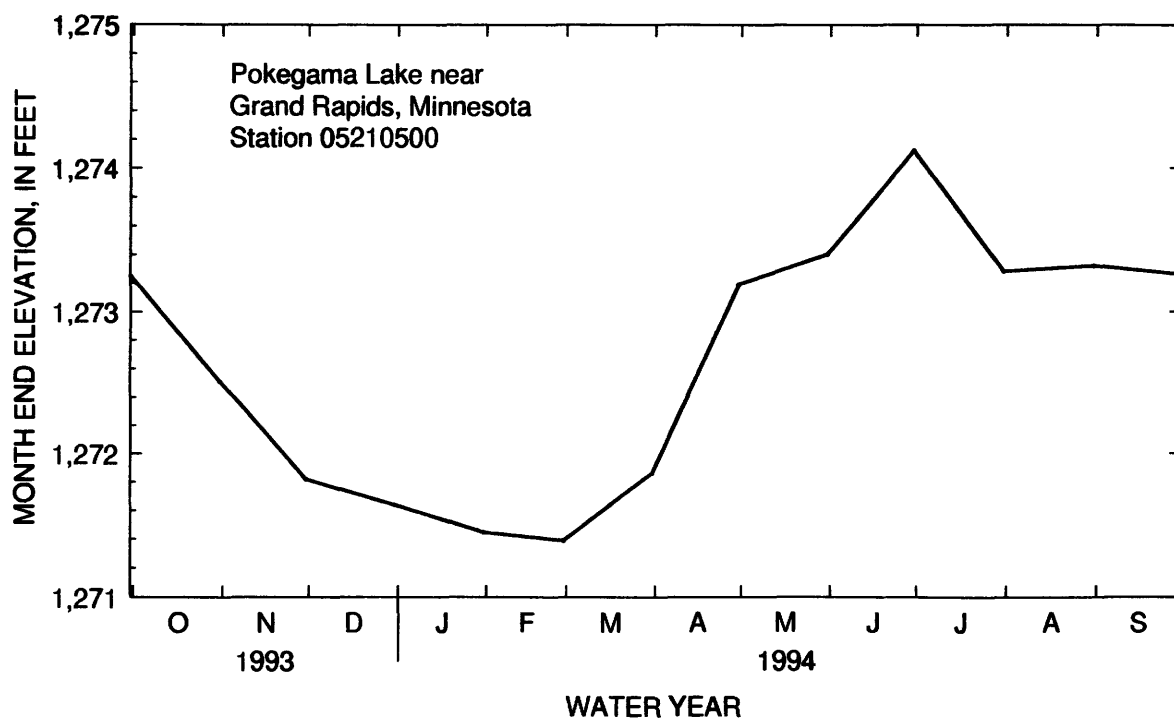
EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 132,160 acre-ft, May 23, 1986, elevation, 1,275.28 ft; maximum elevation, 1,277.92 ft, May 8, 1897; minimum contents observed, 4,520 acre-ft, below zero of capacity table then in use, Sept. 30, 1934, elevation, 1,268.54 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 109,760 acre-ft, June 29, elevation, 1,274.13 ft; minimum, 66,960 acre-ft, Mar. 4, elevation, 1,271.29 ft.

MONTHEND ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

	Elevation	Contents	Change in contents
Sept. 30	1273.25	95320	
Oct. 31	1272.51	84270	-11050
Nov. 30	1271.82	74380	-9890
Dec. 31	1271.64	71820	-2560
CAL YR 1993			-3560
Jan. 31	1271.45	69120	-2700
Feb. 28	1271.39	68290	-830
Mar. 31	1271.86	74950	+6660
Apr. 30	1273.19	94420	+19470
May 31	1273.40	97550	+3130
June 30	1274.12	109600	+12050
July 31	1273.28	95770	-13830
Aug. 31	1273.32	96360	+590
Sept. 30	1273.26	95470	-890
WTR YR 1994			+150

MISSISSIPPI RIVER MAIN STEM
05210500 POKEGAMA LAKE NEAR GRAND RAPIDS, MN--Continued



MISSISSIPPI RIVER MAIN STEM

05211000 MISSISSIPPI RIVER AT GRAND RAPIDS, MN

LOCATION.--Lat 47°13'56", long 93°31'48", in SW¹/₄NW¹/₄ 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 mi², 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 mean sea level. See WSP 1914 for history of changes prior to Jan. 17, 1951.

REMARKS.--Records fair. Flow regulated by Winnibigoshish Lake (station 05201000), Leech Lake (station 05206000), Pokegama Lake (station 05210500) and occasionally at low flow by powerplant at Blandin Dam. Backwater from Prairie River occurs at times in most years.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2280	2120	e1550	e1790	e1630	e1660	683	1430	944	2710	2450	991
2	2250	2090	e1570	e1790	e1640	e1660	653	1460	939	2690	2430	976
3	2240	2100	e1590	e1810	e1640	e1660	646	1340	940	2670	2390	1050
4	2230	2110	1600	e1850	e1640	1660	673	1230	976	2710	2310	973
5	1740	2100	1590	e1850	e1640	1570	667	1260	664	2750	2230	1040
6	2270	2130	e1650	e1910	e1640	1550	819	1240	191	2810	2200	1040
7	2370	2120	1910	e1940	e1640	1490	898	1240	851	2800	2200	988
8	2300	2080	e1910	e1900	e1640	1380	921	1220	1120	2840	2200	1100
9	2270	2050	e1910	e1890	e1640	1490	916	1260	1270	2820	2130	1050
10	2250	2090	e1950	e1830	e1640	1490	870	1310	1300	2770	2030	1050
11	2230	2060	e2190	e1840	e1640	1500	945	1300	1290	2960	1710	1060
12	2160	2050	e2100	e1840	e1640	1490	1050	1270	1300	3380	1870	1080
13	1990	2070	e2050	e1840	e1640	1500	1190	1210	1310	3330	1950	1090
14	1970	2050	e2020	e1840	e1640	1480	1360	1210	1500	3310	1970	1080
15	1980	2040	e2020	e1820	e1640	1400	1450	1210	1660	3240	1890	1250
16	1960	2050	e2020	e1810	e1640	1520	1590	1220	1760	3110	1780	1360
17	1980	2040	e2020	e1810	e1640	1560	1680	1090	2200	3020	1650	1420
18	1960	2020	e2010	e1760	e1570	1550	1670	1070	2330	2930	1550	1400
19	1980	1990	2010	e1760	e1570	1550	1640	1090	2280	2910	1600	1430
20	2010	1940	2060	e1760	e1570	1540	1650	1090	2230	3120	1640	1520
21	2000	1900	e2070	e1760	e1570	1450	1640	1090	2200	3020	1670	1710
22	2100	1830	e2060	e1810	e1570	1300	1570	1090	2200	2880	1630	1960
23	2170	1610	e2050	e1820	e1570	1190	1440	1020	2350	2790	1630	1900
24	2170	1240	e2040	e1840	e1570	1210	1420	894	2510	2720	1570	1850
25	2160	1100	e1980	e1830	e1570	1150	1420	945	2520	2710	1310	1830
26	2140	1100	e1970	e1830	e1660	1010	1430	893	2560	2610	1250	1800
27	2120	1100	e1950	e1770	e1660	1000	1390	939	2530	2560	1240	1760
28	2140	1130	e1900	e1600	e1660	974	1390	921	2510	2510	1170	1770
29	2100	1370	e1890	e1630	---	880	1430	971	2470	2460	1100	1740
30	2120	e1600	e1850	e1630	---	831	1450	939	2570	2470	979	1720
31	2130	---	e1780	e1620	---	674	---	933	---	2460	951	---
TOTAL	65770	55280	59270	55780	45410	42369	36551	35385	51475	88070	54680	40988
MEAN	2122	1843	1912	1799	1622	1367	1218	1141	1716	2841	1764	1366
MAX	2370	2130	2190	1940	1660	1660	1680	1460	2570	3380	2450	1960
MIN	1740	1100	1550	1600	1570	674	646	893	191	2460	951	973
AC-FT	130500	109600	117600	110600	90070	84040	72500	70190	102100	174700	108500	81300
CFSM	.63	.55	.57	.53	.48	.41	.36	.34	.51	.84	.52	.41
IN.	.73	.61	.65	.62	.50	.47	.40	.39	.57	.97	.60	.45

e Estimated.

MISSISSIPPI RIVER MAIN STEM

05211000 MISSISSIPPI RIVER AT GRAND RAPIDS, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1942 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	1410	1543	1448	1461	1464	1372	1191	1264	1313	1387	1253	1250
MAX	2865	2496	2375	2410	2729	2762	3442	3026	3271	3363	3711	3542
(WY)	1986	1954	1954	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 1993 CALENDAR YEAR

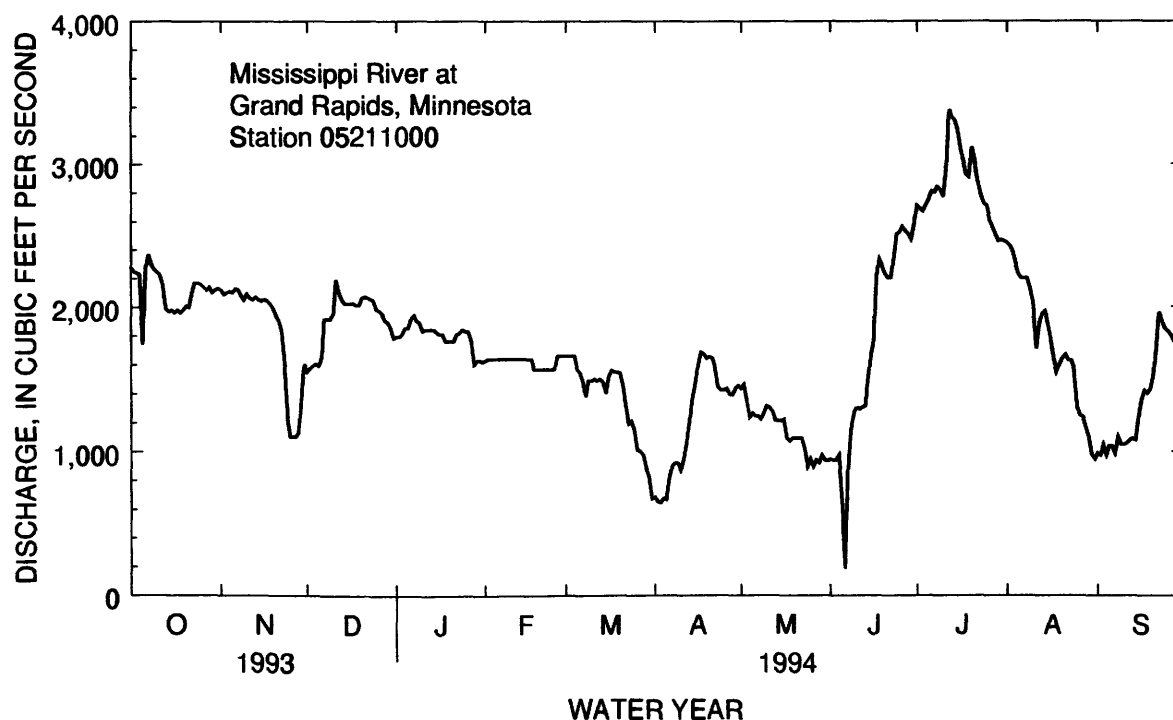
FOR 1994 WATER YEAR

WATER YEARS 1942 - 1994

ANNUAL TOTAL	571201	631028	
ANNUAL MEAN	1565	1729	1370 ^a
HIGHEST ANNUAL MEAN			2265
LOWEST ANNUAL MEAN			277
HIGHEST DAILY MEAN	2950	Jul 19	3380
LOWEST DAILY MEAN	483	Apr 26	191
ANNUAL SEVEN-DAY MINIMUM	577	May 17	688
INSTANTANEOUS PEAK FLOW			3490
INSTANTANEOUS PEAK STAGE			9.93
INSTANTANEOUS LOW FLOW			178
ANNUAL RUNOFF (AC-FT)	1133000	1252000	992600
ANNUAL RUNOFF (CFSM)	.46	.51	.41
ANNUAL RUNOFF (INCHES)	6.31	6.97	5.52
10 PERCENT EXCEEDS	2440	2460	2320
50 PERCENT EXCEEDS	1400	1660	1350
90 PERCENT EXCEEDS	880	996	349

a Average based on 111 years of record is 1190 ft³/s; median of annual mean discharges is 1070 ft³/s.b From rating curve extended above 4500 ft³/s.

c From floodmark, caused by dam failure.



SANDY RIVER BASIN

05218500 SANDY LAKE AT LIBBY, MN

LOCATION.--Lat 46°47'20", long 93°19'10", in sec.25, T.50 N., R.24 W., Aitkin County, Hydrologic Unit 07010103, on dam on Sandy River at Libby, 1.2 mi upstream from mouth, and 14 mi north of McGregor.

DRAINAGE AREA.--421 mi².

PERIOD OF RECORD.--July to December 1893, October to December 1894, July 1895 to current year. Monthend contents only for some periods, published in WSP 1308. Published as Sandy Lake Reservoir at Libby, October 1941 to September 1956.

GAGE.--Water-stage recorder. Datum of gage is in mean sea level (levels by U.S. Army Corps of Engineers). Prior to Sept. 23, 1949, nonrecording gage and Sept. 24, 1949, to Nov. 28, 1962, water-stage recorder at site 1 mi upstream at datum 1,207.71 ft, adjustment of 1912. Nov. 29, 1962, to June 30, 1973, water-stage recorder at present site at datum 1,207.71 ft, adjustment of 1912.

REMARKS.--Lake is formed by concrete dam which controls Sandy, Flowage, Snake, and Aitkin Lakes. Storage began in 1893; original timber crib dam completed in 1895, replaced by present structure in 1911. Capacity between elevation 1,214.31 ft and 1,221.31 ft (top of structure) is 73,037 acre-ft, of which 37,539 acre-ft is controlled storage between elevations 1,214.31 ft and 1,218.31 ft (normal operating range). Contents shown herein are contents above elevation 1,207.00 ft. Prior to September 1978, published contents as contents above elevation 1,209.03 ft. Water is used to benefit navigation on Mississippi River below Minneapolis.

COOPERATION.--Records were provided by U.S. Army Corps of Engineers.

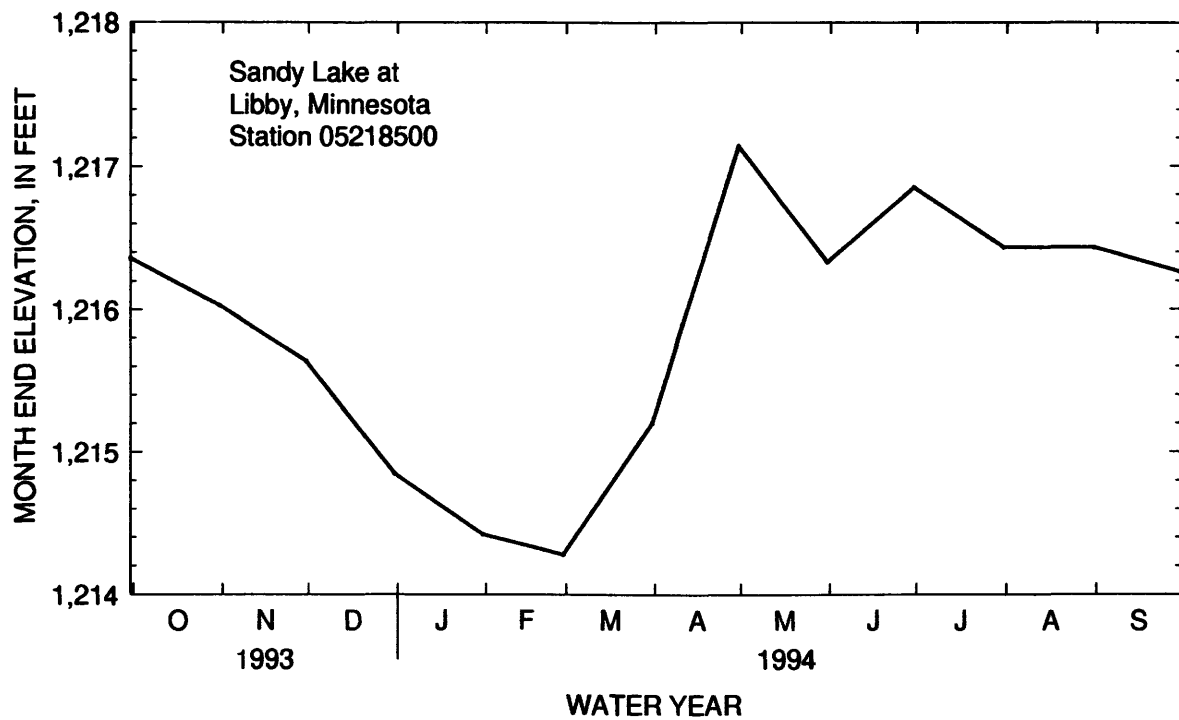
EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 167,200 acre-ft, capacity table then in use, May 19, 1950, elevation, 1,224.82 ft; minimum observed, 5,950 acre-ft, below zero of capacity table then in use, Jan. 20, 1921, elevation, 1,207.96 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 71,202 acre-ft, May 3, elevation, 1,217.27 ft; minimum, 43,960 acre-ft, Feb. 17, elevation, 1,214.26 ft.

MONTHEND ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30	1216.36	62390	
Oct. 31	1216.03	59320	-3070
Nov. 30	1215.64	55770	-3550
Dec. 31	1214.85	48870	-6900
CAL YR 1993			-1630
Jan. 31	1214.42	45270	-3600
Feb. 28	1214.28	44120	-1150
Mar. 31	1215.20	51890	+7770
Apr. 30	1217.14	69930	+18040
May 31	1216.33	62100	-7830
June 30	1216.85	67070	+4970
July 31	1216.43	63060	-4010
Aug. 31	1216.43	63060	0
Sept. 30	1216.26	61440	-1620
WTR YR 1994			-950

SANDY RIVER BASIN
05218500 SANDY LAKE AT LIBBY, MN--Continued



SANDY RIVER BASIN

05219000 SANDY RIVER AT SANDY LAKE DAM, AT LIBBY, MN

LOCATION.--Lat 46°47'20", long 93°19'10", in sec. 25, T. 50 N., R. 24 W., Aitkin County, Hydrologic Unit 07010103, at dam at outlet of Sandy Lake, at Libby, 1.2 mi above mouth, and 14 mi north of McGregor.

DRAINAGE AREA.--421 mi².

PERIOD OF RECORD.--July 1893 to March 1894, July 1894, November 1894 to March 1895, August 1895 to current year. Monthly discharge only for some periods, published in WSP 1308. Published as "below Sandy Lake Reservoir" 1893-1916.

GAGE.--Water-stage recorders on headwater and tailwater. Datum of gages is in sea level (levels by U.S. Army Corps of Engineers). Prior to June 30, 1973, gages (nonrecording gages prior to June 20, 1949) at same site with datum at 1,207.71 ft, adjustment of 1912.

REMARKS.--Discharge computed on basis of head over dam, using modified weir formula, head being obtained from headwater and tailwater recorder records. Flow completely regulated by Sandy Lake (station 05218500).

COOPERATION.--Computations of daily discharge were provided by U.S. Army Corps of Engineers; discharge measurements made and records reviewed by Geological Survey.

AVERAGE DISCHARGE (unadjusted).--99 years (water years 1896-current), 196 ft³/s, 6.34 in./yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 3,740 ft³/s, July 12, 1897; no flow at times.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	57	160	214	178	106	89	160	1180	279	480	104	155
2	57	200	204	182	106	87	162	1180	285	540	107	156
3	58	198	198	185	106	87	162	1360	288	540	135	156
4	58	198	224	146	106	87	162	1360	147	540	350	155
5	58	198	209	146	106	83	164	1360	149	468	350	155
6	59	198	205	146	106	83	166	1410	149	498	355	153
7	60	195	238	143	106	81	166	1430	153	498	360	152
8	60	193	242	143	106	84	164	1420	164	498	365	150
9	59	193	240	143	106	87	261	1410	165	498	213	150
10	58	190	240	140	106	89	252	1380	155	570	195	100
11	57	188	236	140	106	89	249	1150	147	570	198	100
12	58	188	232	140	106	90	365	480	121	528	82	100
13	107	193	224	140	106	90	462	536	121	600	85	100
14	107	195	220	140	106	90	540	552	78	448	87	100
15	109	193	208	140	80	46	642	552	79	504	87	152
16	109	225	204	140	83	46	868	544	76	312	87	396
17	111	225	192	140	83	47	1100	704	70	336	87	384
18	111	225	192	140	83	47	984	704	273	207	45	728
19	111	225	192	140	83	47	936	560	238	153	46	688
20	111	225	192	140	83	47	984	608	214	159	47	688
21	111	225	204	140	87	47	1020	405	459	165	47	680
22	111	225	212	140	87	49	1070	420	460	168	47	664
23	166	229	216	140	87	50	1100	425	936	385	47	640
24	164	218	224	140	87	52	1160	430	816	424	47	608
25	162	200	236	103	87	53	1160	435	768	424	47	592
26	162	206	236	103	89	56	1150	440	720	432	48	592
27	160	208	236	103	89	56	1200	450	648	177	49	462
28	160	208	191	103	89	63	1120	410	528	187	149	474
29	158	206	185	103	---	155	1120	414	528	170	150	304
30	160	224	178	105	---	157	1170	419	480	98	152	311
31	158	---	178	102	---	158	---	419	---	102	153	---
TOTAL	3247	6154	6602	4234	2681	2392	20219	24547	9694	11679	4321	10245
MEAN	105	205	213	137	95.7	77.2	674	792	323	377	139	341
MAX	166	229	242	185	106	158	1200	1430	936	600	365	728
MIN	57	160	178	102	80	46	160	405	70	98	45	100
AC-FT	6440	12210	13100	8400	5320	4740	40100	48690	19230	23170	8570	20320
CFSM	.25	.49	.51	.32	.23	.18	1.60	1.88	.77	.89	.33	.81
IN.	.29	.54	.58	.37	.24	.21	1.79	2.17	.86	1.03	.38	.91

SANDY RIVER BASIN

05219000 SANDY RIVER AT SANDY LAKE DAM, AT LIBBY, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1899 - 1994, BY WATER YEAR (WY)

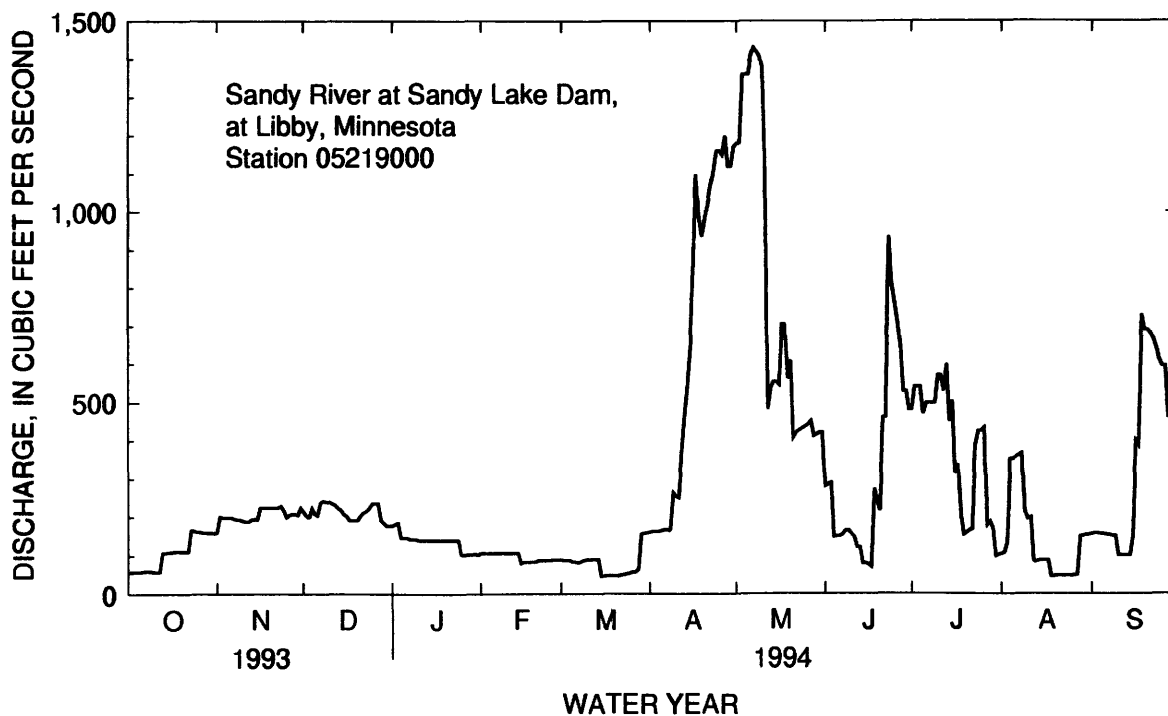
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	187	162	135	110	92.3	95.1	281	438	313	198	159	176
MAX	1003	853	444	436	551	450	1013	1659	1070	916	1158	1052
(WY)	1983	1972	1966	1966	1907	1927	1986	1979	1965	1991	1972	1986
MIN	.000	.000	.000	.000	.000	.000	.000	3.06	5.00	.000	.000	.000
(WY)	1902	1901	1900	1899	1899	1899	1899	1918	1924	1904	1900	1910

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1899 - 1994

ANNUAL TOTAL	116185	106015	
ANNUAL MEAN	318	290	196
HIGHEST ANNUAL MEAN			540
LOWEST ANNUAL MEAN			13.4
HIGHEST DAILY MEAN	1610	1430	2780
LOWEST DAILY MEAN	40	45	.00
ANNUAL SEVEN-DAY MINIMUM	44	47	.00
ANNUAL RUNOFF (AC-FT)	230500	210300	142300
ANNUAL RUNOFF (CFSM)	.76	.69	.47
ANNUAL RUNOFF (INCHES)	10.27	9.37	6.34
10 PERCENT EXCEEDS	859	670	520
50 PERCENT EXCEEDS	193	166	93
90 PERCENT EXCEEDS	50	67	5.0



MISSISSIPPI RIVER MAIN STEM

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 mi², 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 fair. Flow regulated by Winnibigoshish Lake (sta 05201000), Leech Lake (sta 05206000), Pokegama Lake (sta 05210500), and Sandy Lake (sta 05218500). 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.--River gage: Maximum discharge, 4,680 ft³/s, May 2, gage height, 12.67 ft. Diversion channel: Maximum discharge, 3,330 ft³/s, May 2, gage height, 12.36 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2950	2910	e2700	e2500	e2300	e2100	e3050	7910	2800	6580	3840	1830
2	2930	2900	e2800	e2500	e2290	e2100	e2950	7950	2680	6540	3770	1750
3	2940	2920	e2900	e2500	e2200	e2100	e2920	7910	2600	6480	3710	1720
4	2930	2940	e2950	e2450	e2190	e2140	e2930	7830	2500	6420	3680	1720
5	2900	2950	e3000	e2450	e2150	e2190	e2950	7680	2410	6380	3690	1750
6	2890	2910	e3050	e2420	e2140	e2200	2930	7430	2350	6330	3650	1790
7	2830	2880	e3100	e2400	e2100	e2250	2890	7230	2300	6290	3530	1810
8	2710	2930	e3100	e2400	e2100	e2300	2900	6910	2050	6280	3450	1850
9	2710	2950	e3100	e2400	e2100	e2300	3140	6630	1710	6240	3320	1860
10	2790	2920	e3100	e2400	e2100	e2300	3450	6390	1770	6150	3180	1840
11	2860	2930	e3100	e2400	e2100	e2300	3680	6140	2030	6050	3090	1820
12	2910	2970	e3000	e2400	e2100	e2300	3880	5690	2190	5950	2980	1800
13	2910	2970	e2990	e2390	e2100	e2300	4140	5200	2210	5840	2790	1810
14	2900	2930	e3000	e2390	e2090	e2300	4380	5120	2190	5670	2600	1870
15	2860	2910	e3000	e2350	e2090	e2350	4980	5300	2180	5510	2540	1950
16	2770	2930	e3020	e2350	e2090	e2400	6130	5270	2220	5390	2520	2060
17	2690	2960	e3100	e2320	e2050	e2450	6890	5180	2440	5260	2510	2220
18	2660	2970	e3100	e2310	e2090	e2500	7300	5110	2990	5090	2450	2390
19	2650	2950	e3100	e2310	e2090	e2550	7420	4930	3700	4970	2390	2600
20	2640	2940	e3100	e2310	e2100	e2600	7400	4600	4480	4850	2330	2700
21	2640	e2900	e3100	e2300	e2100	e2750	7410	4240	5230	4740	2260	2700
22	2670	e2670	e3050	e2300	e2100	e2800	7380	3950	5670	4650	2230	2790
23	2770	e2500	e3050	e2300	e2100	e2900	7300	3770	5940	4630	2220	2970
24	2850	e2600	e3000	e2300	e2100	e3000	7170	3690	6170	4660	2230	3160
25	2930	e2700	e2800	e2300	e2100	e3100	6980	3530	6380	4630	2240	3300
26	2980	e2300	e2720	e2300	e2100	e3150	7250	3420	6570	4590	2270	3320
27	2970	e2000	e2690	e2300	e2100	e3150	7730	3300	6650	4440	2240	3230
28	2970	e2200	e2620	e2300	e2100	e3150	7800	3180	6710	4250	2120	3110
29	2970	e2400	e2590	e2300	---	e3150	7760	3050	6730	4100	2010	2980
30	2970	e2550	e2550	e2300	---	e3150	7790	2940	6650	3950	1960	2840
31	2940	---	e2500	e2300	---	e3100	---	2880	---	3860	1900	---
TOTAL	88090	83490	90980	73250	59370	79430	160880	164360	112500	166770	85700	69540
MEAN	2842	2783	2935	2363	2120	2562	5363	5302	3750	5380	2765	2318
MAX	2980	2970	3100	2500	2300	3150	7800	7950	6730	6580	3840	3320
MIN	2640	2000	2500	2300	2050	2100	2890	2880	1710	3860	1900	1720
AC-FT	174700	165600	180500	145300	117800	157500	319100	326000	223100	330800	170000	137900
CFSM	.46	.45	.48	.38	.35	.42	.87	.86	.61	.88	.45	.38
IN.	.53	.51	.55	.44	.36	.48	.97	1.00	.68	1.01	.52	.42

e Estimated.

MISSISSIPPI RIVER MAIN STEM

05227500 MISSISSIPPI RIVER AT AITKIN, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1945 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	2569	2638	2175	1905	1817	2182	5114	5235	3705	2997	2305	2236
MAX	6534	6756	3762	3525	3196	5415	10830	15510	8072	8201	8270	6689
(WY)	1966	1972	1972	1966	1966	1945	1966	1950	1965	1993	1953	1986
MIN	313	328	324	345	398	638	1074	669	539	346	273	321
(WY)	1977	1977	1977	1977	1977	1977	1977	1958	1988	1961	1961	1976

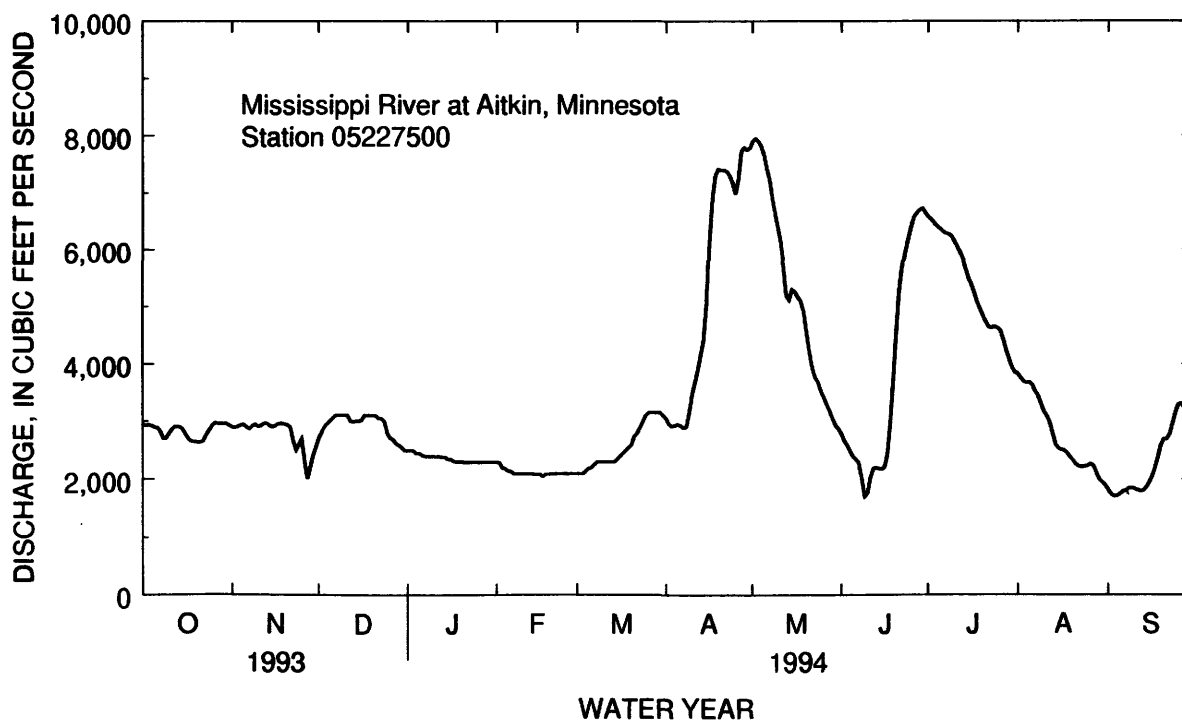
SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1945 - 1994

ANNUAL TOTAL	1261670	1234360	
ANNUAL MEAN	3457	3382	2897
HIGHEST ANNUAL MEAN			4985
LOWEST ANNUAL MEAN			796
HIGHEST DAILY MEAN	9780	Jul 10	7950
LOWEST DAILY MEAN	1190	Mar 1	1710
ANNUAL SEVEN-DAY MINIMUM	1190	Feb 28	1770
INSTANTANEOUS PEAK FLOW			7960
INSTANTANEOUS PEAK STAGE			12.67
INSTANTANEOUS LOW FLOW			1660
ANNUAL RUNOFF (AC-FT)	2503000	2448000	2099000
ANNUAL RUNOFF (CFSM)	.56	.55	.47
ANNUAL RUNOFF (INCHES)	7.64	7.48	6.41
10 PERCENT EXCEEDS	6120	6310	5810
50 PERCENT EXCEEDS	3020	2900	2300
90 PERCENT EXCEEDS	1340	2100	940

a Present datum.



PINE RIVER BASIN

05230500 PINE RIVER RESERVOIR AT CROSS LAKE, MN

LOCATION.--Lat 46°40'09", long 94°06'44", in SW 1/4 NW 1/4 sec. 21, T. 137 N., R. 27 W., Crow Wing County, Hydrologic Unit 07010105, at dam on Pine River, at outlet of Cross Lake at city of Cross Lake.

DRAINAGE AREA.--562 mi².

PERIOD OF RECORD.--March 1886 to current year. Monthend contents only for some periods, published in WSP 1308.

GAGE.--Water-stage recorder. Datum of gage is in mean sea level (levels by U.S. Army Corps of Engineers). Prior to May 3, 1949, nonrecording gage at same site and datum.

REMARKS.--Reservoir is formed by Trout, Whitefish, Rush, and Cross Lakes and several other natural lakes controlled by timber crib dams; storage began in 1886; dam completed in 1886. Capacity between elevations 1,226.32 ft and 1,234.82 ft (maximum allowable range) is 118,703 acre-ft of which 53,272 acre-ft is controlled storage between elevations 1,226.32 ft and 1,230.32 ft (normal operating range). Contents shown herein are contents above an elevation 1,216.00 ft. Prior to September 1978, published contents as contents above elevation 1,218.67 ft. Water is used to benefit navigation on Mississippi River below Minneapolis.

COOPERATION.--Records were provided by U.S. Army Corps of Engineers.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents observed, 173,600 acre-ft, capacity table then in use, July 10, 1916, elevation, 1,234.56 ft; minimum observed, 1,310 acre-ft, below zero of capacity table then in use, Aug. 20, 1918, elevation, 1,217.67 ft.

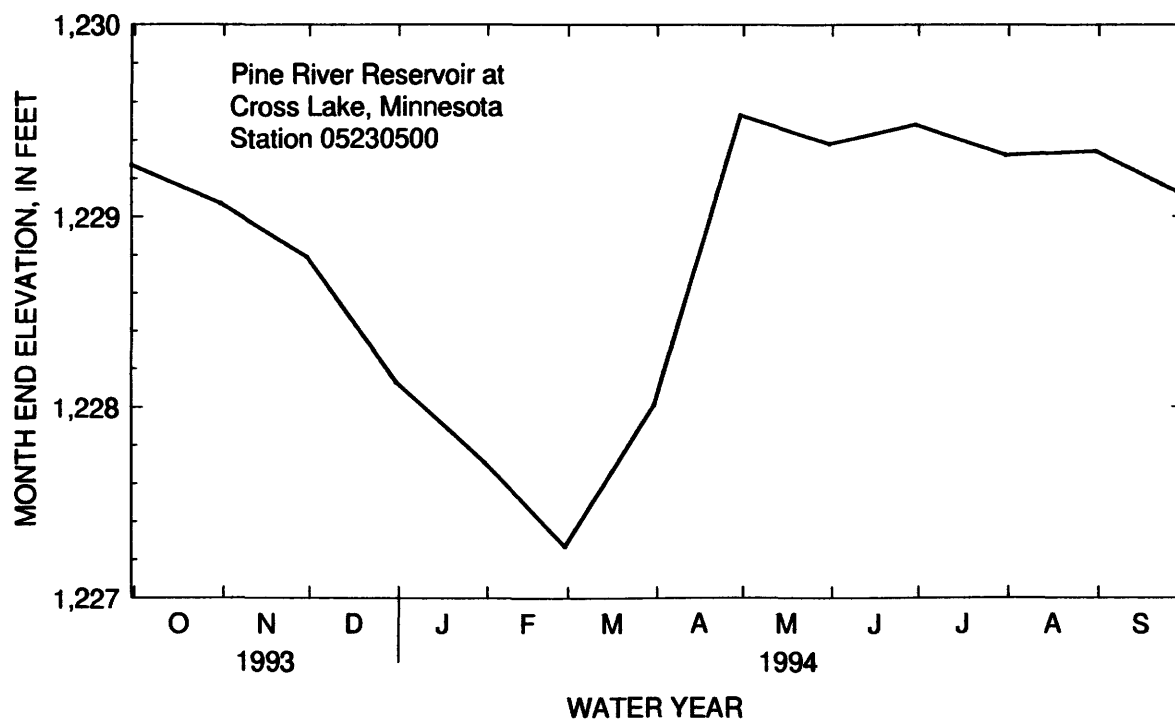
EXTREMES FOR CURRENT YEAR.--Maximum contents, 106,130 acre-ft, May 6, elevation, 1,229.67 ft; minimum, 74,050 acre-ft, Feb. 28, elevation, 1,227.27 ft.

MONTHEND ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

Date	Elevation (feet)	Contents (acre-feet)	Change in content (acre-feet)
Sept. 30	1229.27	100670	
Oct. 31	1229.07	97960	-2710
Nov. 30	1228.79	94170	-3790
Dec. 31	1228.13	85360	-8810
CAL YR 1993			-4390
Jan. 31	1227.71	79810	-5550
Feb. 28	1227.27	74050	-5760
Mar. 31	1228.01	83780	+9730
Apr. 30	1229.53	104210	+20430
May 31	1229.38	102170	-2040
June 30	1229.48	103530	+1360
July 31	1229.32	101350	-2180
Aug. 31	1229.34	101620	+270
Sept. 30	1229.11	98500	-3120
WTR YR 1994			-2170

PINE RIVER BASIN

05230500 PINE RIVER RESERVOIR AT CROSS LAKE, MN--Continued



PINE RIVER BASIN

05231000 PINE RIVER AT CROSS LAKE DAM, AT CROSS LAKE, MN

LOCATION.--Lat 46°40'09", long 94°06'44", in SW¹/₄NW¹/₄ sec.21, T.137 N., R.27 W., Crow Wing County, Hydrologic Unit 07010105, at dam at outlet of Cross Lake at city of Cross Lake.

DRAINAGE AREA.--562 mi².

PERIOD OF RECORD.--April 1886 to current year. Monthly discharge only for some periods, published in WSP 1308. Published as "below Pine River Reservoir" 1895-1916, 1929, and as "at Pine River Dam, at Cross Lake" 1941-56.

GAGE.--Water-stage recorder, headwater gage, and nonrecording tailwater gage. Datum of gages is 1,216.32 ft above mean sea level (levels by U.S. Army Corps of Engineers). Mar. 26, 1886, to May 31, 1929, nonrecording gages on headwater and tail water at same sites and datum. June 1 to Nov. 30, 1929, non-recording gage in tailwater at datum 1.60 ft lower. Dec. 1, 1929, to May 2, 1949, nonrecording gage on headwater and Dec. 1, 1929, to August 1949, nonrecording gage on tailwater at present sites and datum.

REMARKS.--Discharge computed principally on basis of modified weir formula, the head being obtained from twice-daily readings on tailwater gage and from headwater recorder. Flow completely regulated by Pine River Reservoir (station 05230500).

COOPERATION.--Computations of daily discharge were provided by U. S. Army Corps of Engineers.

AVERAGE DISCHARGE (unadjusted).--108 years, 220 ft³/s, 5.33 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 2,250 ft³/s, in June 1896 (does not include flow by passing dam through crevasse); no flow at times.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	150	250	350	350	350	250	150	450	600	300	40	125
2	150	250	350	350	350	250	150	450	150	300	40	125
3	150	250	350	350	350	250	150	600	150	300	40	80
4	150	250	350	350	350	250	150	600	150	300	265	80
5	150	250	350	350	350	200	150	600	150	300	265	80
6	150	250	350	350	350	200	150	750	150	300	265	80
7	150	250	400	350	350	200	150	750	150	300	265	80
8	150	250	400	350	350	150	150	750	100	300	265	80
9	150	250	400	350	350	150	150	750	100	500	150	80
10	150	250	400	350	350	150	150	750	100	500	150	80
11	150	250	400	350	350	150	150	750	60	500	100	80
12	150	250	400	350	350	150	150	750	60	500	100	80
13	150	250	400	350	350	150	150	750	60	500	100	50
14	150	250	400	350	350	150	150	500	40	500	100	50
15	150	250	400	350	350	150	150	500	40	250	100	180
16	150	300	400	350	350	150	150	500	40	250	100	180
17	150	300	400	350	350	150	150	500	40	250	100	320
18	150	300	400	350	350	150	150	250	100	250	100	320
19	150	300	400	350	350	75	150	250	100	250	100	320
20	150	300	400	350	350	75	150	250	100	250	100	320
21	150	300	400	350	350	75	150	300	250	250	100	320
22	150	300	400	350	350	75	150	300	300	250	100	320
23	250	300	400	350	350	75	150	300	300	200	80	320
24	250	300	400	350	350	75	150	450	300	200	80	260
25	250	300	400	350	350	75	150	450	530	200	80	260
26	250	300	400	350	350	150	150	600	530	100	200	260
27	250	300	400	350	350	150	150	600	530	100	200	260
28	250	300	400	350	350	150	150	400	300	40	200	260
29	250	300	350	350	---	150	300	400	300	40	200	260
30	250	350	350	350	---	150	450	400	300	40	125	260
31	250	---	350	350	---	150	---	400	---	40	125	---
TOTAL	5550	8300	11950	10850	9800	4675	4950	16050	6080	8360	4235	5570
MEAN	179	277	385	350	350	151	165	518	203	270	137	186
MAX	250	350	400	350	350	250	450	750	600	500	265	320
MIN	150	250	350	350	350	75	150	250	40	40	40	50
AC-FT	11010	16460	23700	21520	19440	9270	9820	31840	12060	16580	8400	11050
CFSM	.32	.49	.69	.62	.62	.27	.29	.92	.36	.48	.24	.33
IN.	.37	.55	.79	.72	.65	.31	.33	1.06	.40	.55	.28	.37

PINE RIVER BASIN

05231000 PINE RIVER AT CROSS LAKE DAM, AT CROSS LAKE, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1898 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	236	191	190	201	184	181	212	286	284	257	203	216
MAX	1126	898	547	499	613	657	907	1213	1316	988	853	787
(WY)	1974	1972	1987	1944	1910	1910	1966	1950	1965	1985	1972	1898
MIN	10.0	10.0	4.35	7.94	10.0	10.0	5.27	6.35	8.73	9.10	10.0	10.0
(WY)	1937	1935	1899	1899	1935	1935	1931	1931	1931	1931	1936	1936

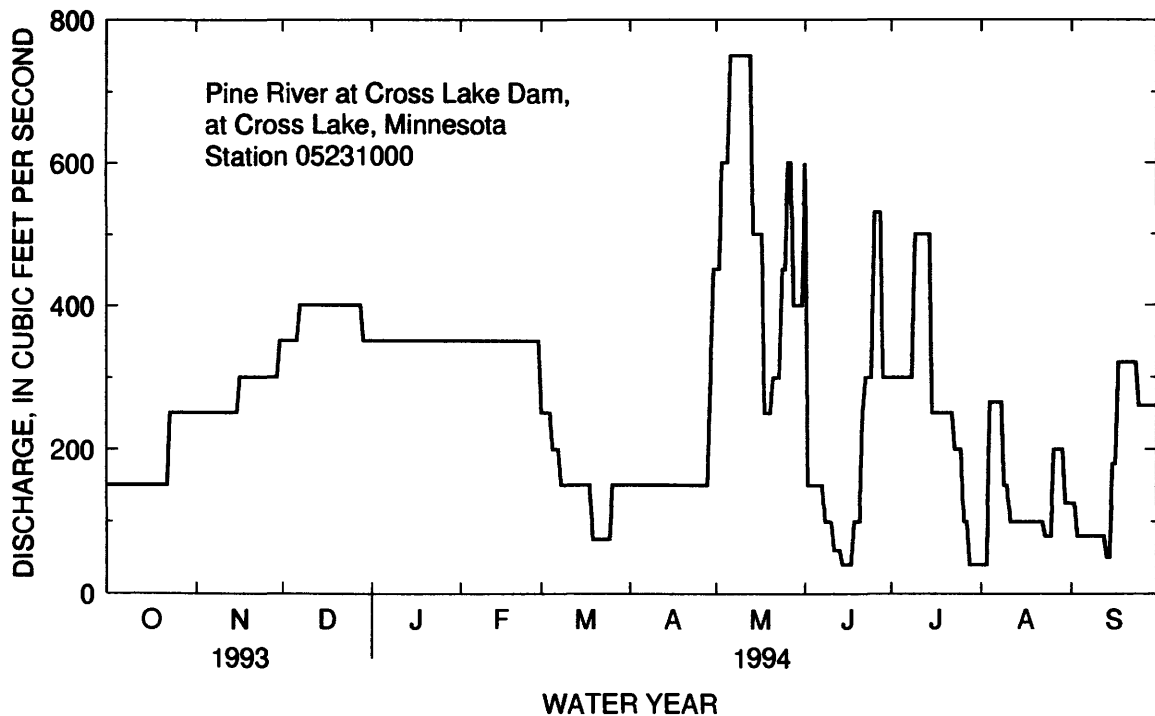
SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1898 - 1994

ANNUAL TOTAL	107322	96370	
ANNUAL MEAN	294	264	220
HIGHEST ANNUAL MEAN			509
LOWEST ANNUAL MEAN			32.9
HIGHEST DAILY MEAN	1250	Jul 16	750
LOWEST DAILY MEAN	50	Mar 26	40
ANNUAL SEVEN-DAY MINIMUM	50	Apr 8	40
ANNUAL RUNOFF (AC-FT)	212900	191100	159700
ANNUAL RUNOFF (CFSM)	.52	.47	.39
ANNUAL RUNOFF (INCHES)	7.10	6.38	5.33
10 PERCENT EXCEEDS	630	400	496
50 PERCENT EXCEEDS	200	250	150
90 PERCENT EXCEEDS	100	92	30

a June 14-17, July 28 to Aug. 3.



MISSISSIPPI RIVER MAIN STEM

05242300 MISSISSIPPI RIVER AT BRAINERD, MN

LOCATION.--Lat 46°22'40", long 94°10'59", in SE 1/4 SW 1/4 sec. 18, T. 145 N., R. 30 W., Crow Wing County, Hydrologic Unit 07010104, on left bank in hydro-plant of Pottlach 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 mi², approximately.

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

GAGE.--Water-stage recorder. Datum of gage is 1,146.96 ft above mean sea level.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Flow regulated by Winnibigoshish Lake (sta. 05201000), Leech Lake (sta. 05206000), Pokegama Lake (sta. 05210500), Sandy Lake (sta. 05218500), Pine River Reservoir at Cross Lake (sta. 05230500), and by hydro-plant in Brainerd.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3310	3470	2670	e3350	e3000	e2800	3680	10100	3510	7840	4200	2190
2	3220	3450	2770	e3250	e2950	e2800	4030	10200	3430	7640	4060	1960
3	3250	3460	2920	e3200	e2950	e2800	4010	10200	3160	7620	4410	1940
4	3250	3550	3140	e3200	e2950	e2800	3930	10200	3020	7590	4010	2070
5	3250	3650	3350	e3150	e2950	e2800	3820	10100	2980	7450	3960	1980
6	3240	3480	3490	e3150	e2950	e2800	3750	9790	2740	7410	4080	2050
7	3250	3490	3680	e3100	e2950	e2800	3790	9400	2730	7410	4220	2230
8	2940	3490	3470	e3100	e2950	e2800	3810	9070	2320	7520	3920	2170
9	2990	3370	3660	e3100	e2950	e2800	3950	8640	2350	7280	3860	2180
10	2980	3680	3620	e3100	e2950	e2800	4270	8280	1810	7280	3670	2280
11	3160	3540	3800	e3100	e2900	e2800	4490	8030	2190	7220	3470	2150
12	3230	3470	3540	e3100	e2900	e2800	4810	7530	2310	7110	3360	2130
13	3180	3690	3490	e3100	e2900	e2800	4840	7000	2420	7020	3300	1980
14	3210	3510	3570	e3100	e2900	2730	5230	7140	2400	6810	2840	2130
15	3250	3620	3540	e3100	e2900	2710	5700	6760	2560	6570	2900	2050
16	3130	3540	3630	e3100	e2900	2950	6830	6880	2520	6400	2750	2240
17	3030	3600	3740	e3100	e2900	2970	7950	6710	2580	6170	2770	2270
18	3020	3630	3800	e3100	e2900	3110	8480	6480	3170	5820	2790	2640
19	3020	3630	3840	e3100	e2850	3080	8770	6310	3920	5790	2670	2900
20	3040	3400	3900	e3100	e2850	3090	8900	5890	4740	5460	2630	3200
21	3150	3800	4020	e3100	e2800	3130	8800	5450	5450	5600	2370	3250
22	3040	3600	3710	e3100	e2800	3320	8740	5120	6260	5250	2440	3400
23	3090	2760	e3800	e3100	e2800	3570	8740	4680	6620	5170	2310	3420
24	3220	2500	e3800	e3100	e2800	3700	8710	4800	7130	5210	2470	3760
25	3360	2320	e3750	e3100	e2800	3800	8550	4510	7480	5130	2310	3860
26	3400	2190	e3700	e3100	e2800	3780	8980	4450	7810	5060	2520	3830
27	3540	2340	e3600	e3100	e2800	3690	9410	4260	7960	4940	2470	3840
28	3490	1900	e3550	e3100	e2800	3510	9930	4290	8140	4700	2380	3720
29	3460	2200	e3500	e3100	---	3640	9890	3980	8200	4450	2300	3420
30	3440	2490	e3450	e3100	---	3440	9890	3830	7950	4360	2310	3390
31	3460	---	e3400	e3050	---	3730	---	3700	---	4240	2100	---
TOTAL	99600	96820	109900	96750	80850	96350	196680	213780	129860	193520	95850	80630
MEAN	3213	3227	3545	3121	2887	3108	6556	6896	4329	6243	3092	2688
MAX	3540	3800	4020	3350	3000	3800	9930	10200	8200	7840	4410	3860
MIN	2940	1900	2670	3050	2800	2710	3680	3700	1810	4240	2100	1940
AC-FT	197600	192000	218000	191900	160400	191100	390100	424000	257600	383800	190100	159900
CFSM	.44	.44	.48	.43	.39	.42	.90	.94	.59	.85	.42	.37
IN.	.51	.49	.56	.49	.41	.49	1.00	1.09	.66	.98	.49	.41

e Estimated.

MISSISSIPPI RIVER MAIN STEM

05242300 MISSISSIPPI RIVER AT BRAINERD, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1987 - 1994, BY WATER YEAR (WY)

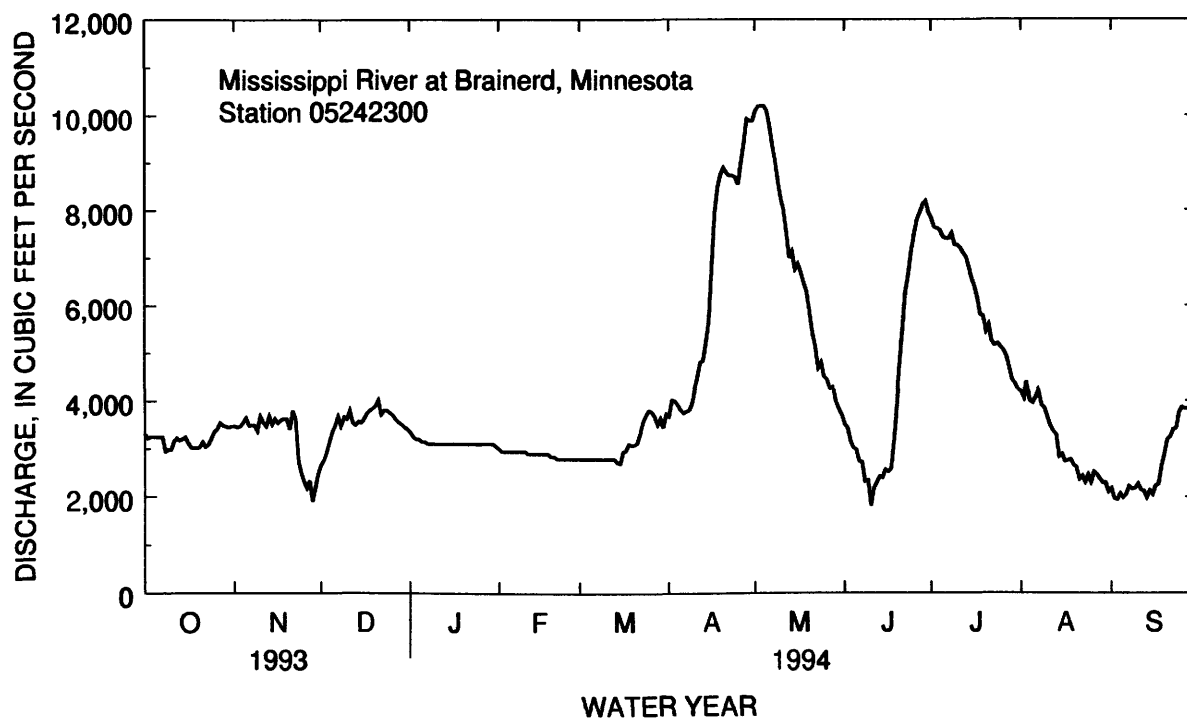
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	2441	2547	2281	2120	1912	2299	5144	4916	3688	3945	2114	2412
MAX	3213	3430	3545	3121	2887	3108	8601	6923	6193	10260	5071	3681
(WY)	1994	1992	1994	1994	1994	1994	1989	1989	1990	1993	1993	1993
MIN	1840	1931	1362	1140	1040	1435	3400	1928	662	442	935	1166
(WY)	1992	1993	1991	1991	1991	1991	1990	1988	1988	1988	1990	1990

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1987 - 1994

ANNUAL TOTAL	1539440	1490590	3042
ANNUAL MEAN	4218	4084	4084
HIGHEST ANNUAL MEAN			1994
LOWEST ANNUAL MEAN			1950
HIGHEST DAILY MEAN	12100	10200	12100
LOWEST DAILY MEAN	1550	1810	348
ANNUAL SEVEN-DAY MINIMUM	1550	2040	357
INSTANTANEOUS PEAK FLOW		10300	12200
INSTANTANEOUS PEAK STAGE		12.29	13.65
INSTANTANEOUS LOW FLOW		1700	273
ANNUAL RUNOFF (AC-FT)	3053000	2957000	2204000
ANNUAL RUNOFF (CFSM)	.58	.56	.42
ANNUAL RUNOFF (INCHES)	7.82	7.58	5.65
10 PERCENT EXCEEDS	7220	7500	5410
50 PERCENT EXCEEDS	3550	3420	2400
90 PERCENT EXCEEDS	1770	2430	1160



CROW WING RIVER BASIN

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 mi².

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). Records of hourly water temperature, available in files of the Geological Survey.

GAGE.--Water-stage recorder. Elevation of gage is 1,400 ft above mean sea level, from topographic map.

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

EXTREMES OUTSIDE PERIOD OF RECORD.--A discharge of 35 ft³/s was measured Aug. 4, 1976.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	73	72	e70	e55	e50	e58	75	81	61	66	62	55
2	72	e73	e70	e55	e51	e62	78	77	59	64	61	54
3	73	e73	e69	e54	e51	e66	76	75	58	65	63	55
4	72	e72	e69	e54	e51	e71	76	77	59	66	59	56
5	71	e72	e69	e54	e51	e72	74	77	71	65	59	59
6	70	e73	e69	e53	e51	e74	73	74	71	66	58	58
7	70	e74	e68	e53	e51	e75	74	71	68	75	61	57
8	71	e74	e68	e52	e51	e75	75	70	64	85	62	56
9	71	e74	e68	e52	e51	e75	78	69	63	85	60	55
10	70	e74	e67	e52	e51	e73	77	68	62	81	60	55
11	70	e74	e66	e52	e51	e71	78	67	61	80	59	58
12	70	e74	e66	e51	e50	e70	78	67	60	76	57	60
13	70	e74	e65	e51	e50	e68	78	66	59	74	59	63
14	69	e74	e65	e51	e50	68	79	71	59	76	58	72
15	69	e74	e64	e50	e50	e69	86	72	59	72	56	85
16	70	e74	e64	e50	e50	e72	86	70	62	70	55	86
17	69	e74	e63	e50	e50	e71	83	68	77	67	55	82
18	70	e74	e63	e51	e50	68	82	66	74	65	54	77
19	71	e73	e62	e51	e50	e68	80	65	71	68	56	73
20	73	e73	e62	e51	e50	e71	77	65	83	70	56	70
21	74	e73	e62	e51	e50	e75	74	64	84	68	54	67
22	73	e72	e61	e51	e51	e83	72	63	84	70	54	65
23	73	e72	e61	e51	e51	e87	71	63	83	68	56	64
24	72	e72	e60	e50	e52	e86	69	65	79	67	58	63
25	72	e71	e60	e50	e52	e85	72	65	77	65	57	62
26	73	e71	e59	e50	e53	e82	82	65	74	63	59	61
27	73	e70	e58	e50	e54	77	83	63	72	60	58	61
28	74	e70	e57	e50	e56	74	80	62	71	60	60	61
29	73	e70	e57	e50	---	71	81	61	70	58	58	61
30	74	e70	e56	e50	---	70	83	63	69	58	56	62
31	73	---	e56	e50	---	71	---	62	---	62	56	---
TOTAL	2218	2180	1974	1595	1429	2258	2330	2112	2064	2135	1796	1913
MEAN	71.5	72.7	63.7	51.5	51.0	72.8	77.7	68.1	68.8	68.9	57.9	63.8
MAX	74	74	70	55	56	87	86	81	84	85	63	86
MIN	69	70	56	50	50	58	69	61	58	58	54	54
AC-FT	4400	4320	3920	3160	2830	4480	4620	4190	4090	4230	3560	3790
CFSM	1.34	1.37	1.20	.97	.96	1.37	1.46	1.28	1.29	1.29	1.09	1.20
IN.	1.55	1.52	1.38	1.12	1.00	1.58	1.63	1.48	1.44	1.49	1.26	1.34

e Estimated.

CROW WING RIVER BASIN

05243725 STRAIGHT RIVER NEAR PARK RAPIDS, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1987 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	54.6	55.9	51.4	45.3	47.4	58.7	64.9	60.7	55.0	52.9	49.3	54.1
MAX	73.6	72.7	63.7	51.5	51.0	72.8	77.7	68.2	68.8	70.5	74.7	73.6
(WY) 1987	1987	1994	1994	1994	1994	1994	1994	1987	1994	1993	1993	1993
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	1993	1989	1989	1992	1992	1989	1991	1992	1992	1988	1990	1990

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

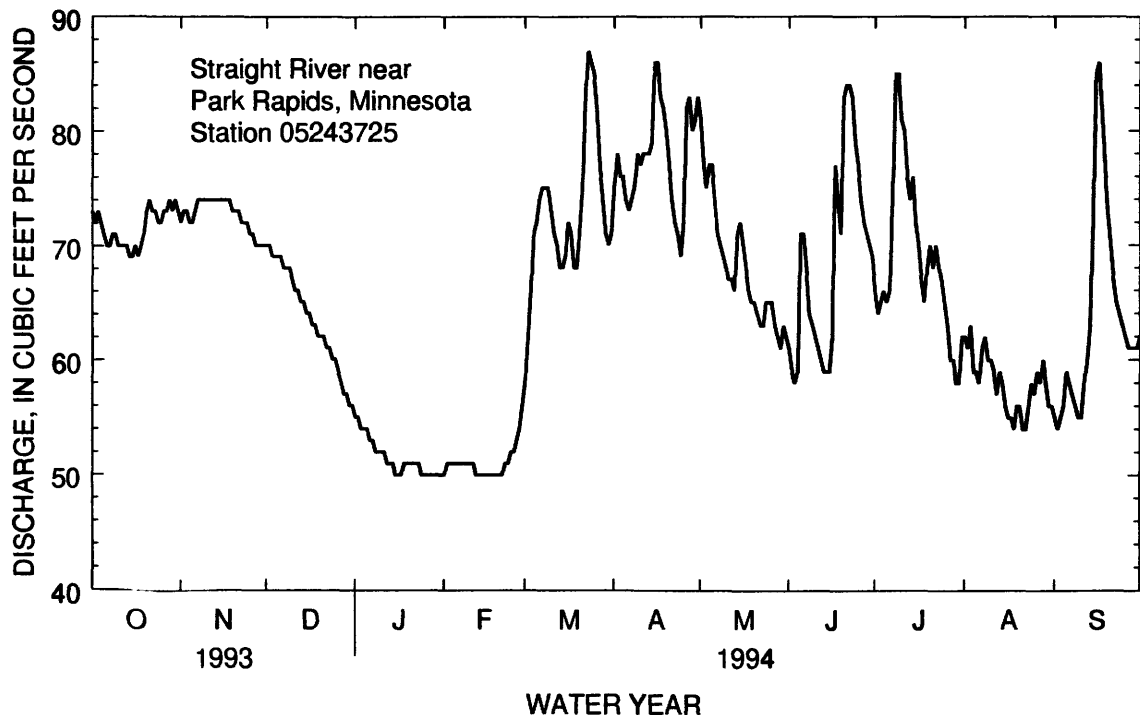
WATER YEARS 1987 - 1994

ANNUAL TOTAL	23170	24004	
ANNUAL MEAN	63.5	65.8	54.8
HIGHEST ANNUAL MEAN			65.8
LOWEST ANNUAL MEAN			48.0
HIGHEST DAILY MEAN	89	Apr 25	89
LOWEST DAILY MEAN	43	Jan 7	28
ANNUAL SEVEN-DAY MINIMUM	44	Jan 3	34
INSTANTANEOUS PEAK FLOW		88	93
INSTANTANEOUS PEAK STAGE		2.84 ^b	2.84 ^b
INSTANTANEOUS LOW FLOW			25 ^c
ANNUAL RUNOFF (AC-FT)	45960	47610	39720
ANNUAL RUNOFF (CFSM)	1.19	1.24	1.03
ANNUAL RUNOFF (INCHES)	16.20	16.78	14.00
10 PERCENT EXCEEDS	76	77	73
50 PERCENT EXCEEDS	66	67	53
90 PERCENT EXCEEDS	45	51	42

a Occurred Jan 15-17,24 to Feb 1,12-21.

b From floodmark, backwater from ice.

c Result of freezeup.



CROW WING RIVER BASIN

05244000 CROW WING RIVER AT NIMROD, MN

LOCATION.--Lat 46°38'25", long 94°52'44", in SE 1/4 NW 1/4 sec. 32, T. 137 N., R. 33 W., Wadena County, Hydrologic Unit 07010106, on right bank 200 ft upstream from highway bridge, 0.2 mi north of Nimrod, and 0.7 mi upstream from Cat River.

DRAINAGE AREA.--1,010 mi² (2,620 km²), approximately.

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 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	544	459	e412	e377	e329	e350	723	1060	477	785	610	350
2	566	431	e412	e375	e329	e355	792	1040	480	762	590	343
3	570	405	e412	e372	e328	e390	773	1010	480	724	580	338
4	571	e405	e412	e370	e328	e435	765	994	481	701	559	346
5	588	e400	e412	e369	e328	e450	720	966	580	675	537	351
6	590	e395	e412	e367	e327	e460	714	936	561	625	521	346
7	596	e390	e412	e365	e327	e440	725	916	548	625	560	331
8	538	e385	e412	e362	e326	e420	745	903	534	735	565	319
9	487	e380	e412	e360	e326	e410	801	882	520	783	554	307
10	491	e380	e412	e358	e325	e410	825	838	491	773	539	297
11	485	e385	e412	e357	e325	e410	829	799	466	760	526	300
12	478	e395	e412	e355	e324	e410	828	770	462	748	506	313
13	475	e410	e412	e352	e322	e420	821	749	456	732	500	352
14	480	e405	e412	e350	e321	e460	803	759	450	731	503	387
15	477	e395	e412	e348	e320	e490	865	762	446	727	476	417
16	472	e400	e412	e347	e320	e530	901	733	483	720	463	441
17	475	e405	e412	e345	e330	e590	857	695	611	707	458	479
18	480	e410	e410	e342	e340	e650	822	674	655	706	446	510
19	485	e415	e405	e340	e350	e710	819	662	684	918	453	522
20	497	e420	e403	e338	e360	e770	811	647	850	972	440	527
21	505	e425	e400	e335	e360	e840	796	634	894	932	420	522
22	488	e430	e398	e335	e355	e900	779	639	890	894	400	510
23	468	e415	e395	e333	e350	e950	745	640	890	842	411	502
24	468	e410	e392	e333	e350	e920	722	659	886	795	428	490
25	468	e410	e390	e332	e350	e850	734	650	886	767	436	470
26	462	e410	e388	e331	e350	e780	863	634	886	755	431	440
27	448	e410	e387	e331	e350	e730	957	605	869	727	412	424
28	444	e410	e385	e330	e350	680	976	571	875	707	394	427
29	446	e410	e382	e330	---	664	990	528	845	680	366	438
30	456	e410	e380	e330	---	644	1030	501	816	640	355	439
31	467	---	e379	e330	---	656	---	485	---	631	358	---
TOTAL	15465	12210	12498	10799	9400	18174	24531	23341	19452	23279	14797	12238
MEAN	499	407	403	348	336	586	818	753	648	751	477	408
MAX	596	459	412	377	360	950	1030	1060	894	972	610	527
MIN	444	380	379	330	320	350	714	485	446	625	355	297
AC-FT	30670	24220	24790	21420	18640	36050	48660	46300	38580	46170	29350	24270
CFSM	.49	.40	.40	.34	.33	.58	.81	.75	.64	.74	.47	.40

e Estimated.

CROW WING RIVER BASIN

05244000 CROW WING RIVER AT NIMROD, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1910 - 1994, BY WATER YEAR (WY)

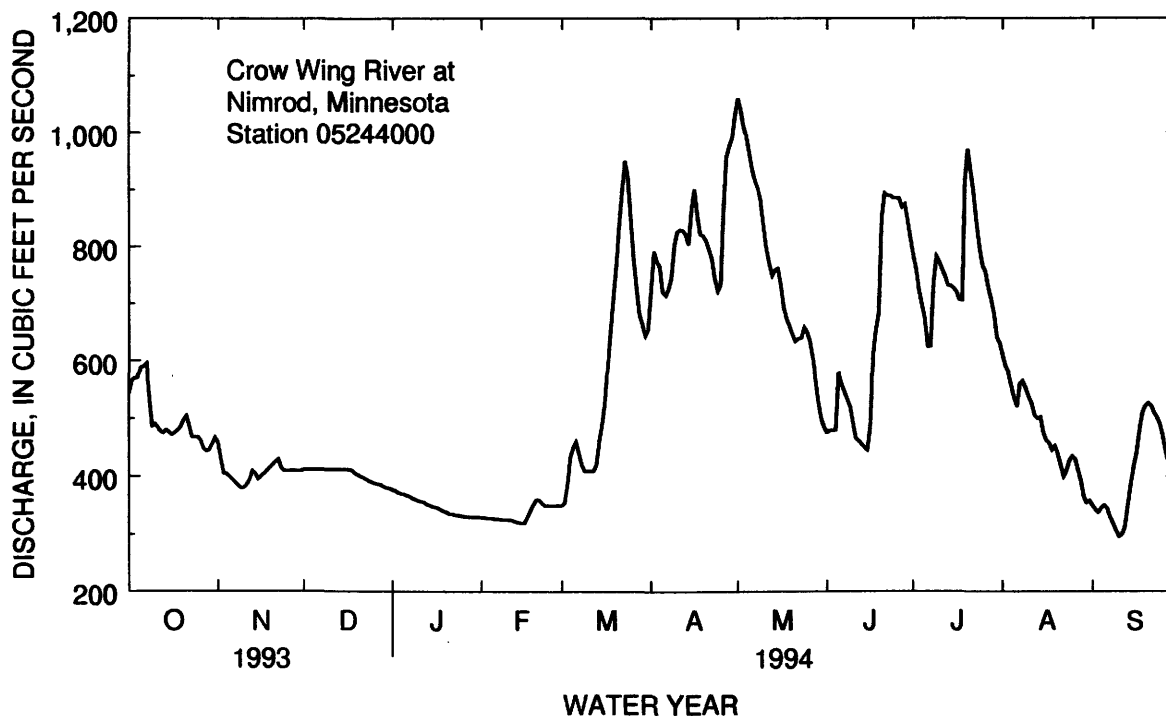
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	400	390	329	290	294	392	742	663	574	434	373	381
MAX	1463	871	596	462	456	768	1624	1615	1354	956	1452	929
(WY)	1974	1972	1952	1966	1966	1945	1966	1950	1965	1949	1944	1944
MIN	137	146	131	125	170	171	202	181	149	84.0	74.3	131
(WY)	1937	1937	1940	1940	1940	1940	1911	1911	1934	1936	1936	1934

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1910 - 1994

ANNUAL TOTAL	196353		196184			
ANNUAL MEAN	538		537			470
HIGHEST ANNUAL MEAN						719
LOWEST ANNUAL MEAN						230
HIGHEST DAILY MEAN	1300	Mar 31	1060	May 1	3580	Oct 10 1973
LOWEST DAILY MEAN	243	Jan 8	297	Sep 10	45	Aug 7 1936
ANNUAL SEVEN-DAY MINIMUM	245	Jan 6	316	Sep 6	55	Aug 3 1936
INSTANTANEOUS PEAK FLOW			1060	Apr 30	3700	Oct 10 1973
INSTANTANEOUS PEAK STAGE			5.04 ^a	Mar 25	7.64	Apr 20 1950
INSTANTANEOUS LOW FLOW			295	Sep 10	45	Aug 7 1936
ANNUAL RUNOFF (AC-FT)	389500		389100			340600
ANNUAL RUNOFF (CFSM)	.53		.53			.47
10 PERCENT EXCEEDS	824		841			786
50 PERCENT EXCEEDS	522		468			370
90 PERCENT EXCEEDS	263		339			194

^a Backwater from ice.

CROW WING RIVER BASIN

05245100 LONG PRAIRIE RIVER AT LONG PRAIRIE, MN

LOCATION.--Lat 45°58'30", long 94°51'56", in NE 1/4 NW 1/4 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.--432 mi².

PERIOD OF RECORD.--October 1971 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,281.74 ft above mean sea level

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

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	214	106	e135	e105	e92	e97	559	885	201	143	105	76
2	210	106	e132	e104	e92	e98	524	799	194	139	97	76
3	206	103	e128	e104	e92	e100	474	724	187	136	102	78
4	202	103	e124	e104	e92	e108	476	698	180	135	98	83
5	197	105	e124	e103	e92	e114	474	646	180	138	95	86
6	192	106	e120	e103	e92	e117	473	611	173	136	95	86
7	189	104	e116	e103	e92	e123	453	560	166	136	96	85
8	182	114	e117	e102	e92	e125	441	517	161	141	94	81
9	176	99	e119	e101	e92	e128	430	480	158	142	95	78
10	172	129	e116	e100	e92	e129	407	443	154	142	97	76
11	169	89	e112	e100	e92	e130	394	414	152	143	97	76
12	163	120	e111	e100	e92	e140	391	383	149	143	92	77
13	157	98	e106	e99	e92	e155	367	350	147	142	89	80
14	151	98	e107	e99	e92	e169	359	369	143	141	85	90
15	146	110	e113	e98	e92	e186	380	353	142	138	82	93
16	146	104	e114	e98	e92	e232	390	334	142	133	79	93
17	142	103	e115	e98	e93	e260	395	321	160	127	76	92
18	140	102	e115	e98	e95	e272	408	311	163	129	76	87
19	142	106	e115	e98	e98	283	418	303	155	140	89	83
20	146	144	e115	e98	e100	319	411	289	159	141	90	81
21	146	86	e115	e97	e100	403	373	270	161	146	91	81
22	143	141	e111	e97	e100	549	343	253	157	147	92	82
23	142	112	e98	e96	e99	646	333	244	156	144	89	83
24	138	72	e105	e96	e98	690	322	270	155	143	86	81
25	135	46	e110	e95	e97	752	325	268	155	140	83	77
26	130	82	e108	e95	e95	689	482	261	154	139	87	74
27	125	e98	e107	e95	e94	718	706	253	153	132	84	74
28	127	e110	e106	e94	e95	732	692	241	151	125	82	72
29	124	e115	e106	e94	---	667	736	228	148	119	80	70
30	127	e133	e106	e93	---	623	842	216	146	113	78	69
31	116	---	e105	e93	---	571	---	209	---	109	79	---
TOTAL	4895	3144	3531	3060	2636	10325	13778	12503	4802	4222	2760	2420
MEAN	158	105	114	98.7	94.1	333	459	403	160	136	89.0	80.7
MAX	214	144	135	105	100	752	842	885	201	147	105	93
MIN	116	46	98	93	92	97	322	209	142	109	76	69
AC-FT	9710	6240	7000	6070	5230	20480	27330	24800	9520	8370	5470	4800
CFSM	.37	.24	.26	.23	.22	.77	1.06	.93	.37	.32	.21	.19

e Estimated.

CROW WING RIVER BASIN

05245100 LONG PRAIRIE RIVER AT LONG PRAIRIE, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1972 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	123	113	72.4	58.3	57.7	170	344	250	206	184	134	120
MAX	512	425	270	217	208	441	748	653	422	777	715	607
(WY)	1987	1972	1987	1987	1987	1985	1986	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

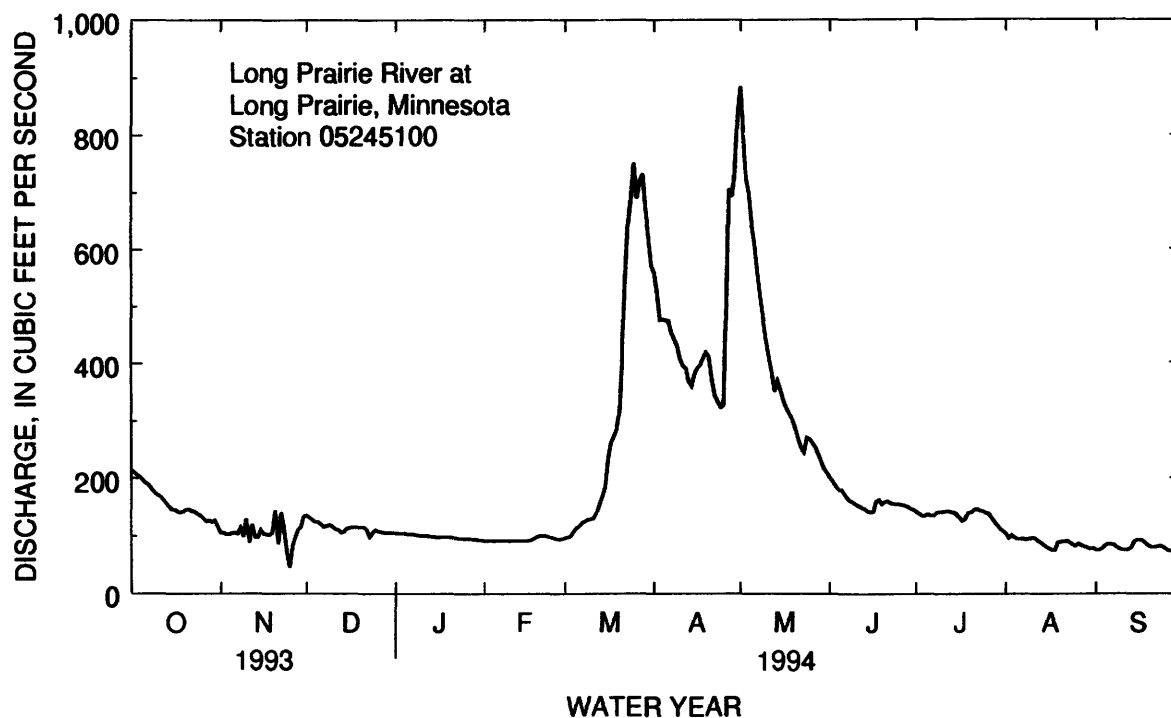
SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1972 - 1994

ANNUAL TOTAL	67518	68076	
ANNUAL MEAN	185	187	153
HIGHEST ANNUAL MEAN			366
LOWEST ANNUAL MEAN			25.2
HIGHEST DAILY MEAN	546	Jul 10	885
LOWEST DAILY MEAN	24	Jan 1	46
ANNUAL SEVEN-DAY MINIMUM	24	Jan 1	74
INSTANTANEOUS PEAK FLOW			955
INSTANTANEOUS PEAK STAGE			6.05
INSTANTANEOUS LOW FLOW			38a
ANNUAL RUNOFF (AC-FT)	133900	135000	110700
ANNUAL RUNOFF (CFSM)	.43	.43	.35
10 PERCENT EXCEEDS	374	412	360
50 PERCENT EXCEEDS	176	123	92
90 PERCENT EXCEEDS	25	85	22

a Result of freezeup.



CROW WING RIVER BASIN

05246500 GULL LAKE NEAR BRAINERD, MN

LOCATION.--Lat 46°24'40", long 94°21'26", in NE 1/4 sec. 20, T. 134 N., R. 29 W., Cass County. Hydrologic Unit 07010106, in pool of dam on Gull River, 800 ft south of outlet of Gull Lake, 0.2 mi upstream from Gull Lake Dam, and 8 mi northwest of Brainerd.

DRAINAGE AREA.--287 mi².

PERIOD OF RECORD.--August 1911 to current year. Prior to October 1941 monthend contents only, published in WSP 1308. Published as Gull Lake Reservoir October 1941 to September 1956.

GAGE.--Water-stage recorder. Datum of gage is in mean sea level (levels by U.S. Army Corps of Engineers). Prior to Aug. 10, 1949, nonrecording gage 800 ft north of present site at same datum. Aug. 11, 1949, to June 30, 1973, water-stage recorder at present site and at datum 1,188.14 ft, adjustment of 1912.

REMARKS.--Reservoir is formed by Gull Lake and several other natural lakes controlled by concrete dam completed in 1913; storage began in 1912. Capacity between elevation 1,192.75 ft and 1,194.75 ft (maximum allowable range and normal operating range) is 26,008 acre-ft. Contents shown herein are contents above elevation 1,188.00 ft. Prior to September 1978, published contents as contents above elevation 1,188.75 ft. Water is used to benefit navigation on Mississippi River below Minneapolis.

COOPERATION.--Records were provided by U.S. Army Corps of Engineers.

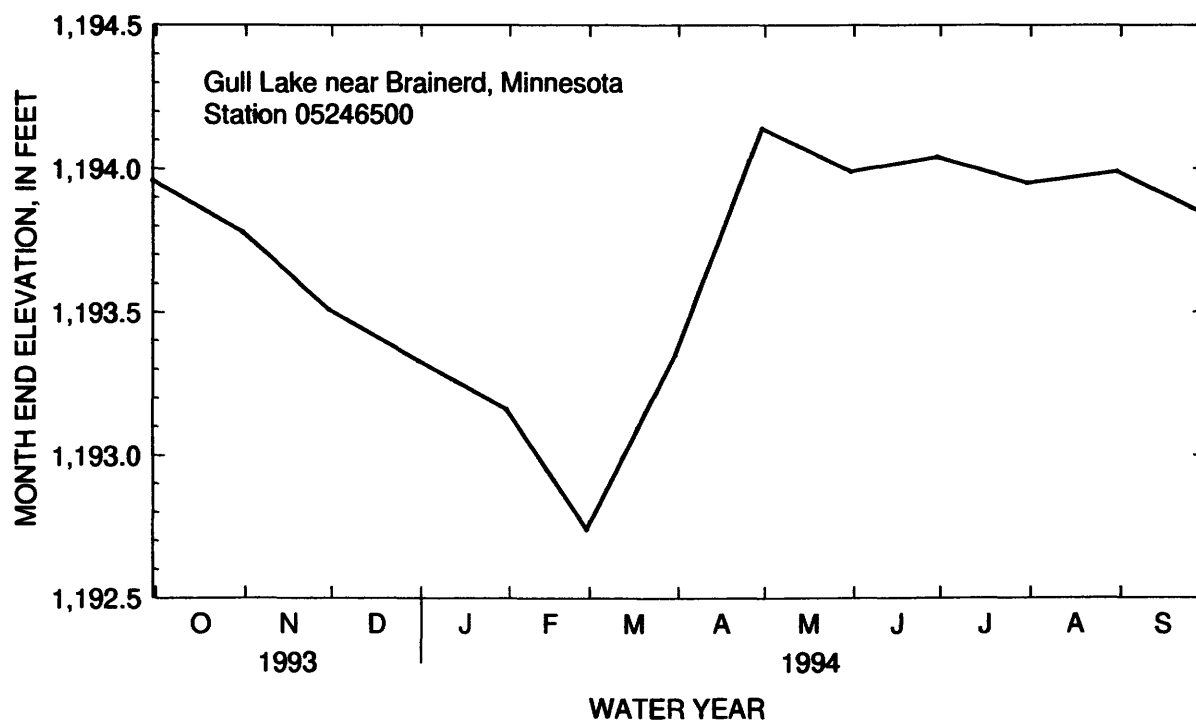
EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 74,800 acre-ft, capacity table then in use, June 30, 1914, elevation, 1,195.05 ft; minimum observed, 22,250 acre-ft, capacity table then in use, Mar. 20, 1924, elevation, 1,190.75 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 62,980 acre-ft, Apr. 29, elevation, 1,194.15 ft; minimum, 44,490 acre-ft, Mar. 2, elevation, 1,192.72.

MONTHEND ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30	1193.96	60500	
Oct. 31	1193.78	58160	-2340
Nov. 30	1193.51	54650	-3510
Dec. 31	1193.33	52330	-2320
CAL YR 1993			-2580
Jan. 31	1193.16	50120	-2210
Feb. 28	1192.74	44730	-5390
Mar. 31	1193.35	52580	+7850
Apr. 30	1194.14	62850	+10270
May 31	1193.99	60890	-1960
June 30	1194.04	61550	+660
July 31	1193.95	60370	-1180
Aug. 31	1193.99	60890	+520
Sept. 30	1193.84	58940	-1950
WTR YR 1994			-1560

CROW WING RIVER BASIN
05246500 GULL LAKE NEAR BRAINERD, MN--Continued



CROW WING RIVER BASIN

05247000 GULL RIVER AT GULL LAKE DAM, NEAR BRAINERD, MN

LOCATION.--Lat 46°24'40", long 94°21'12", in sec. 20, T. 134 N., R. 29 W., Cass County, Hydrologic Unit 07010106, in headwater and tailwater of dam at outlet of Gull Lake, 8 mi. northwest of Brainerd.

DRAINAGE AREA.--287 mi².

PERIOD OF RECORD.--August 1911 to current year. Monthly discharge only for some periods, published in WSP 1308. Published as "Gull Lake Reservoir" 1929.

GAGE.--Water-stage recorder on headwater and nonrecording gage on tailwater. Datum of gages is in sea level (levels by U.S. Army Corps of Engineers). August 1911 to May 23, 1929, and Dec. 1, 1929, to Aug. 1, 1949, both gages were nonrecording gages at same site and datum in use. May 24 to Nov. 30, 1929, non-recording gage 500 ft downstream at different datum. Aug. 2, 1949, to June 30, 1973, at present sites with datum of gage at 1,188.14 ft, adjustment of 1912.

REMARKS.--Discharge computed at dam on basis of modified weir formulas, the head being obtained from twice-daily readings on tailwater gage and from headwater recorder. Flow completely regulated by Gull Lake (station 05246500).

COOPERATION.--Computations of daily discharge were provided by U.S. Army Corps of Engineers.

AVERAGE DISCHARGE.--(unadjusted).--82 years, 109 ft³/s, 5.15 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 1,120 ft³/s, May 15, 1938; no flow at times.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	20	83	185	113	143	130	47	486	65	61	20	18
2	20	82	195	113	146	130	111	407	65	40	20	18
3	20	82	195	113	144	111	111	407	65	41	20	23
4	20	82	150	126	143	111	112	405	47	41	56	23
5	20	103	150	126	143	76	183	407	34	41	112	23
6	20	144	150	126	143	76	183	407	34	41	77	24
7	20	144	150	126	139	42	185	306	34	42	84	24
8	76	144	150	126	142	39	185	306	34	42	79	24
9	76	144	150	126	143	42	223	210	34	43	113	24
10	76	144	150	126	143	42	223	127	34	66	113	24
11	76	144	126	148	194	42	223	127	34	66	113	24
12	76	144	126	148	231	42	276	96	34	42	113	24
13	76	186	126	148	245	42	276	96	34	42	79	24
14	76	186	126	148	241	42	276	207	22	42	79	135
15	76	186	126	143	241	42	198	207	22	42	79	220
16	76	186	126	141	236	42	281	200	22	64	50	220
17	76	186	126	143	236	42	281	255	64	64	32	220
18	76	186	113	141	232	42	281	255	123	64	32	220
19	55	186	113	141	232	42	191	235	125	32	32	220
20	55	196	113	140	232	42	102	185	125	62	32	108
21	55	196	113	140	228	42	102	90	157	61	32	108
22	55	193	113	143	222	44	50	90	155	62	32	32
23	56	194	113	145	216	44	50	92	154	107	20	32
24	56	193	113	148	190	45	50	125	101	107	20	20
25	56	194	113	148	194	45	52	125	101	60	20	20
26	77	195	110	148	192	45	52	194	101	31	20	20
27	77	185	110	148	192	46	279	194	101	31	78	20
28	78	187	110	148	130	46	279	126	157	20	78	20
29	78	187	110	148	---	46	408	126	157	20	78	20
30	82	185	108	145	---	46	486	125	116	20	40	20
31	83	---	110	143	---	46	---	125	---	20	38	---
TOTAL	1839	4847	4069	4266	5313	1714	5756	6743	2351	1517	1791	1952
MEAN	59.3	162	131	138	190	55.3	192	218	78.4	48.9	57.8	65.1
MAX	83	196	195	148	245	130	486	486	157	107	113	220
MIN	20	82	108	113	130	39	47	90	22	20	20	18
AC-FT	3650	9610	8070	8460	10540	3400	11420	13370	4660	3010	3550	3870
CFSM	.21	.56	.46	.48	.66	.19	.67	.76	.27	.17	.20	.23
IN.	.24	.63	.53	.55	.69	.22	.75	.87	.30	.20	.23	.25

e Estimated.

CROW WING RIVER BASIN

05247000 GULL RIVER AT GULL LAKE DAM, NEAR BRAINERD, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1912 - 1994, BY WATER YEAR (WY)

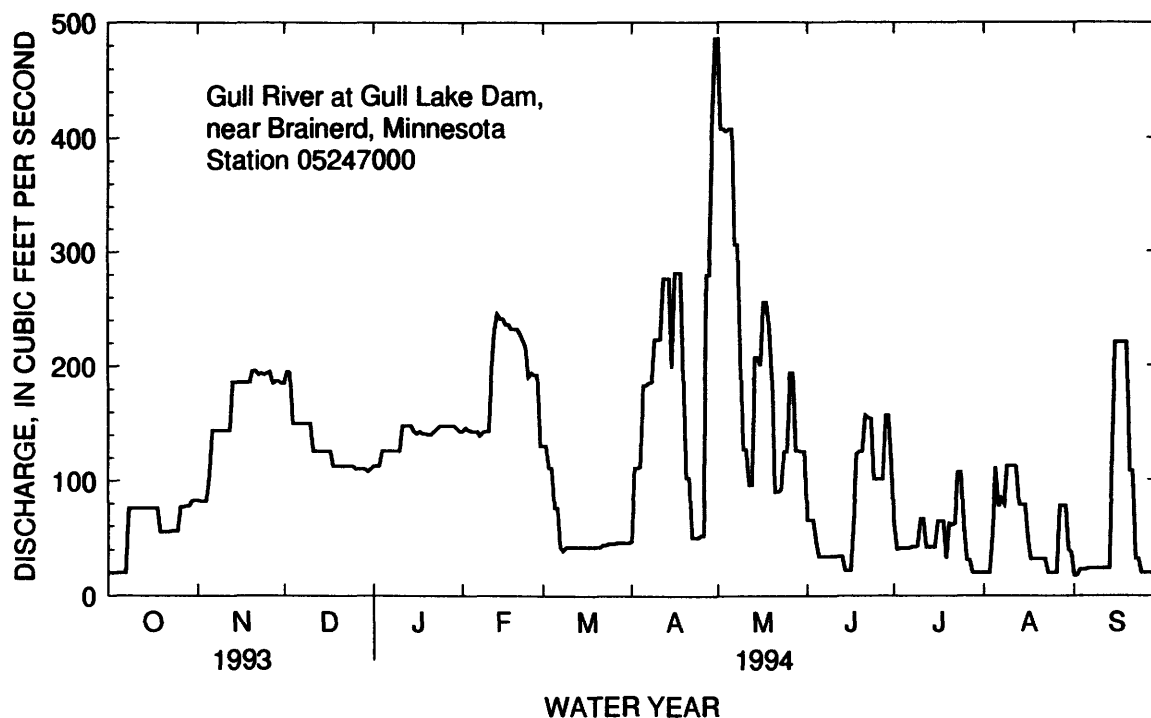
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	88.7	104	105	103	101	101	161	154	146	96.8	65.3	70.6
MAX	340	534	329	281	350	355	575	602	655	484	382	380
(WY)	1974	1972	1952	1944	1945	1945	1966	1950	1944	1946	1952	1986
MIN	5.00	5.00	5.00	5.00	5.00	5.00	7.00	9.13	8.73	9.06	7.97	6.70
(WY)	1933	1933	1933	1933	1933	1933	1933	1931	1931	1940	1940	1932

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1912 - 1994

ANNUAL TOTAL	47591	42158	
ANNUAL MEAN	130	116	109
HIGHEST ANNUAL MEAN			228
LOWEST ANNUAL MEAN			20.3
HIGHEST DAILY MEAN	584	486	995
LOWEST DAILY MEAN	20	18	.00
ANNUAL SEVEN-DAY MINIMUM	20	20	.00
ANNUAL RUNOFF (AC-FT)	94400	83620	78800
ANNUAL RUNOFF (CFSM)	.45	.40	.38
ANNUAL RUNOFF (INCHES)	6.17	5.46	5.15
10 PERCENT EXCEEDS	263	220	231
50 PERCENT EXCEEDS	110	110	72
90 PERCENT EXCEEDS	22	24	12



CROW WING RIVER BASIN

05247500 CROW WING RIVER NEAR PILLAGER, MN

LOCATION.--Lat 46°18'18", long 94°22'38", in SW 1/4 NE 1/4 sec. 30, T. 133 N., R. 29 W., Cass County, Hydrologic Unit 07010106, at Sylvan dam powerplant of Minnesota Power Co., 3.6 mi above mouth and 4.9 mi southeast of Pillager.

DRAINAGE AREA.--3,520 mi², 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, adjustment of 1912. Prior to January 16, 1991, staff gage attached to retaining wall approximately 20 ft below the turbine outlet bays. Datum of staff gage is 1,150.00 ft, adjustment of 1912.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Discharge computed on the basis of powerplant 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 powerplants and Gull Lake (station 05246500).

COOPERATION.--Records collected by Minnesota Power Co. under general supervision of Geological Survey prior to February 1991, in connection with a Federal Power Commission project.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum daily discharge since 1924, 18,300 ft³/s, Apr. 14, 1965.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1480	1270	e1300	874	860	841	e4350	e5750	1360	1400	1030	705
2	1440	e1270	e1300	862	849	843	e4180	e5960	1430	1410	949	701
3	1390	e1230	e1420	958	819	860	e4330	e6260	1410	1250	1150	733
4	1390	e1240	e1530	960	812	859	e4400	e6040	1320	1180	1070	763
5	1380	e1470	e1370	972	816	859	e4280	5670	1310	1100	850	731
6	1350	e1120	e1450	1080	843	855	e4130	5300	1370	1020	909	719
7	1270	e991	e1290	1110	863	846	e4230	4750	1450	1170	971	722
8	1240	e1150	1510	1050	841	925	e4140	4360	1230	1190	1090	711
9	1230	e1270	1510	892	841	932	e4030	4100	1130	1290	1060	595
10	1280	e1280	e1240	881	848	994	e3970	3720	1060	1260	1010	645
11	1280	e1270	e1240	890	813	1180	e4030	3350	1060	1430	989	634
12	1250	e1230	e1180	939	842	1170	e3990	3120	1090	1480	969	630
13	1220	e1270	e1230	974	924	1160	e3890	2790	1010	1190	974	585
14	1150	e1430	e1270	1010	939	1230	e3690	3180	942	1200	961	752
15	1190	e1430	e1210	941	900	1420	e3900	2980	954	1190	948	874
16	1260	e1380	e1230	1060	890	1620	e3890	2940	997	1150	947	956
17	1220	e1430	e1240	1070	964	1640	e4120	2790	1050	1130	859	996
18	1190	e1440	e1280	903	920	1640	e3890	2760	1100	1020	748	963
19	1110	e1470	e1200	1040	955	1810	e3810	2540	1250	1430	805	938
20	1190	e1160	1570	882	e1040	e2110	e3500	2570	1470	1490	866	921
21	1210	e1310	1470	875	1070	e2270	e3420	2440	1470	1730	859	956
22	1240	e1520	1280	911	989	e2890	e3060	1920	1620	1920	814	833
23	1320	e1060	1120	867	1010	e3230	e2990	2180	1720	1520	812	806
24	1280	e989	1170	868	1020	e3200	e2900	2150	1690	1570	768	792
25	1220	e875	1260	851	e1020	e3710	e2820	2220	1670	1500	772	692
26	1140	e756	1230	851	977	e4460	e3270	2330	1580	1280	843	685
27	1200	e1000	1010	889	962	e4860	e4220	1990	1470	1300	905	672
28	1240	e1020	1110	929	866	e5020	e4620	1870	1470	1110	877	652
29	1250	e1250	1110	841	---	e4780	e5160	1930	1450	1090	828	528
30	1240	e1280	1040	824	---	e4390	e5330	1850	1400	1110	840	527
31	1240	---	925	812	---	e4280	---	1570	---	1060	793	---
TOTAL	39090	36861	39295	28866	25493	66884	118540	103380	39533	40170	28266	22417
MEAN	1261	1229	1268	931	910	2158	3951	3335	1318	1296	912	747
MAX	1480	1520	1570	1110	1070	5020	5330	6260	1720	1920	1150	996
MIN	1110	756	925	812	812	841	2820	1570	942	1020	748	527
AC-FT	77530	73110	77940	57260	50570	132700	235100	205100	78410	79680	56070	44460
CFSM	.38	.37	.38	.28	.28	.65	1.20	1.01	.40	.39	.28	.23
IN.	.44	.42	.44	.33	.29	.75	1.34	1.17	.45	.45	.32	.25

e Estimated.

CROW WING RIVER BASIN

05247500 CROW WING RIVER NEAR PILLAGER, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1969 - 1994, BY WATER YEAR (WY)

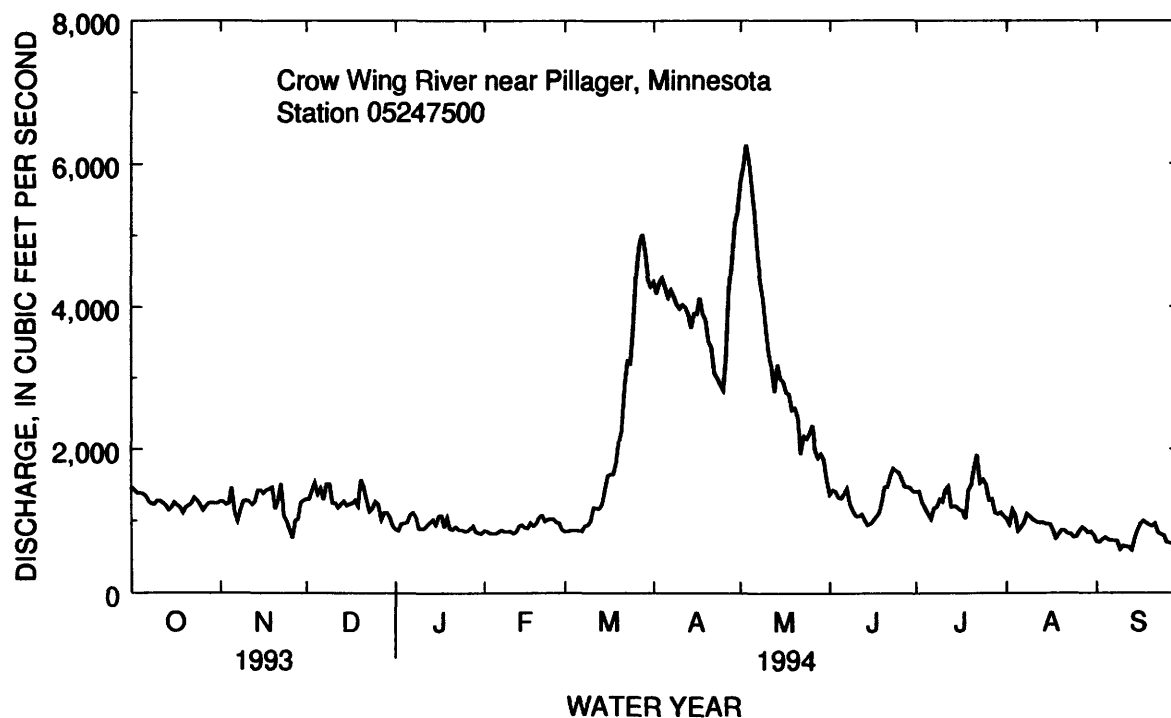
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	1136	1134	776	639	643	1290	3074	2282	1625	1329	918	894
MAX	3771	3674	1544	1188	1125	2996	7429	5671	3625	3295	3520	3309
(WY)	1974	1972	1972	1986	1986	1972	1969	1986	1993	1972	1972	1986
MIN	215	215	199	218	255	548	882	545	447	206	120	161
(WY)	1977	1977	1977	1977	1977	1981	1981	1977	1988	1988	1976	1976

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1969 - 1994

ANNUAL TOTAL	674220	588795	
ANNUAL MEAN	1847	1613	1313
HIGHEST ANNUAL MEAN			2564
LOWEST ANNUAL MEAN			446
HIGHEST DAILY MEAN	7130	6260	16600
LOWEST DAILY MEAN	399	527	60
ANNUAL SEVEN-DAY MINIMUM	426	646	68
ANNUAL RUNOFF (AC-FT)	1337000	1168000	951000
ANNUAL RUNOFF (CFSM)	.56	.49	.40
ANNUAL RUNOFF (INCHES)	7.60	6.64	5.40
10 PERCENT EXCEEDS	3180	3840	2780
50 PERCENT EXCEEDS	1510	1200	860
90 PERCENT EXCEEDS	523	826	411



MISSISSIPPI RIVER MAIN STEM

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 a mile 982.1 upstream from Ohio River.

DRAINAGE AREA.--11,010 mi², 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 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 powerplants and Winnibigoshish, Leech, Pokegama, Sandy, and Gull Lakes and by Pine River Reservoir (see stations 05201000, 05206000, 05210500, 05218500, 05230500, 05246500).

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4700	4710	e3650	e4100	e3900	e3200	8880	16500	5220	9090	5280	3000
2	4960	4750	e3950	e4100	e3850	e3200	9120	16800	5040	8960	5150	3050
3	4790	4700	e4150	e4050	e3800	e3200	9170	17000	4890	8770	5450	2840
4	4810	4720	e4250	e4000	e3700	e3200	9120	16800	4600	8610	5360	3040
5	4950	5090	e4350	e4000	e3700	e3200	8880	16400	4520	8470	4940	3030
6	4960	4700	e4450	e3950	e3700	e3200	8610	15800	4320	8170	5030	2840
7	4950	4330	e4350	e3950	e3700	e3200	8520	14900	4450	8350	5180	3080
8	4480	4510	e4300	e3950	e3700	e3200	8470	14000	3950	8590	5290	3050
9	4240	4570	e4300	e3950	e3700	e3200	8390	13500	3840	8530	5010	2930
10	4220	5000	e4300	e3900	e3700	e3200	8650	12600	3330	8400	5020	2980
11	4430	4750	e4250	e3900	e3700	e3150	8890	12000	3200	8470	4690	3000
12	4450	4910	e4200	e3900	e3650	e3150	9120	11200	3720	8540	4600	2850
13	4410	4880	e4350	e3900	e3600	e3200	9120	10300	3640	8190	4530	3000
14	4360	5000	e4500	e3900	e3550	e3500	9270	10500	3630	7910	4210	3030
15	4430	5110	e4550	e3900	e3500	e3750	9780	9960	3560	7730	4060	3650
16	4430	5000	e4600	e3900	e3500	e4050	10800	10100	3660	7490	4050	3490
17	4300	5050	e4600	e3900	e3500	e4550	12100	9770	3800	7190	3900	3830
18	4250	5150	e4600	e3900	e3500	e4950	12900	9520	4230	6840	3920	3930
19	4170	5110	e4550	e3900	e3500	e5200	13200	9130	5110	6990	3830	4220
20	4210	4800	e4500	e3900	e3500	5650	13000	8620	6240	6900	3870	4530
21	4370	4870	e4400	e3900	e3500	5780	12600	8100	6910	7030	3650	4660
22	4260	5320	e4350	e3900	e3400	6470	12300	7390	7870	7160	3610	4710
23	4480	4800	e4300	e3900	e3350	7410	12000	6980	8450	6590	3450	4670
24	4510	4590	e4250	e3900	e3300	7620	12000	7040	8810	6630	3480	4810
25	4590	3870	e4250	e3900	e3300	8150	11700	6780	9110	6590	3510	4920
26	4570	3500	e4250	e3900	e3300	8970	12300	6800	9310	6310	3480	4950
27	4680	e3250	e4200	e3900	e3300	9230	13900	6520	9310	6200	3600	4950
28	4740	e3200	e4200	e3900	e3250	9290	14800	6230	9380	5970	3560	4970
29	4730	e3250	e4200	e3900	---	9230	15600	6240	9350	5570	3340	4660
30	4700	e3450	e4150	e3900	---	8590	16000	5850	9210	5550	3400	4520
31	4670	---	e4100	e3900	---	8690	---	5590	---	5400	3320	---
TOTAL	140800	136940	133400	121850	99650	162580	329190	328920	172660	231190	131770	113190
MEAN	4542	4565	4303	3931	3559	5245	10970	10610	5755	7458	4251	3773
MAX	4960	5320	4600	4100	3900	9290	16000	17000	9380	9090	5450	4970
MIN	4170	3200	3650	3900	3250	3150	8390	5590	3200	5400	3320	2840
AC-FT	279300	271600	264600	241700	197700	322500	652900	652400	342500	458600	261400	224500
CFSM	.41	.41	.39	.36	.32	.48	1.00	.96	.52	.68	.39	.34

e Estimated.

MISSISSIPPI RIVER MAIN STEM

05261000 MISSISSIPPI RIVER NEAR FORT RIPLEY, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1987 - 1994, BY WATER YEAR (WY)

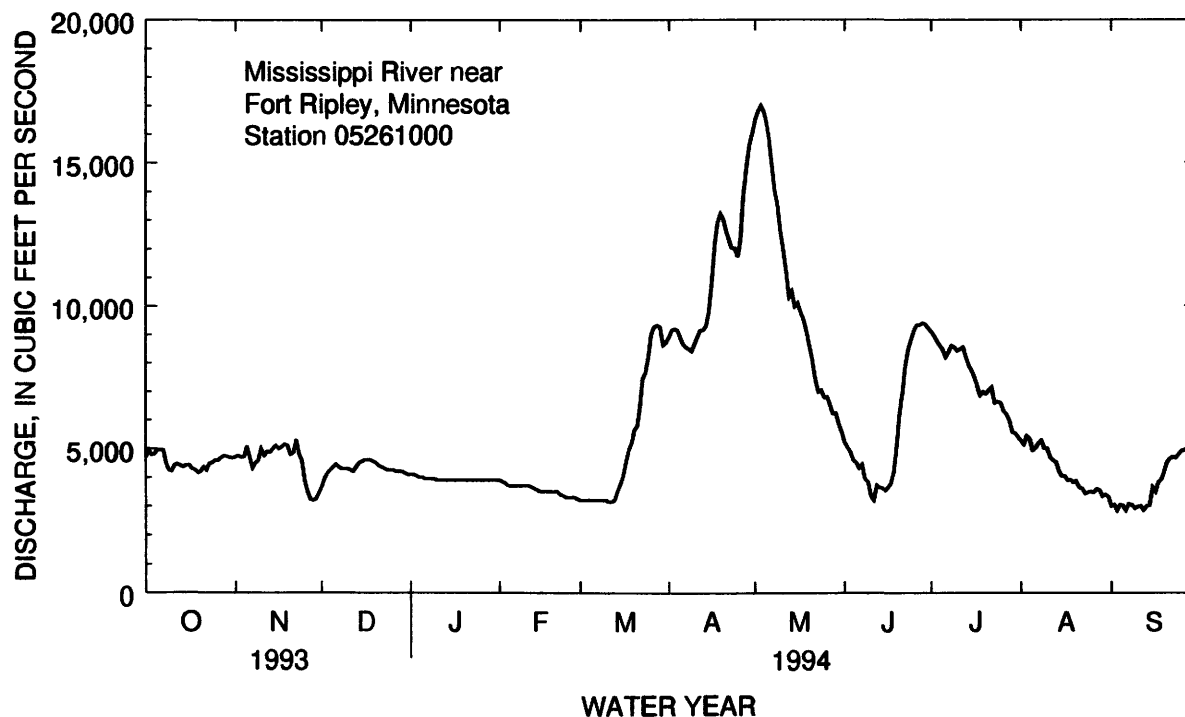
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	3274	3390	2839	2619	2445	3924	7979	7504	5353	5249	3070	3409
MAX	4542	4565	4303	3931	3559	6042	12210	10610	9972	13710	7293	5657
(WY)	1994	1994	1994	1994	1994	1990	1989	1994	1993	1993	1993	1993
MIN	2563	2624	1827	1518	1508	2559	5510	3025	1196	729	1517	1769
(WY)	1993	1993	1991	1991	1991	1993	1990	1988	1988	1988	1989	1990

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1987 - 1994

ANNUAL TOTAL	2256920		2102140			4296	
ANNUAL MEAN	6183		5759				
HIGHEST ANNUAL MEAN						5759	1994
LOWEST ANNUAL MEAN						2813	1988
HIGHEST DAILY MEAN	16600	Jul 13	17000	May 3	17000	May 3	1994
LOWEST DAILY MEAN	2200	Mar 5	2840	Sep 3	558	Jul 30	1988
ANNUAL SEVEN-DAY MINIMUM	2200	Mar 4	2960	Sep 6	626	Jul 24	1988
INSTANTANEOUS PEAK FLOW			17100	May 3	17100	May 3	1994
INSTANTANEOUS PEAK STAGE			10.78	Dec 22	10.78	Dec 22	1993
INSTANTANEOUS LOW FLOW			2790	Sep 3	528	Jul 30	1988
ANNUAL RUNOFF (AC-FT)	4477000		4170000		3113000		
ANNUAL RUNOFF (CFSM)	.56		.52		.39		
10 PERCENT EXCEEDS	11000		9330		8330		
50 PERCENT EXCEEDS	5000		4550		3300		
90 PERCENT EXCEEDS	2400		3310		1690		



MISSISSIPPI RIVER MAIN STEM

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 mi², approximately.

PERIOD OF RECORD.--March 1924 to current year.

REMARKS.--No estimated daily discharges. Records fair. Discharge computed based on powerplant records adjusted by correction factors based on current-meter measurements. Flow partly regulated by powerplants and Winnibigoshish, Leech, Pokegama, Sandy, and Gull Lakes and by Pine River Reservoir (see stations 05201000, 05206000, 05210500, 05218500, 05230500, 05246500).

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

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4930	4940	3880	4330	4130	3420	9500	17300	5500	9800	5600	3400
2	5190	4980	4180	4330	4080	3580	9600	17300	5300	9700	5500	3400
3	5020	4930	4380	4280	4030	3540	9600	18300	5150	9500	5800	3200
4	5040	4950	4480	4230	3930	3400	9500	18000	4900	9300	5700	3300
5	5180	5320	4580	4230	3930	3400	9400	17000	4700	9100	5500	3300
6	5190	4930	4680	4180	3930	3400	9260	16800	4600	9000	5400	3250
7	5180	4560	4580	4180	3930	3400	9200	16000	4700	9100	5500	3400
8	4710	4740	4530	4180	3930	3580	9100	15000	4500	9200	5600	3400
9	4470	4800	4530	4180	3930	4150	9100	14500	4200	9200	5500	3300
10	4450	5230	4530	4130	3930	3900	9200	13300	3800	9100	5400	3250
11	4660	4980	4480	4130	3930	4170	9300	13000	3700	9100	5200	3250
12	4680	5140	4430	4130	3880	3570	9400	12500	3900	9100	4900	3200
13	4640	5110	4580	4130	3830	3710	9700	11800	3900	9000	4800	3400
14	4590	5230	4730	4130	3780	4250	10000	11400	3900	8800	4600	3600
15	4660	5340	4780	4130	3730	4800	11000	11300	3800	8500	4400	4000
16	4660	5230	4830	4130	3730	5500	12000	11300	4000	8300	4300	3900
17	5430	5280	4830	4130	3730	6170	13000	11000	4400	8000	4200	4300
18	4480	5380	4830	4130	3730	6400	13500	10600	4900	7700	4200	4500
19	4400	5340	4930	4130	3730	6700	13700	9870	5800	7600	4150	4700
20	4440	5030	4950	4130	3730	7000	13800	9270	6800	8590	4000	5000
21	4600	5100	4630	4130	3750	7300	13900	8700	7600	7640	3800	5100
22	4490	5550	4580	4130	3700	7450	13400	8000	8400	7870	3800	5100
23	4710	5030	4530	4130	3650	7610	13000	7500	9000	7210	3700	5000
24	4740	4820	4480	4130	3860	9200	13000	7500	9400	6850	3600	5300
25	4820	4100	4480	4130	3720	9470	13000	7300	9700	6800	3700	5400
26	4800	3730	4480	4130	3640	9590	13800	7300	9900	6700	3750	5300
27	4910	3500	4430	4130	3760	9730	15000	7000	10000	6600	3900	5300
28	4970	3430	4430	4130	3520	9730	16000	6600	10300	6500	3800	5300
29	4960	3480	4430	4130	---	9700	16400	6500	10000	6100	3650	5200
30	4930	3680	4380	4130	---	9500	16400	6240	9800	5900	3700	5000
31	4900	---	4330	4130	---	9400	---	5800	---	5800	3600	---
TOTAL	148830	143860	140900	128980	107150	186720	352760	353980	186550	251660	141250	125050
MEAN	4801	4795	4545	4161	3827	6023	11760	11420	6218	8118	4556	4168
MAX	5430	5550	4950	4330	4130	9730	16400	18300	10300	9800	5800	5400
MIN	4400	3430	3880	4130	3520	3400	9100	5800	3700	5800	3600	3200
AC-FT	295200	285300	279500	255800	212500	370400	699700	702100	370000	499200	280200	248000
CFSM	.41	.41	.39	.36	.33	.52	1.01	.98	.54	.70	.39	.36
IN.	.48	.46	.45	.41	.34	.60	1.13	1.14	.60	.81	.45	.40

e Estimated.

MISSISSIPPI RIVER MAIN STEM

05267000 MISSISSIPPI RIVER NEAR ROYALTON, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1924 - 1994, BY WATER YEAR (WY)

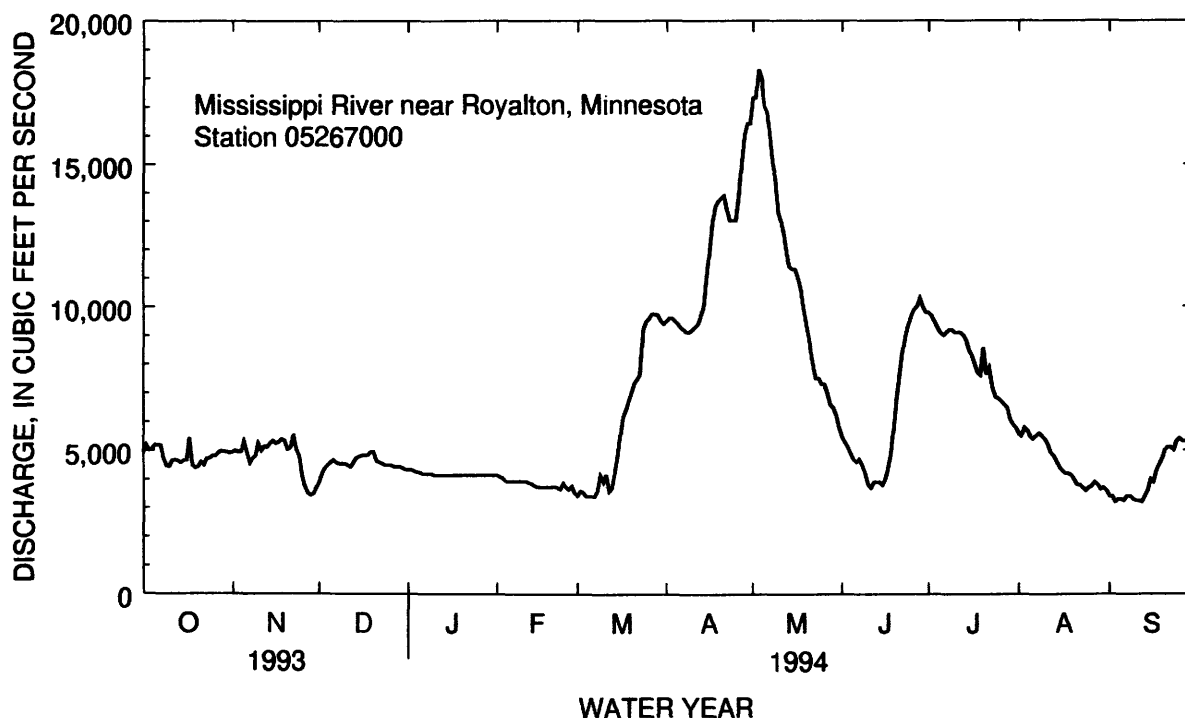
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	3965	3755	2941	2626	2517	3668	8915	8486	6430	4715	3601	3532
MAX	12930	14640	6456	5713	5048	12290	22200	24600	18160	15250	15230	12940
(WY)	1966	1972	1952	1966	1984	1966	1966	1950	1965	1993	1953	1986
MIN	632	618	627	534	758	968	1924	1663	1071	648	449	535
(WY)	1937	1937	1935	1935	1937	1940	1931	1977	1988	1988	1934	1934

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1924 - 1994

ANNUAL TOTAL	2541500	2267690	
ANNUAL MEAN	6963	6213	4623
HIGHEST ANNUAL MEAN			9555
LOWEST ANNUAL MEAN			1213
HIGHEST DAILY MEAN	19000	Jul 11	18300
LOWEST DAILY MEAN	2370	Mar 2	3200
ANNUAL SEVEN-DAY MINIMUM	2480	Feb 28	3290
ANNUAL RUNOFF (AC-FT)	5041000	4498000	3349000
ANNUAL RUNOFF (CFSM)	.60	.54	.40
ANNUAL RUNOFF (INCHES)	8.15	7.27	5.41
10 PERCENT EXCEEDS	12400	10000	9560
50 PERCENT EXCEEDS	5340	4900	3340
90 PERCENT EXCEEDS	2860	3700	1280



MISSISSIPPI RIVER MAIN STEM

05267000 MISSISSIPPI RIVER NEAR ROYALTON, MN--Continued
(National stream-quality accounting network station)

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1963-66, 1975 to current year.

REMARKS.--Letter K indicates non-ideal colony count, letter E indicates estimated value.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE- CIFIC CON- DUCT- ANCE LAB (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)	OXYGEN, DIS- SOLVED (MG/L) (00300)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)
OCT												
21...	1130	4600	291	326	8.3	8.1	8.0	0.80	--	9.5	K4	46
MAR												
17...	1100	6030	324	--	7.4	--	0.0	--	722	9.7	K16	K51
APR												
21...	1219	13900	214	233	7.5	7.5	10.0	2.0	744	11.1	K6	20
JUN												
28...	1500	10300	229	232	7.8	7.8	23.5	7.2	728	7.0	41	84
AUG												
24...	1215	3190	299	300	8.2	8.4	22.5	1.3	737	8.7	K7	59

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)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CAR- BONATE WATER DIS IT FIELD MG/L AS CO3 (00452)	BICAR- BONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)
OCT												
21...	40	14	5.6	1.6	162	163	0	198	6.9	4.6	0.10	7.1
MAR												
17...	--	--	--	--	163	--	0	199	--	--	--	--
APR												
21...	28	8.3	3.9	1.8	103	106	0	125	5.8	5.3	<0.10	7.5
JUN												
28...	31	9.0	3.8	1.3	92	111	0	112	4.9	3.6	<0.10	8.6
AUG												
24...	38	13	5.6	1.7	144	150	0	176	7.0	4.5	0.11	9.7

MISSISSIPPI RIVER MAIN STEM

05267000 MISSISSIPPI RIVER NEAR ROYALTON, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DATE	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	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)	SEDI- MENT, SUS- PENDE (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)	ALUM- INUM, DIS- SOLVED (UG/L AS AL) (01106)
OCT 21...	192	<0.010	0.066	0.020	0.60	0.030	<0.010	<0.010	10	71	--
MAR 17...	--	0.010	0.300	0.150	0.60	0.040	0.030	0.020	5	98	--
APR 21...	159	0.020	0.140	0.020	0.70	0.040	0.040	<0.010	12	89	30
JUN 28...	182	<0.010	0.130	0.050	0.90	0.060	0.030	0.030	19	98	40
AUG 24...	179	<0.010	0.100	0.020	0.40	0.020	0.010	<0.010	7	92	30

DATE	BARIUM, DIS- SOLVED (UG/L AS BA) (01005)	COBALT, DIS- SOLVED (UG/L AS CO) (01035)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	LITHIUM DIS- SOLVED (UG/L AS LI) (01130)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, DIS- SOLVED (UG/L AS AG) (01075)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)	VANA- DIUM, DIS- SOLVED (UG/L AS V) (01085)
OCT 21...	--	--	--	--	--	--	--	--	--	--	--
MAR 17...	--	--	--	--	--	--	--	--	--	--	--
APR 21...	33	<3	310	<4	27	<10	<1	<1	<1.0	57	<6
JUN 28...	34	<3	220	<4	32	<10	1	<1	<1.0	65	<6
AUG 24...	39	<3	50	<4	4	<10	1	<1	<1.0	83	<6

SAUK RIVER BASIN

05270500 SAUK RIVER NEAR ST. CLOUD, MN

LOCATION.--Lat 45°33'35", long 94°14'00", in SW 1/4 SW 1/4 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.--925 mi².

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 mean 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 fair. Flow regulated by powerplants and reservoirs above station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	413	273	e325	e240	e215	e206	1330	1670	580	468	287	269
2	392	280	e320	e239	e213	e210	1290	1680	527	427	267	269
3	375	278	e315	e238	e212	e215	1230	1750	500	393	284	287
4	350	273	e310	e236	e211	e220	1160	1780	480	403	277	299
5	337	319	e305	e234	e211	e225	1110	1750	577	500	257	320
6	325	328	e300	e233	e210	e235	1080	1690	554	487	246	312
7	317	319	e297	e231	e210	e242	1040	1640	538	569	237	304
8	305	310	e292	e230	e210	e251	994	1610	516	778	224	304
9	341	297	e290	e230	e209	e260	1010	1540	524	722	218	291
10	338	297	e287	e229	e209	e275	911	1470	512	711	243	282
11	338	300	285	e228	e208	e290	864	1400	492	736	252	276
12	329	296	e280	e227	e208	e320	824	1330	465	760	258	318
13	313	371	e277	e227	e207	e350	823	1270	439	754	260	337
14	302	394	e274	e226	e207	e410	811	1280	414	745	246	335
15	291	409	e271	e226	e206	552	940	1230	413	723	232	335
16	308	429	e269	e225	e206	595	977	1140	373	684	223	323
17	301	427	e265	e224	e205	670	964	1060	744	635	208	322
18	300	431	e262	e223	e205	783	1020	1030	645	588	208	307
19	313	445	e260	e223	e204	904	1080	992	572	609	215	297
20	320	422	e259	e222	e204	1020	1070	951	614	600	222	291
21	342	428	e258	e222	e203	1140	1050	905	643	595	207	293
22	330	414	e255	e221	e203	1250	1030	858	626	585	204	298
23	324	375	e253	e221	e202	1370	1020	824	614	557	211	280
24	324	389	e251	e220	e202	1450	956	857	610	524	243	288
25	322	373	e250	e220	e202	1500	997	840	612	485	252	290
26	330	352	e249	e220	e202	1510	1340	811	611	447	308	279
27	307	e349	e248	e220	e203	1510	1360	791	586	411	320	285
28	308	e340	e246	e220	e203	1490	1420	759	576	379	301	282
29	305	e335	e243	e220	---	1460	1540	729	530	353	288	263
30	275	e330	e241	e220	---	1430	1620	683	487	330	288	242
31	273	---	e240	e218	---	1380	---	644	---	308	277	---
TOTAL	10048	10583	8477	7013	5790	23723	32861	36964	16374	17266	7763	8878
MEAN	324	353	273	226	207	765	1095	1192	546	557	250	296
MAX	413	445	325	240	215	1510	1620	1780	744	778	320	337
MIN	273	273	240	218	202	206	811	644	373	308	204	242
AC-FT	19930	20990	16810	13910	11480	47050	65180	73320	32480	34250	15400	17610
CFSM	.35	.38	.30	.24	.22	.83	1.18	1.29	.59	.60	.27	.32

e Estimated.

SAUK RIVER BASIN

05270500 SAUK RIVER NEAR ST. CLOUD, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	148	164	128	93.6	102	296	776	483	403	311	200	178
MAX	555	1091	528	336	568	1380	2810	1572	1333	1262	1250	1136
(WY)	1958	1972	1972	1980	1966	1966	1965	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

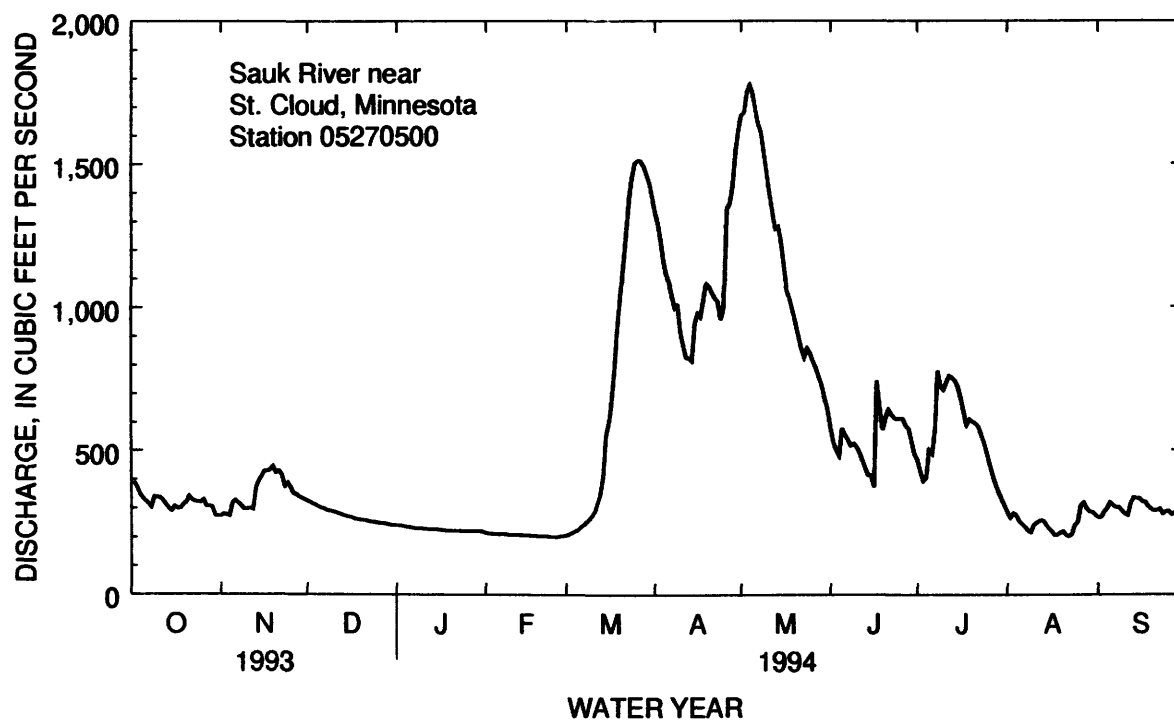
SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1909 - 1994

ANNUAL TOTAL	200811	185740	
ANNUAL MEAN	550	509	289 ^a
HIGHEST ANNUAL MEAN			732
LOWEST ANNUAL MEAN			51.0
HIGHEST DAILY MEAN	1920	Jul 8	1780
LOWEST DAILY MEAN	92	Feb 24	202
ANNUAL SEVEN-DAY MINIMUM	93	Feb 22	202
INSTANTANEOUS PEAK FLOW			1800
INSTANTANEOUS PEAK STAGE			5.04
INSTANTANEOUS LOW FLOW			195
ANNUAL RUNOFF (AC-FT)	398300	368400	209600
ANNUAL RUNOFF (CFSM)	.59	.55	.31
10 PERCENT EXCEEDS	1250	1120	688
50 PERCENT EXCEEDS	414	320	128
90 PERCENT EXCEEDS	101	215	35

^a Median of annual mean discharges is 245 ft³/s.



MISSISSIPPI RIVER MAIN STEM
05270700 MISSISSIPPI RIVER AT ST. CLOUD, MN

LOCATION.--Lat 45°32'50", long 94°08'44", in SE 1/4 SW 1/4 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 mi², 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 discharges, which are fair. Flow partly regulated by powerplants and reservoirs.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6360	6090	5500	e5250	e5000	e5000	14800	22000	6840	10900	6570	3990
2	5940	6300	6390	e5230	e5000	e5000	14900	22300	6520	10600	6600	4090
3	6080	6300	6450	e5240	e4950	e5000	15000	22200	6340	10600	6990	4100
4	6040	6450	6490	e5200	e4900	e5100	15100	22100	6370	10700	6520	4040
5	5910	6610	7030	e5200	e4850	e5200	14600	21200	6330	10700	6110	4170
6	5910	6640	6050	e5200	e4800	e5300	14500	20300	6020	10400	6420	3890
7	6270	6160	4880	e5200	e4750	e5400	14200	19000	5820	11400	6700	3880
8	5830	5740	5360	e5200	e4750	e5600	14100	17700	5550	12300	6670	3950
9	5330	6340	5160	e5200	e4700	e5670	13800	16700	5240	11900	6420	3890
10	5500	6490	5870	e5200	e4700	e5800	13800	15600	4920	11700	6270	3870
11	5830	6640	4620	e5200	e4750	e6000	13700	15300	4520	11800	6050	3990
12	5620	6350	4660	e5200	e4800	e6100	14300	14400	4830	11500	6050	3940
13	5860	7390	5590	e5200	e4800	e6200	14200	13200	4920	11100	5800	4030
14	5660	6710	5590	e5100	e4800	e6400	14000	13400	5070	10800	5350	4410
15	5840	7610	5600	e5100	e4800	e6600	15200	13700	5130	10600	5140	4720
16	5830	7400	5670	e5000	e4800	e7000	16200	13100	5500	10200	5170	4830
17	5630	7070	5790	e5000	e4900	e7400	16200	12800	5860	9570	4870	5110
18	5690	7280	5670	e5000	e5000	e8100	16600	12700	5780	9740	4800	5300
19	5780	7260	5860	e5000	e5000	e9100	16500	12600	7020	11200	4940	5400
20	5740	6890	5740	e5000	e5000	9570	16600	11400	8210	11300	4620	6090
21	5890	6870	5290	e5100	e5100	10400	16100	11200	9160	10700	e4600	6340
22	5980	7410	4690	e5100	e5200	11700	15400	9670	10100	10400	e4630	6130
23	5880	4870	4700	e5100	e5200	13200	15200	9470	10600	9490	e4660	6240
24	5670	5280	4500	e5100	e5100	12000	15000	9340	11200	9090	e4700	6700
25	5750	5170	e4500	e5100	e5100	13800	15100	8890	11700	8740	4780	6730
26	5960	4390	e4540	e5100	e5100	13800	15900	8980	11700	8260	4570	5770
27	5960	4840	e4600	e5000	e5000	14300	18100	8670	11900	7940	4570	5640
28	5930	4440	e4610	e5000	e5000	14900	19100	8190	11800	7480	4650	6280
29	6310	4830	e4720	e5000	---	15100	20300	7970	11700	7040	4400	6140
30	5970	5310	e4850	e5000	---	14900	21100	7790	11500	6900	4450	5820
31	6190	---	e5150	e5000	---	14700	---	7350	---	6860	4360	---
TOTAL	182140	187130	166120	158520	137850	274340	469600	429220	228150	311910	168430	149480
MEAN	5875	6238	5359	5114	4923	8850	15650	13850	7605	10060	5433	4983
MAX	6360	7610	7030	5250	5200	15100	21100	22300	11900	12300	6990	6730
MIN	5330	4390	4500	5000	4700	5000	13700	7350	4520	6860	4360	3870
AC-FT	361300	371200	329500	314400	273400	544200	931500	851400	452500	618700	334100	296500
CFSM	.44	.47	.40	.38	.37	.66	1.18	1.04	.57	.76	.41	.37

e Estimated.

MISSISSIPPI RIVER MAIN STEM

05270700 MISSISSIPPI RIVER AT ST. CLOUD, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1988 - 1994, BY WATER YEAR (WY)

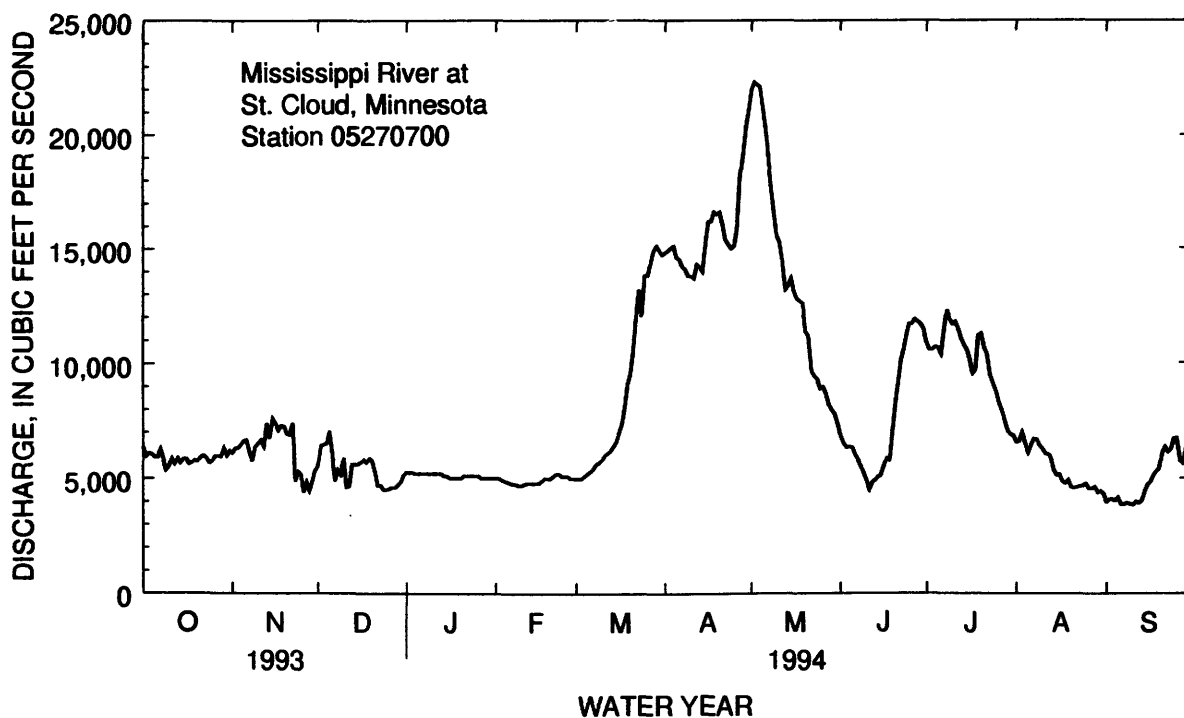
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	3930	4169	3489	3299	3068	5826	11060	10460	7801	8058	4003	4952
MAX	5875	6238	5359	5114	4923	8850	15760	13850	12730	16830	9079	7360
(WY)	1994	1994	1994	1994	1994	1994	1989	1994	1993	1993	1993	1988
MIN	3106	2953	2310	1927	1815	3860	6576	6210	3743	3930	1535	2297
(WY)	1993	1989	1991	1991	1990	1989	1990	1992	1992	1989	1989	1990

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1988 - 1994

ANNUAL TOTAL	2908230		2862890									
ANNUAL MEAN	7968		7844							5819		
HIGHEST ANNUAL MEAN										7844		1994
LOWEST ANNUAL MEAN										4615		1990
HIGHEST DAILY MEAN	20900	Jul 11				22300	May 2			22300	May 2	1994
LOWEST DAILY MEAN	2800	Jan 29				3870	Sep 10			1010	Aug 24	1989
ANNUAL SEVEN-DAY MINIMUM	2930	Mar 18				3920	Sep 6			1250	Aug 13	1989
INSTANTANEOUS PEAK FLOW						23300	May 2			23300	May 2	1994
INSTANTANEOUS PEAK STAGE						8.24	May 2			8.24	May 2	1994
INSTANTANEOUS LOW FLOW						729 ^a	Aug 25			484 ^a	Oct 18	1992
ANNUAL RUNOFF (AC-FT)	5768000					5679000				4216000		
ANNUAL RUNOFF (CFSM)	.60					.59				.44		
10 PERCENT EXCEEDS	14500					14500				11900		
50 PERCENT EXCEEDS	6640					6000				4710		
90 PERCENT EXCEEDS	3200					4700				2100		

^a Result of regulation.

ELK RIVER BASIN

05275000 ELK RIVER NEAR BIG LAKE, MN

LOCATION.--Lat 45°20'02", long 93°40'00", in NE1/4, SW1/4 sec.23, T.22 N., R.27 W., Sherburne County, Hydrologic Unit 07010203, on right bank at upstream side of highway bridge, 4 mi east of Big Lake and 4 mi downstream from St. Francis River.

DRAINAGE AREA.--615 mi².

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 mean 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 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	194	227	e285	e170	e136	e138	652	1050	213	198	139	157
2	261	226	e280	e169	e135	e142	635	1020	198	183	140	166
3	252	227	e270	e167	e134	e155	599	1000	185	172	140	179
4	244	237	e269	e163	e133	e170	565	1050	174	175	141	191
5	234	268	e262	e160	e133	e185	532	1110	195	274	138	191
6	259	274	e260	e158	e132	e210	507	1130	208	291	127	191
7	260	258	e255	e156	e132	e230	479	1090	192	292	125	185
8	261	278	e250	e154	e131	e255	458	1030	178	369	133	183
9	286	251	e248	e152	e131	e285	444	952	164	386	141	181
10	282	246	e242	e150	e130	e315	433	858	152	377	163	178
11	260	244	e238	e150	e130	e350	421	748	141	366	169	172
12	237	242	e232	e149	e129	e385	419	649	130	350	160	170
13	225	304	e230	e149	e128	e425	421	574	141	330	156	183
14	215	348	e225	e149	e128	e470	417	530	140	312	150	205
15	212	350	e222	e147	e127	e535	500	524	128	289	141	219
16	225	350	e220	e146	e127	e510	586	504	133	268	132	212
17	225	365	e217	e145	e127	483	597	476	143	267	127	203
18	219	383	e210	e144	e126	508	583	453	184	239	124	192
19	212	390	e200	e143	e126	557	627	430	216	239	127	185
20	213	383	e160	e142	e125	582	706	409	268	252	124	179
21	232	375	e129	e142	e124	588	731	390	348	238	119	178
22	255	362	e132	e141	e124	583	709	375	370	233	115	192
23	270	348	e170	e141	e123	576	681	361	348	222	114	198
24	281	334	e190	e140	e123	573	662	362	355	210	126	192
25	281	284	e190	e140	e125	594	711	335	369	201	137	185
26	273	248	e190	e139	e129	641	801	306	331	193	182	178
27	267	235	e185	e139	e130	658	822	279	281	188	186	174
28	258	285	e180	e138	e132	652	807	261	250	172	166	169
29	248	e285	e179	e138	---	649	837	248	230	162	157	161
30	243	e290	e176	e137	---	652	963	237	214	155	153	152
31	233	---	e171	e137	---	654	---	225	---	147	155	---
TOTAL	7617	8897	6667	4595	3610	13710	18305	18966	6579	7750	4407	5501
MEAN	246	297	215	148	129	442	610	612	219	250	142	183
MAX	286	390	285	170	136	658	963	1130	370	386	186	219
MIN	194	226	129	137	123	138	417	225	128	147	114	152
AC-FT	15110	17650	13220	9110	7160	27190	36310	37620	13050	15370	8740	10910
CFSM	.40	.48	.35	.24	.21	.72	.99	.99	.36	.41	.23	.30
IN.	.46	.54	.40	.28	.22	.83	1.11	1.15	.40	.47	.27	.33

e Estimated.

ELK RIVER BASIN

05275000 ELK RIVER NEAR BIG LAKE, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1911 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	212	213	150	111	117	304	645	443	344	270	178	201
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

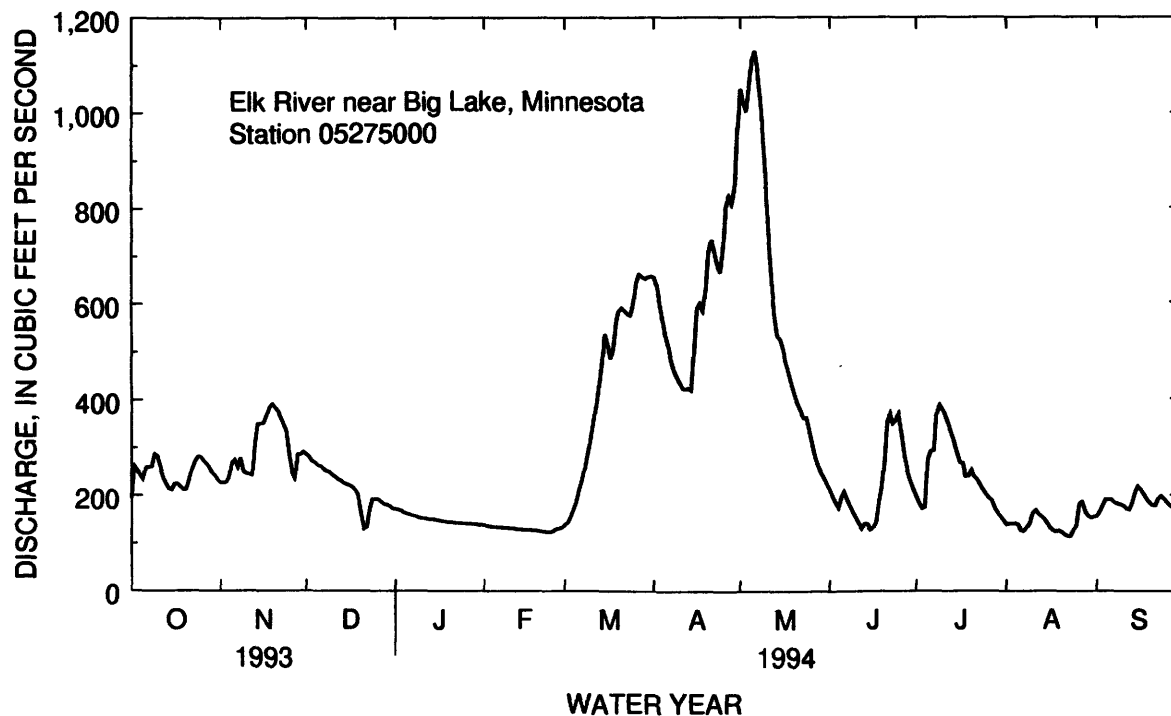
SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1911 - 1994

ANNUAL TOTAL	100030	106604	
ANNUAL MEAN	274	292	277 ^a
HIGHEST ANNUAL MEAN			669
LOWEST ANNUAL MEAN			88.0
HIGHEST DAILY MEAN	706	1130	7170
LOWEST DAILY MEAN	105	114	4.0
ANNUAL SEVEN-DAY MINIMUM	106	121	4.5
INSTANTANEOUS PEAK FLOW		1130	7360
INSTANTANEOUS PEAK STAGE		3.98	10.86
INSTANTANEOUS LOW FLOW		107	3.6
ANNUAL RUNOFF (AC-FT)	198400	211400	200500
ANNUAL RUNOFF (CFSM)	.45	.47	.45
ANNUAL RUNOFF (INCHES)	6.05	6.45	6.12
10 PERCENT EXCEEDS	462	587	557
50 PERCENT EXCEEDS	255	225	165
90 PERCENT EXCEEDS	108	132	67

^a Median of annual mean discharges is 249 ft³/s.



CROW RIVER BASIN

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 and 1 mi downstream from confluence of North and South Forks.

DRAINAGE AREA.--2,520 mi², approximately.

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 mean 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 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1430	794	1130	e680	e445	e570	2630	4220	1720	1240	572	872
2	1360	780	1180	e660	e445	e575	2530	4580	1600	1150	535	867
3	1300	761	1240	e650	e440	e580	2440	4940	1480	1070	504	847
4	1240	749	1260	e640	e440	e620	2380	5160	1380	961	484	829
5	1190	783	1260	e630	e435	e860	2310	5240	1330	963	471	839
6	1140	807	1240	e620	e430	e1230	2270	5260	1320	1020	445	862
7	1100	807	1210	e610	e430	e1620	2220	5210	1300	1130	426	866
8	1080	807	1170	e600	e425	e1940	2160	5020	1300	1340	433	856
9	1090	807	1120	e590	e425	e2150	2120	4780	1300	1650	413	814
10	1070	784	1140	e580	e420	e2300	2050	4520	1280	1940	479	756
11	1060	779	1120	e570	e425	e2400	1990	4300	1230	2130	657	684
12	1060	777	1010	e560	e425	e2530	1930	4070	1180	2200	768	621
13	1050	1000	982	e550	e425	e2750	1940	3850	1130	2170	796	597
14	1030	1370	1000	e540	e425	e3020	1940	3670	1100	2050	792	650
15	1010	1640	1030	e530	e430	e3280	2180	3530	1030	1880	712	789
16	1010	1770	1070	e530	e440	e3290	2430	3390	980	1700	627	853
17	1020	1830	1090	e520	e460	e3230	2670	3240	935	1540	549	858
18	1020	1850	1110	e510	e500	3460	2820	3090	944	1420	492	858
19	1020	1850	1130	e490	e520	3630	2900	2940	988	1350	466	852
20	1010	1780	1110	e480	e540	3490	2980	2780	1090	1340	452	807
21	1010	1710	1040	e475	e550	3430	3060	2640	1310	1350	441	764
22	1010	1670	873	e470	e560	3380	3100	2520	1450	1360	417	796
23	1000	1600	787	e470	e570	3320	3060	2410	1510	1350	393	976
24	992	1520	698	e470	e565	3230	2990	2360	1550	1250	379	1120
25	979	1440	777	e470	e565	3120	3100	2300	1570	1140	367	1170
26	957	1280	e770	e460	e560	3050	3280	2240	1570	1040	389	1180
27	932	1010	e750	e460	e560	3000	3420	2150	1520	919	705	1160
28	908	947	e730	e460	e560	2970	3550	2070	1450	815	829	1110
29	877	e920	e710	e460	---	2920	3760	2000	1380	731	845	1070
30	848	e900	e690	e450	---	2830	3960	1930	1300	663	851	998
31	815	---	e670	e450	---	2730	---	1840	---	609	857	---
TOTAL	32618	35522	31097	16635	13415	77505	80170	108250	39227	41471	17546	26321
MEAN	1052	1184	1003	537	479	2500	2672	3492	1308	1338	566	877
MAX	1430	1850	1260	680	570	3630	3960	5260	1720	2200	857	1180
MIN	815	749	670	450	420	570	1930	1840	935	609	367	597
AC-FT	64700	70460	61680	33000	26610	153700	159000	214700	77810	82260	34800	52210
CFSM	.42	.47	.40	.21	.19	.99	1.06	1.39	.52	.53	.22	.35
IN.	.48	.52	.46	.25	.20	1.14	1.18	1.60	.58	.61	.26	.39

e Estimated.

CROW RIVER BASIN

05280000 CROW RIVER AT ROCKFORD, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1906 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	433	408	287	166	160	838	2086	1406	1247	974	519	483
MAX	3809	1909	1477	928	1115	4085	9026	5992	6166	6759	2784	4941
(WY)	1986	1972	1983	1992	1966	1983	1965	1986	1906	1993	1993	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 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

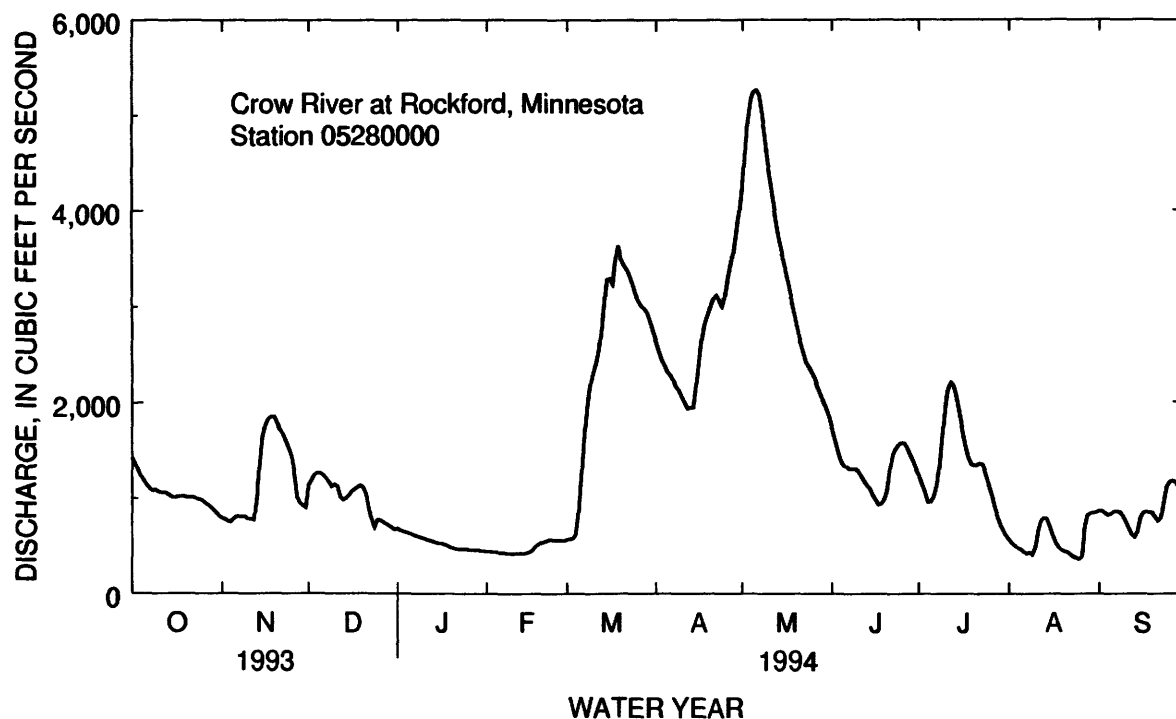
WATER YEARS 1906 - 1994

ANNUAL TOTAL	849928	519777	
ANNUAL MEAN	2329	1424	782 ^a
HIGHEST ANNUAL MEAN			2754
LOWEST ANNUAL MEAN			64.5
HIGHEST DAILY MEAN	9930	Jul 8	5260
LOWEST DAILY MEAN	210	Feb 16	367
ANNUAL SEVEN-DAY MINIMUM	210	Feb 16	405
INSTANTANEOUS PEAK FLOW			5260
INSTANTANEOUS PEAK STAGE			8.98
INSTANTANEOUS LOW FLOW			1.8 ^c
ANNUAL RUNOFF (AC-FT)	1686000	1031000	566200
ANNUAL RUNOFF (CFSM)	.92	.57	.31
ANNUAL RUNOFF (INCHES)	12.55	7.67	4.21
10 PERCENT EXCEEDS	5520	3070	2140
50 PERCENT EXCEEDS	1640	1040	246
90 PERCENT EXCEEDS	216	470	37

a Median of annual mean discharges is 602 ft³/s.

b From floodmark.

c Caused by ice jam upstream.



RUM RIVER BASIN

05284000 MILLE LACS LAKE AT COVE BAY NEAR ONAMIA, MN

LOCATION.--Lat 46°06'36", long 93°37'08", in NE 1/4, NE 1/4, 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 September 1941, but converted to gage datum at Garrison for publication).

GAGE.--Water-stage recorder. Datum of gage is 1,240.40 ft above mean sea level (levels by Minnesota Department of Natural Resources). Gage readings have been reduced to elevations above sea level. Prior to Oct. 1, 1941, nonrecording 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 change in direction and velocity of wind and by seiches.

EXTREMES FOR PERIOD OF RECORD.--Maximum elevation, 1,253.87 ft, Aug. 14, 1972, affected by wind action and seiche action; maximum daily, 1,253.43 ft, Aug. 22, 1972; minimum observed, 1,245.74 ft, Oct. 16-19, 1936.

EXTREMES FOR CURRENT YEAR.--Maximum elevation, 1,253.13 ft, Aug. 25, affected by wind and seiche action; maximum daily, 1,252.37 ft, June 29; minimum, 1,251.01 ft, Aug. 25; minimum daily, 1,251.36 ft, Nov. 1.

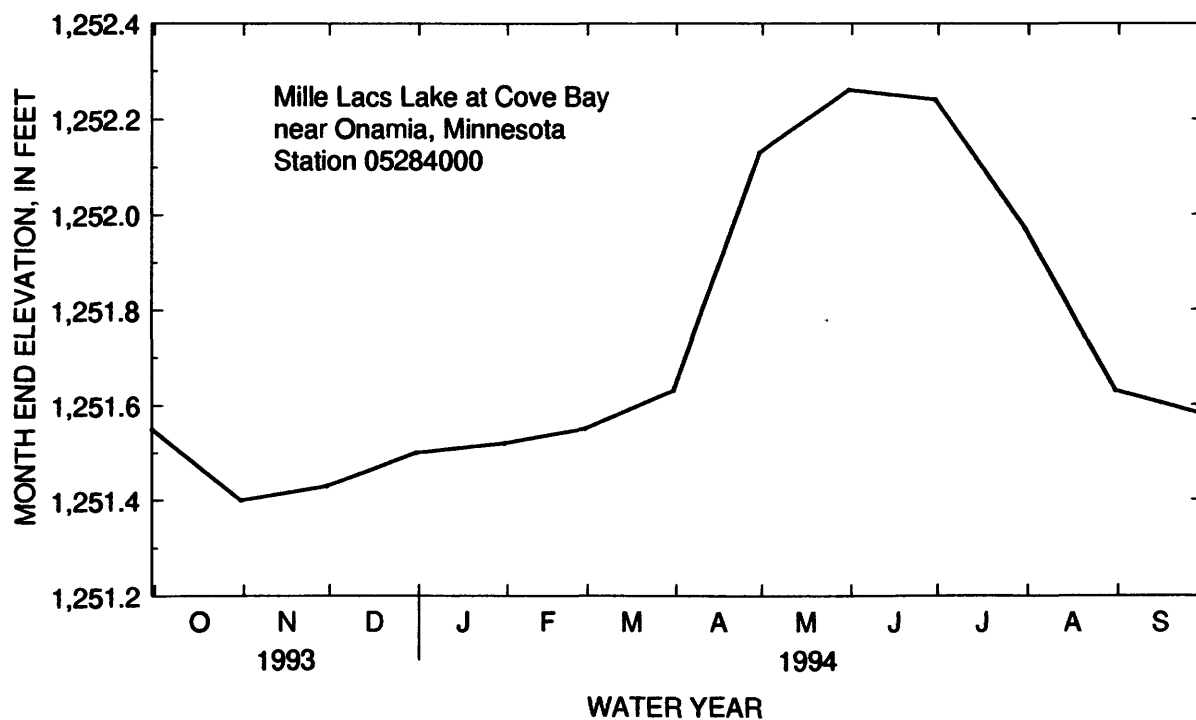
MONTHEND ELEVATION, IN FEET ABOVE SEA LEVEL, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

Oct. 31	1251.40	Feb. 28	1251.55	June 30	1252.24
Nov. 30	1251.43	Mar. 31	1251.63	July 31	1251.97
Dec. 31	1251.50	Apr. 30	1252.13	Aug. 31	1251.63
Jan. 31	1251.52	May 31	1252.26	Sept. 30	1251.58

Note--Elevations other than those shown are available.

RUM RIVER BASIN

05284000 MILLE LACS LAKE AT COVE BAY NEAR ONAMIA, MN--Continued



RUM RIVER BASIN

05286000 RUM RIVER NEAR ST. FRANCIS, MN

LOCATION.--Lat 45°19'40", long 93°22'20", in SE 1/4 sec.19, T.33 N., R.24 W., Anoka County, Hydrologic Unit 07010207, on left bank at upstream side of highway bridge, 4 mi south of St. Francis and 15.8 mi upstream from mouth.

DRAINAGE AREA.--1,360 mi², 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 mean 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. Occasional regulation by Ogechie (also controls Mille Lacs Lake) and Onamia Lakes.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	428	449	e550	e352	e310	e300	1530	2520	530	575	469	416
2	e415	450	e565	e350	e310	e310	1440	2840	508	532	462	390
3	e410	450	e580	e345	e310	e330	1370	3090	490	489	485	389
4	e410	455	e581	e340	e310	e340	1320	3220	480	455	510	385
5	e394	486	e580	e336	e310	e370	1320	3240	488	500	505	385
6	e415	531	e580	e335	e310	e430	1350	3180	486	489	604	385
7	e420	562	e560	e335	e310	e470	1380	3030	480	497	763	385
8	e420	528	e540	e336	e310	e510	1350	2740	472	554	866	380
9	430	494	e520	e337	e310	e560	1280	2380	460	601	901	370
10	441	493	e500	e337	e310	e610	1220	1970	455	702	861	361
11	453	511	e485	e338	e310	e670	1160	1610	445	784	764	345
12	463	517	e475	e336	e310	e745	1140	1350	444	813	686	339
13	451	610	e460	e335	e300	e820	1150	1190	449	760	621	343
14	434	728	444	e335	e300	e868	1170	1090	433	671	520	375
15	429	825	454	e335	e300	e960	1250	1050	425	581	481	439
16	441	877	e450	e330	e300	e1010	1450	1000	420	533	470	460
17	440	902	e450	e330	e300	e1100	1650	967	428	510	454	490
18	441	908	e440	e320	e300	1120	1760	950	473	516	431	556
19	451	892	e430	e320	e300	1150	1930	928	485	541	416	599
20	471	859	e425	e320	e300	1260	2210	892	591	634	404	574
21	486	825	e410	e320	e300	1360	2500	850	665	665	393	549
22	500	782	e371	e320	e300	1610	2670	806	656	682	386	523
23	513	741	e395	e320	e300	1820	2630	764	639	685	378	523
24	534	706	e380	e320	e300	1710	2390	729	625	682	379	504
25	542	640	e372	e320	e300	1640	2020	703	591	683	383	499
26	528	479	e370	e320	e300	1700	1770	687	559	668	414	500
27	511	471	e370	e320	e300	1770	1700	661	575	630	418	492
28	504	e500	e365	e320	e295	1820	1780	645	587	584	409	485
29	496	e520	e360	e320	---	1810	1910	627	619	545	432	478
30	480	e530	e359	e310	---	1730	2160	597	620	515	443	458
31	460	---	e355	e310	---	1630	---	565	---	488	433	---
TOTAL	14211	18721	14176	10202	8515	32533	49960	46871	15578	18564	16141	13377
MEAN	458	624	457	329	304	1049	1665	1512	519	599	521	446
MAX	542	908	581	352	310	1820	2670	3240	665	813	901	599
MIN	394	449	355	310	295	300	1140	565	420	455	378	339
AC-FT	28190	37130	28120	20240	16890	64530	99100	92970	30900	36820	32020	26530
CFSM	.34	.46	.34	.24	.22	.77	1.22	1.11	.38	.44	.38	.33

e Estimated.

RUM RIVER BASIN

05286000 RUM RIVER NEAR ST. FRANCIS, MN—Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1929 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	459	442	324	242	242	614	1503	1104	886	638	400	426
MAX	2300	1715	1051	660	813	2699	4269	3899	3399	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

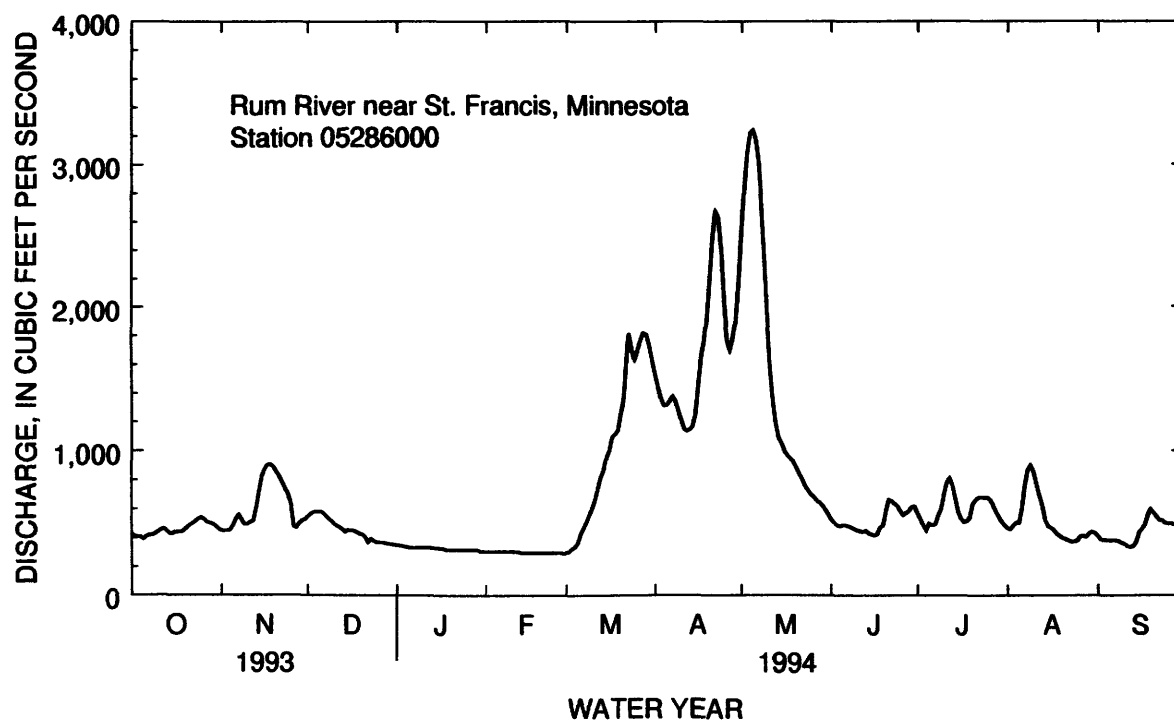
SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1929 - 1994

ANNUAL TOTAL	224617	258849	
ANNUAL MEAN	615	709	626
HIGHEST ANNUAL MEAN			1512
LOWEST ANNUAL MEAN			66.1
HIGHEST DAILY MEAN	2390	Jul 2	3240
LOWEST DAILY MEAN	163	Mar 17	295
ANNUAL SEVEN-DAY MINIMUM	165	Mar 12	299
INSTANTANEOUS PEAK FLOW			3250
INSTANTANEOUS PEAK STAGE			6.32
INSTANTANEOUS LOW FLOW			295
ANNUAL RUNOFF (AC-FT)	445500	513400	453700
ANNUAL RUNOFF (CFSM)	.45	.52	.46
10 PERCENT EXCEEDS	1210	1480	1360
50 PERCENT EXCEEDS	511	497	356
90 PERCENT EXCEEDS	172	320	110

a Also occurred Apr. 13, 1969.



ELM CREEK BASIN

05287890 ELM CREEK NEAR CHAMPLIN, MN

LOCATION.--Lat 45°09'48", long 93°26'11", in NE¼,NW¼ 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.--84.9 mi².

PERIOD OF RECORD.--October 1978 to current year.

GAGE.--Water-stage recorder. Datum of gage is 850.71 ft above mean sea level. Prior to March 15, 1979, 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 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	55	19	48	e12	e5.2	55	54	480	18	6.3	14	14
2	51	19	44	e12	e5.2	48	52	374	16	5.7	12	13
3	48	18	43	e11	e5.2	42	50	355	15	5.9	11	18
4	42	18	40	e10	e5.2	47	50	332	14	6.2	9.4	21
5	39	20	39	e10	e5.2	65	47	303	15	14	7.9	19
6	37	21	37	e9.6	e5.2	e71	43	273	16	19	7.0	21
7	33	21	e35	e9.2	e5.2	e81	41	253	17	21	6.1	17
8	32	21	34	e8.8	e5.2	e118	39	207	20	31	5.3	13
9	32	21	32	e8.5	e5.2	e128	39	177	21	36	5.2	10
10	31	21	32	e8.2	e5.3	e111	39	157	21	33	8.3	8.5
11	31	21	e31	e7.8	e5.3	e108	39	133	21	30	13	6.9
12	30	21	e30	e7.5	e5.3	97	39	114	20	27	11	6.7
13	27	58	28	e7.2	e5.3	97	48	100	19	23	11	9.2
14	25	104	29	e6.9	e5.3	102	53	89	18	20	10	12
15	24	119	31	e6.7	e5.3	108	79	82	17	17	8.4	9.4
16	24	133	33	e6.3	e5.3	106	124	72	17	15	7.8	11
17	25	148	36	e6.1	e5.5	106	144	64	17	13	6.7	11
18	25	155	39	e5.9	8.5	98	162	57	17	11	6.8	10
19	25	151	42	e5.6	14	94	166	49	16	13	6.5	9.2
20	29	137	39	e5.4	e24	90	159	43	18	25	6.2	7.9
21	30	124	e29	e5.2	e42	86	145	37	20	35	5.7	7.9
22	27	110	e23	e5.2	e52	82	126	33	19	48	6.1	10
23	28	97	e18	e5.2	e58	80	111	30	17	50	7.2	11
24	27	85	e17	e5.2	e63	77	98	31	16	48	10	9.9
25	27	72	e16	e5.2	e68	73	138	30	14	43	9.8	9.5
26	26	e66	e15	e5.2	e72	73	238	30	13	37	24	9.0
27	24	e62	e15	e5.2	e68	71	268	27	13	32	27	8.1
28	24	e57	e14	e5.2	62	67	303	24	10	27	22	7.3
29	22	e53	e13	e5.2	---	62	476	23	9.5	23	18	6.4
30	21	e50	e13	e5.2	---	58	494	21	7.3	19	17	5.3
31	20	---	e13	e5.2	---	56	---	19	---	16	16	---
TOTAL	941	2022	908	221.9	620.9	2557	3864	4019	491.8	750.1	336.4	332.2
MEAN	30.4	67.4	29.3	7.16	22.2	82.5	129	130	16.4	24.2	10.9	11.1
MAX	55	155	48	12	72	128	494	480	21	50	27	21
MIN	20	18	13	5.2	5.2	42	39	19	7.3	5.7	5.2	5.3
AC-FT	1870	4010	1800	440	1230	5070	7660	7970	975	1490	667	659
CFSM	.36	.79	.34	.08	.26	.97	1.52	1.53	.19	.29	.13	.13
IN.	.41	.89	.40	.10	.27	1.12	1.69	1.76	.22	.33	.15	.15

e Estimated.

ELM CREEK BASIN

05287890 ELM CREEK NEAR CHAMPLIN, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1979 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	29.5	20.6	12.6	5.96	11.6	69.6	89.3	58.3	42.2	34.8	27.9	31.7
MAX	229	67.4	41.3	22.0	99.1	182	221	146	140	157	143	170
(WY)	1986	1994	1992	1992	1984	1992	1986	1991	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

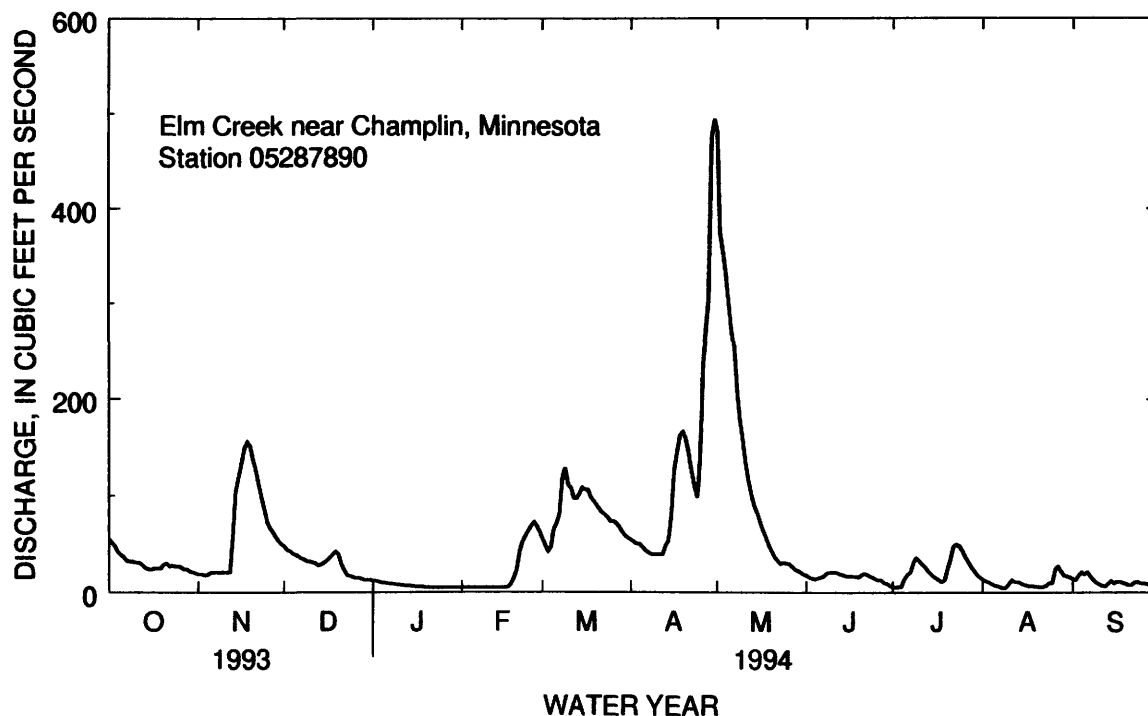
SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1979 - 1994

ANNUAL TOTAL	27124.8	17064.3	
ANNUAL MEAN	74.3	46.8	36.3
HIGHEST ANNUAL MEAN			75.1
LOWEST ANNUAL MEAN			4.54
HIGHEST DAILY MEAN	311	494	545
LOWEST DAILY MEAN	2.4	5.2	.31
ANNUAL SEVEN-DAY MINIMUM	2.6	5.2	.35
INSTANTANEOUS PEAK FLOW		498	597
INSTANTANEOUS PEAK STAGE		9.69	9.93
INSTANTANEOUS LOW FLOW		4.7	.29
ANNUAL RUNOFF (AC-FT)	53800	33850	26270
ANNUAL RUNOFF (CFSM)	.88	.55	.43
ANNUAL RUNOFF (INCHES)	11.89	7.48	5.80
10 PERCENT EXCEEDS	204	110	105
50 PERCENT EXCEEDS	50	23	11
90 PERCENT EXCEEDS	4.3	5.9	1.5

a Occurred Jan 21 to Feb 9, and Aug 9.



ELM CREEK BASIN
05287890 ELM CREEK NEAR CHAMPLIN, MN--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--February 1988 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

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)
OCT							
15...	1530	23	495	8.7	8.5	--	9.0
NOV							
16...	1548	133	429	8.0	2.0	755	13.6
DEC							
20...	1100	37	597	7.7	0.0	730	13.5
JAN							
21...	1600	5.2	652	7.3	0.0	747	9.7
FEB							
16...	1455	5.3	667	7.6	2.5	750	10.7
MAR							
11...	1610	111	450	7.0	1.0	746	7.7
APR							
12...	1345	38	503	7.8	7.5	735	10.3
25...	1215	139	466	7.4	12.0	742	8.0
MAY							
18...	1330	57	492	7.9	18.5	747	7.2
JUN							
09...	1427	23	494	7.2	16.5	741	8.1
30...	1010	7.1	556	7.2	17.5	739	6.7
JUL							
28...	1320	27	481	7.8	20.0	744	7.4
AUG							
18...	1420	6.6	587	7.6	17.5	743	8.1
SEP							
29...	1240	6.1	568	7.6	11.5	740	8.1

ELM CREEK BASIN

05287890 ELM CREEK NEAR CHAMPLIN, MN--Continued

WATER-QUALITY RECORDS

WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DATE	OXYGEN DEMAND, CHEM- ICAL (HIGH LEVEL) (MG/L) (00340)	RESIDUE TOTAL AT 105 DEG. C, SUS- PENDED (MG/L) (00530)	RESIDUE VOLA- TILE, SUS- PENDED (MG/L) (00535)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)	PHOS- PHORUS DIS- SOLVED (MG/L AS P) (00666)
OCT 15...	34	4	3	0.170	1.1	0.120	0.050
NOV 16...	45	6	18	0.490	0.90	0.150	0.100
DEC 20...	33	3	1	0.360	0.90	0.070	0.030
JAN 21...	25	2	2	0.220	1.3	0.090	0.020
FEB 16...	21	2	1	0.230	1.1	0.090	0.030
MAR 11...	<10	19	8	0.370	1.5	0.220	0.100
APR 12...	35	11	4	0.130	1.0	0.100	0.030
25...	43	32	11	0.140	1.2	0.160	0.080
MAY 18...	59	13	7	0.072	1.1	0.160	0.080
JUN 09...	35	<1	4	<0.050	1.1	0.180	0.110
30...	33	9	7	0.090	0.90	0.160	0.090
JUL 28...	60	5	2	0.160	1.3	0.230	0.150
AUG 18...	32	1	<1	0.130	0.90	0.150	0.090
SEP 29...	25	—	—	0.180	0.60	0.090	0.040

ELM CREEK BASIN
 05287890 ELM CREEK NEAR CHAMPLIN, MN
 WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
 SAMPLES COLLECTED BY AUTOMATIC SAMPLER

DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	RESIDUE TOTAL AT 105 DEG. C, SUS- PENDED (MG/L) (00530)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)
APR				
12...	1400	38	9	0.090
25...	1148	129	33	0.190
26...	0427	220	67	0.220
26...	2106	271	92	0.250
27...	1345	270	56	0.160
28...	0624	269	43	0.160
28...	2303	378	33	0.110
29...	1542	381	29	0.100
30...	0821	380	26	0.120
MAY				
01...	0100	378	25	0.090
03...	1936	349	17	0.070
07...	2330	224	16	0.060
10...	1806	144	17	0.100
12...	2003	107	25	0.160

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MISSISSIPPI RIVER MAIN STEM

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 mi², 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.--No estimated daily discharges. Records good. Discharge during period of backwater from ice, Dec. 24 to Feb. 19, computed from discharge furnished by Ford Plant Dam downstream from station adjusted for time of travel, leakage through dam, and diversions to St. Paul and Minneapolis waterworks. Flow slightly regulated by six reservoirs on headwaters; total usable capacity, 1,640,600 acre-ft. Diurnal regulation caused by dam above station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8990	7890	7760	e8660	e6460	6980	18700	32900	10800	13700	8320	6110
2	8960	7850	8040	e8250	e6190	6780	18900	34400	9850	13100	8200	5580
3	8430	8060	8330	e7750	e6270	6680	18700	35000	9380	12600	7710	5560
4	8530	8030	8680	e7730	e5940	6810	18600	35100	8870	12400	8210	6060
5	8120	8330	8760	e7650	e6170	7310	18400	34900	9180	13800	8540	5390
6	8320	8510	8870	e6920	e6040	7560	17600	33900	9080	12900	6950	5920
7	8210	8510	8100	e7640	e5710	7860	17400	32800	8790	12900	7880	5660
8	8530	8010	8610	e7030	e5710	8120	17000	31100	8320	14400	8160	5340
9	8210	7670	8670	e6960	e5660	8650	16800	28900	8320	14800	8600	5620
10	7790	8140	8550	e7450	e6030	9060	16400	27300	7600	15300	8390	5360
11	7870	8420	8170	e7820	e6050	9360	16300	25400	7520	14900	8230	5300
12	8270	8270	7520	e6760	e6040	9670	16300	23700	6820	15500	7920	5130
13	7780	8940	8180	e7140	e6300	9950	16700	22600	6770	14800	7850	5450
14	7980	10100	8710	e6960	e5910	10600	16600	20800	7220	14400	7860	5090
15	7860	10300	8660	e6600	e6050	11100	17600	20700	6680	13600	7080	5760
16	8200	11300	8730	e7170	e5800	12200	19700	20300	7330	13300	6600	6160
17	7870	11100	9030	e8340	e6270	13900	21300	19200	7030	12600	6510	6320
18	7800	10800	9060	e6960	e6280	15300	22800	18600	8390	12000	6610	6530
19	7810	11100	8890	e5560	e7260	15800	23600	18100	7680	11500	5740	6810
20	7990	10800	9020	e5800	8710	16100	23800	17600	8810	13000	6290	6900
21	7990	10500	7900	e6670	7630	16400	24300	16200	10900	14500	5880	7260
22	8170	10200	7740	e7180	7730	17600	23500	15900	11600	13100	5640	8180
23	8240	10200	7270	e7040	9380	19300	23300	14700	12600	13200	5710	7660
24	8140	8090	e5610	e7080	9180	19700	22700	13500	13500	12300	5970	7940
25	8460	8350	e6110	e6900	8010	18700	23300	14000	13400	11600	5410	8210
26	8560	7370	e5010	e6530	8190	20500	24600	12900	14200	11100	6200	8710
27	8520	6140	e6070	e6380	7670	20900	25900	13000	13900	10400	6260	7910
28	8050	6730	e6320	e6390	7180	21000	28300	12600	14300	10200	5750	7190
29	8460	6420	e6420	e6550	---	20700	30300	12100	14100	9620	6570	7750
30	8230	7050	e6720	e6170	---	20200	31600	11600	14000	8780	5980	7870
31	7700	---	e7470	e6400	---	19300	---	11200	---	8580	5930	---
TOTAL	254040	263180	242980	218440	189820	414090	631000	681000	296940	394880	216950	194730
MEAN	8195	8773	7838	7046	6779	13360	21030	21970	9898	12740	6998	6491
MAX	8990	11300	9060	8660	9380	21000	31600	35100	14300	15500	8600	8710
MIN	7700	6140	5010	5560	5660	6680	16300	11200	6680	8580	5410	5090
AC-FT	503900	522000	482000	433300	376500	821300	1252000	1351000	589000	783200	430300	386200
CFSM	.43	.46	.41	.37	.35	.70	1.10	1.15	.52	.67	.37	.34
IN.	.49	.51	.47	.43	.37	.81	1.23	1.33	.58	.77	.42	.38

e Estimated.

MISSISSIPPI RIVER MAIN STEM

05288500 MISSISSIPPI RIVER NEAR ANOKA, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	6219	6031	4668	4140	4035	7117	17070	14700	11460	8502	5922	5810
MAX	21250	22800	10800	8304	9947	23410	42970	39760	29910	27240	22490	23570
(WY)	1987	1972	1972	1986	1966	1966	1969	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

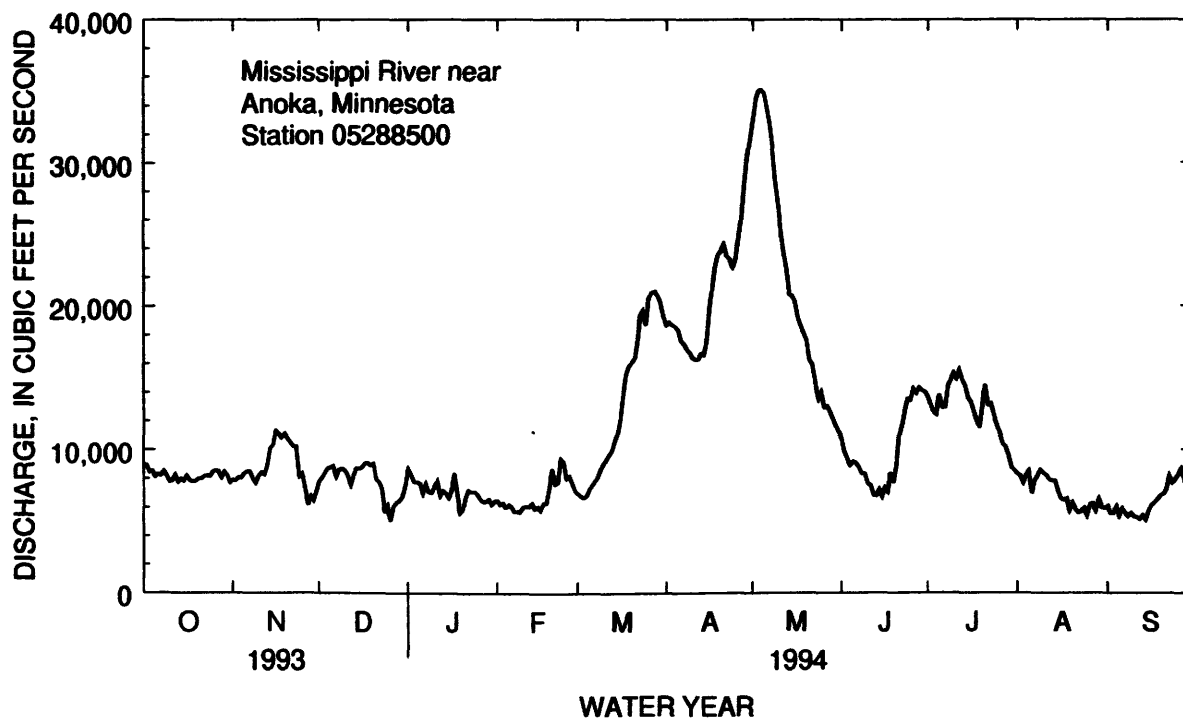
SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1931 - 1994

ANNUAL TOTAL	4408370	3998050	
ANNUAL MEAN	12080	10950	8006
HIGHEST ANNUAL MEAN			17750
LOWEST ANNUAL MEAN			1603
HIGHEST DAILY MEAN	34400	Jul 11	35100
LOWEST DAILY MEAN	2810	Jan 29	5010
ANNUAL SEVEN-DAY MINIMUM	3380	Feb 23	5330
INSTANTANEOUS PEAK FLOW			35400
INSTANTANEOUS PEAK STAGE			10.42
INSTANTANEOUS LOW FLOW			4490
ANNUAL RUNOFF (AC-FT)	8744000	7930000	5800000
ANNUAL RUNOFF (CFSM)	.63	.57	.42
ANNUAL RUNOFF (INCHES)	8.59	7.79	5.70
10 PERCENT EXCEEDS	22000	19700	17500
50 PERCENT EXCEEDS	10000	8320	5500
90 PERCENT EXCEEDS	3820	6050	2030

a Result of regulation.



MISSISSIPPI RIVER MAIN STEM

05288500 MISSISSIPPI RIVER NEAR ANOKA, MN--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

	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	16	388	3	64	6	126	6	140	6	105	8	151
2	26	629	2	42	6	130	6	134	6	100	9	165
3	34	774	7	152	6	135	6	126	6	102	10	180
4	40	921	7	152	6	141	6	125	6	96	11	202
5	22	482	7	157	6	142	6	124	6	100	13	257
6	14	314	7	161	7	168	6	112	6	98	12	245
7	19	421	7	161	7	153	6	124	6	93	13	276
8	24	553	6	130	7	163	6	114	6	93	15	329
9	6	133	6	124	7	164	6	113	6	92	17	397
10	6	126	6	132	7	162	6	121	6	98	20	489
11	6	127	6	136	7	154	6	127	6	98	17	430
12	17	380	6	134	8	162	6	110	6	98	18	470
13	18	378	7	169	8	177	6	116	6	102	19	510
14	14	302	12	327	9	212	6	113	6	96	25	715
15	22	467	13	362	9	210	6	107	6	98	30	899
16	28	620	14	427	7	165	6	116	6	94	36	1190
17	17	361	15	450	6	146	6	135	6	102	48	1800
18	10	211	9	262	6	147	6	113	6	102	54	2230
19	8	169	11	330	7	168	6	90	6	118	49	2090
20	7	151	9	262	6	146	6	94	6	141	53	2300
21	5	108	8	227	6	128	6	108	6	124	47	2080
22	5	110	7	193	6	125	6	116	6	125	48	2280
23	5	111	6	165	6	118	6	114	6	152	57	2970
24	6	132	6	131	6	91	6	115	6	149	58	3090
25	27	617	6	135	6	99	6	112	6	130	50	2520
26	14	324	6	119	6	81	6	106	6	133	50	2770
27	6	138	6	99	6	98	6	103	6	124	57	3220
28	11	239	6	109	6	102	6	104	6	116	51	2890
29	11	251	6	104	6	104	6	106	—	—	38	2120
30	8	178	6	114	6	109	6	100	—	—	38	2070
31	4	83	—	—	6	121	6	104	—	—	42	2190
TOTAL	—	10198	—	5530	—	4347	—	3542	—	3079	—	43525

MISSISSIPPI RIVER MAIN STEM

05288500 MISSISSIPPI RIVER NEAR ANOKA, MN--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

	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	24	1210	45	4000	26	758	36	1330	7	157	3	49
2	27	1380	56	5200	26	691	34	1200	10	221	8	121
3	30	1510	33	3120	24	608	27	919	7	146	10	150
4	35	1760	35	3320	24	575	25	837	12	266	10	164
5	34	1690	36	3390	27	669	34	1270	13	300	10	146
6	28	1330	31	2840	28	686	33	1150	7	131	7	112
7	23	1080	28	2480	25	593	25	871	12	255	8	122
8	21	964	32	2690	23	517	33	1280	9	198	9	130
9	20	907	33	2570	23	517	37	1480	16	372	5	76
10	24	1060	25	1840	18	369	41	1690	18	408	9	130
11	25	1100	22	1510	18	365	38	1530	12	267	5	72
12	31	1360	23	1470	18	331	33	1380	6	128	3	42
13	25	1130	27	1650	17	311	33	1320	13	276	4	59
14	23	1030	24	1350	15	292	27	1050	16	340	10	137
15	21	998	26	1450	14	253	19	698	13	249	4	62
16	25	1330	28	1530	13	257	21	754	11	196	5	83
17	37	2130	28	1450	13	247	27	919	10	176	8	137
18	48	2950	27	1360	26	589	27	875	9	161	4	71
19	55	3500	28	1370	22	456	23	714	10	155	9	165
20	60	3860	28	1330	18	428	24	842	5	85	12	224
21	63	4130	24	1050	31	912	25	979	7	111	10	196
22	65	4120	25	1070	35	1100	26	920	6	91	15	331
23	65	4090	22	873	37	1260	20	713	3	46	5	103
24	58	3550	23	838	43	1570	23	764	8	129	5	107
25	51	3210	24	907	39	1410	23	720	6	88	4	89
26	59	3920	23	801	39	1500	18	539	7	117	4	94
27	50	3500	22	772	37	1390	17	477	8	135	3	64
28	46	3510	24	816	36	1390	13	358	9	140	3	58
29	55	4500	26	849	33	1260	7	182	13	231	3	63
30	41	3500	26	814	34	1290	12	284	14	226	3	64
31	---	---	26	786	---	---	10	232	7	112	---	---
TOTAL YEAR	--- 256231	70309	---	55496	---	22594	---	28277	---	5913	---	3421

MISSISSIPPI RIVER MAIN STEM

05288500 MISSISSIPPI RIVER NEAR ANOKA, MN--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	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)
MAR 29...	1315	20800	0	0	0	2	41	93	98	100
JUL 15...	1145	13000	0	0	4	29	80	94	98	100

MINNESOTA RIVER BASIN

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.--447 mi².

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 450 ft³/s and maximum (*):

Date	Time	Discharge (ft³/s)	Gage height (ft)	Date	Time	Discharge (ft³/s)	Gage height (ft)
Mar. 10	--	500	Ice jam	Apr. 27	1400	674	5.01
Mar. 21	0100	*874	5.41				

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	25	16	e19	e15	e9.6	e11	273	605	74	11	15	4.0
2	24	16	e19	e15	e9.6	e11	274	502	65	10	14	5.3
3	23	16	e19	e15	e9.6	e12	282	401	59	9.6	12	6.2
4	23	17	e19	e14	e9.6	e16	270	359	55	10	11	7.3
5	21	17	e19	e14	e9.6	e80	267	340	51	11	10	9.9
6	21	15	e19	e14	e9.6	e400	241	303	47	11	10	9.9
7	25	e15	e19	e13	e9.6	e350	224	278	44	58	10	8.1
8	24	e15	e19	e13	e9.6	e300	210	253	41	178	9.6	7.0
9	22	e15	e19	e13	e9.6	e420	215	227	39	249	9.5	5.8
10	21	e15	e19	e12	e9.6	e480	231	205	37	212	11	5.1
11	20	e16	e19	e12	e9.6	e390	224	185	35	234	11	4.1
12	19	e16	e19	e12	e9.6	e320	214	169	34	209	14	3.8
13	19	e16	e18	e11	e9.6	e350	205	156	32	146	18	4.0
14	20	e17	e18	e11	e9.6	e620	189	166	30	108	19	4.0
15	20	e17	e18	e11	e9.6	e840	198	227	28	111	15	5.5
16	20	e18	e18	e11	e9.6	e770	220	225	28	90	12	6.3
17	19	e18	e18	e11	e9.6	e800	206	202	29	80	10	4.5
18	20	e18	e18	e10	e9.7	e820	190	173	33	74	8.8	4.7
19	21	e19	e18	e10	e9.8	836	176	156	34	66	7.8	4.7
20	23	e19	e18	e10	e9.9	825	165	145	30	66	8.2	4.4
21	23	e19	e18	e9.9	e10	856	154	133	28	64	7.6	4.3
22	22	e19	e18	e9.8	e10	816	150	118	25	65	7.0	4.2
23	21	e19	e18	e9.7	e10	759	141	110	22	60	5.9	4.0
24	19	e19	e18	e9.7	e10	465	134	277	20	53	5.1	4.5
25	18	e19	e18	e9.6	e11	e405	172	405	18	44	5.0	4.2
26	18	e19	e18	e9.6	e11	e390	319	336	16	37	5.1	4.2
27	18	e19	e17	e9.6	e11	e370	614	231	15	29	5.5	4.3
28	18	e19	e17	e9.6	e11	e350	572	166	13	25	4.4	3.9
29	17	e19	e17	e9.6	---	339	522	128	13	21	4.1	3.6
30	17	e19	e16	e9.6	---	304	612	104	11	18	4.3	3.8
31	16	---	e16	e9.6	---	276	---	86	---	16	4.1	---
TOTAL	637	521	563	353.3	276.6	13981	7864	7371	1006	2375.6	294.0	155.6
MEAN	20.5	17.4	18.2	11.4	9.88	451	262	238	33.5	76.6	9.48	5.19
MAX	25	19	19	15	11	856	614	605	74	249	19	9.9
MIN	16	15	16	9.6	9.6	11	134	86	11	9.6	4.1	3.6
AC-FT	1260	1030	1120	701	549	27730	15600	14620	2000	4710	583	309
CFSM	.05	.04	.04	.03	.02	1.01	.59	.53	.08	.17	.02	.01
IN.	.05	.04	.05	.03	.02	1.16	.65	.61	.08	.20	.02	.01

MINNESOTA RIVER BASIN

05290000 LITTLE MINNESOTA RIVER NEAR PEEVER, SD--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1940 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	3.90	4.75	2.70	1.32	2.53	102	200	86.1	73.3	56.4	12.9	4.44
MAX	40.7	34.7	18.2	11.4	21.8	573	1321	531	355	865	235	43.3
(WY)	1943	1958	1994	1994	1976	1943	1952	1962	1942	1993	1993	1993
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 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

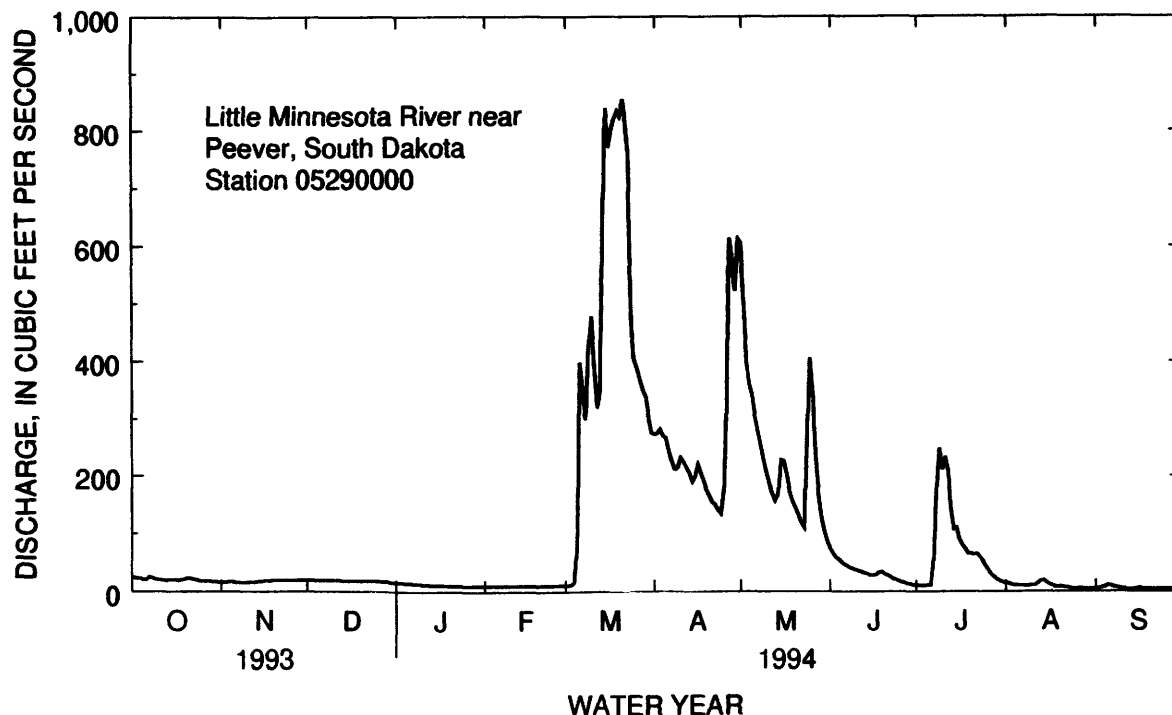
WATER YEARS 1940 - 1994

ANNUAL TOTAL	55571.87					35398.1						
ANNUAL MEAN	152					97.0				45.9 ^a		
HIGHEST ANNUAL MEAN										153		1962
LOWEST ANNUAL MEAN										1.37		1981
HIGHEST DAILY MEAN	5400	Jul 25				856	Mar 21			5400	Jul 25	1993
LOWEST DAILY MEAN	.80	Jan 9				3.6	Sep 29			.00 ^b	Jan 1	1940
ANNUAL SEVEN-DAY MINIMUM	.81	Jan 6				4.1	Sep 24			.00	Jan 1	1940
INSTANTANEOUS PEAK FLOW						874	Mar 21			8900	Jul 25	1993
INSTANTANEOUS PEAK STAGE						9.87 ^c	Mar 6			13.58	Jul 25	1993
INSTANTANEOUS LOW FLOW						3.4	Sep 29					
ANNUAL RUNOFF (AC-FT)	110200					70210				33270		
ANNUAL RUNOFF (CFSM)	.34					.22				.10		
ANNUAL RUNOFF (INCHES)	4.62					2.95				1.40		
10 PERCENT EXCEEDS	356					303				100		
50 PERCENT EXCEEDS	31					19				2.9		
90 PERCENT EXCEEDS	2.2					7.2				.30		

a Median of annual mean discharges is 33 ft³/s.

b Many days, several years.

c From highwater mark, backwater from ice..



MINNESOTA RIVER BASIN

05291000 WHETSTONE RIVER NEAR BIG STONE CITY, SD

LOCATION.--Lat 45°17'32", long 96°29'14", in SE $\frac{1}{4}$ NW $\frac{1}{4}$ 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.--389 mi².

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 in mean 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.

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 ft³/s, from dam break.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 200 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Mar. 06		1200a		Apr. 30	2100	1260	6.87
Mar. 15	0100	1510	7.43	May 16	1200	215	3.48
Mar. 22	0100	814	5.76	Jun 18	2100	528	4.93
Apr. 03	1300	280	3.72	Jul 08	0800	*3980	*11.14
Apr. 10	1700	239	3.46	July 14	2400	1460	7.31
Apr. 16	2100	312	3.83	July 19	2200	1280	6.94
Apr. 27	1300	1800	7.98				

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	41	33	38	e38	e36	e83	189	1120	66	49	63	32
2	39	33	41	e38	e36	e92	205	800	64	45	59	34
3	36	34	43	e37	e36	e105	261	520	59	43	63	48
4	36	37	42	e37	e36	e120	238	403	56	42	61	67
5	36	36	43	e37	e36	e500	208	334	54	46	53	76
6	37	36	44	e37	e36	e1200	187	294	52	43	50	75
7	36	30	e44	e36	e36	e950	172	266	51	1190	48	67
8	40	33	e43	e36	e36	873	167	234	49	3230	45	57
9	45	37	e42	e36	e36	801	172	204	48	1670	52	48
10	43	30	e42	e36	e37	581	215	182	46	698	78	43
11	43	29	e41	e36	e38	404	231	168	42	365	117	38
12	43	30	e41	e36	e40	405	198	149	39	218	124	33
13	42	35	e40	e36	e42	542	181	139	37	154	105	37
14	42	37	e39	e36	e44	1090	174	144	36	533	94	39
15	41	35	e39	e36	e45	1350	203	163	36	1020	82	37
16	41	36	e40	e36	e47	935	263	203	42	458	73	36
17	41	40	e42	e36	e49	668	274	168	70	361	66	31
18	40	41	e42	e36	e51	586	212	144	295	236	63	30
19	42	42	e42	e36	e52	562	177	123	345	934	59	30
20	42	41	e42	e36	e54	650	167	110	185	870	56	27
21	42	41	e41	e36	e55	775	163	100	113	399	54	26
22	40	39	e41	e36	e57	719	165	95	89	241	51	28
23	39	35	e41	e36	e59	616	160	95	93	171	45	27
24	39	47	e40	e36	e62	423	148	104	103	137	42	25
25	38	52	e40	e36	e64	334	275	111	135	112	38	27
26	37	44	e39	e36	e66	329	1020	132	104	96	41	30
27	36	e43	e39	e36	e71	306	1660	110	80	87	40	28
28	36	e41	e39	e36	e76	320	985	94	69	79	37	26
29	34	40	e39	e36	---	269	608	88	60	74	34	24
30	33	39	e39	e36	---	221	1030	77	54	71	31	23
31	34	---	e38	e36	---	189	---	71	---	66	32	---
TOTAL	1214	1126	1266	1124	1333	16998	10308	6945	2572	13738	1856	1149
MEAN	39.2	37.5	40.8	36.3	47.6	548	344	224	85.7	443	59.9	38.3
MAX	45	52	44	38	76	1350	1660	1120	345	3230	124	76
MIN	33	29	38	36	36	83	148	71	36	42	31	23
AC-FT	2410	2230	2510	2230	2640	33720	20450	13780	5100	27250	3680	2280
CFSM	.10	.10	.10	.09	.12	1.41	.88	.58	.22	1.14	.15	.10

a. Daily mean discharge

MINNESOTA RIVER BASIN

05291000 WHETSTONE RIVER NEAR BIG STONE CITY, SD—Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1910 - 1994, BY WATER YEAR (WY)

MEAN	9.38	10.9	7.80	5.30	11.4	151	183	81.5	75.4	54.8	17.7	9.19
MAX	70.5	78.3	43.3	36.3	118	612	1386	491	478	885	327	65.7
(WY)	1958	1972	1972	1994	1984	1978	1952	1972	1984	1993	1991	1942
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 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

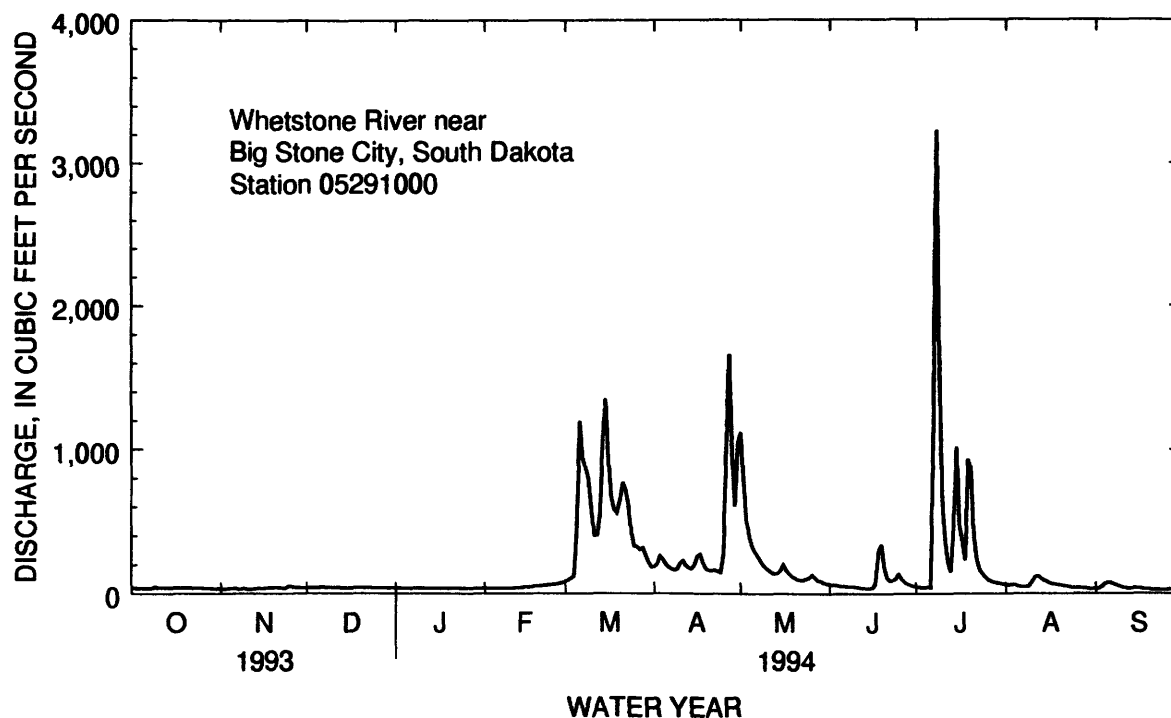
WATER YEARS 1910 - 1994

ANNUAL TOTAL	58841.5			59629								
ANNUAL MEAN	161			163						53.1 _a		
HIGHEST ANNUAL MEAN										181		1986
LOWEST ANNUAL MEAN										1.52		1934
HIGHEST DAILY MEAN	3440	Jul 18		3230	Jul 8				6090		Apr 8	1969
LOWEST DAILY MEAN	8.0	Jan 16		23	Sep 30				.00 _b		Sep 13	1931
ANNUAL SEVEN-DAY MINIMUM	8.1	Jan 13		26	Sep 24				.00		Jul 31	1933
INSTANTANEOUS PEAK FLOW				3980	Jul 8				6870		Apr 8	1969
INSTANTANEOUS PEAK STAGE				11.14	Jul 8				14.32 _c		Apr 8	1969
ANNUAL RUNOFF (AC-FT)	116700			118300					38450			
ANNUAL RUNOFF (CFSM)	.41			.42					.14			
10 PERCENT EXCEEDS	397			404					95			
50 PERCENT EXCEEDS	52			47					7.2			
90 PERCENT EXCEEDS	9.0			36					1.3			

a Median of annual mean discharges is 36 ft³/s.

b No flow at times in most years.

c From floodmark.



MINNESOTA RIVER BASIN

05292000 MINNESOTA RIVER AT ORTONVILLE, MN

LOCATION.--Lat 45°17'44", long 96°26'38", in NE 1/4 NW 1/4 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 mi², 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 mean 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. Some regulation by Big Stone Lake (station 05291500).

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	240	26	26	e28	e25	e1180	905	2150	266	30	e114	86
2	231	26	26	e28	e25	e977	777	1790	147	28	117	85
3	229	26	26	e28	e25	810	383	1390	147	27	117	84
4	225	27	26	e28	e25	733	380	1370	144	28	114	84
5	120	26	26	e28	e25	952	486	1200	145	80	96	85
6	30	24	26	e28	e25	1760	717	1050	139	69	81	181
7	29	24	26	e28	e24	1890	700	953	133	1540	80	171
8	30	24	26	e28	e24	1700	701	925	94	2610	77	101
9	29	19	26	e27	e24	1580	716	650	65	2470	78	143
10	28	1.9	27	e27	e24	1410	686	495	63	1840	207	68
11	27	1.7	28	e27	e24	1160	675	503	61	1580	294	67
12	27	17	28	e27	e24	1140	645	492	58	1200	175	67
13	27	29	27	e27	e24	1230	570	472	58	857	176	82
14	27	28	27	e27	e24	1780	281	495	58	916	175	90
15	26	28	27	e27	e24	2130	91	493	58	1850	174	87
16	26	27	27	e27	e24	1960	87	405	47	922	184	84
17	26	26	27	e27	e23	1780	86	310	62	374	137	80
18	84	25	27	e26	e23	1810	116	353	208	910	36	79
19	99	27	27	e26	e23	1850	136	357	468	1110	35	78
20	35	26	27	e26	e23	2060	127	345	218	1670	33	76
21	34	26	28	e26	e23	2200	129	352	203	1220	32	70
22	83	26	29	e26	e23	2150	129	350	143	576	34	72
23	121	26	e29	e26	e24	2040	128	214	244	426	33	70
24	121	26	e29	e26	e24	1810	130	296	186	421	32	66
25	92	26	e29	e26	e30	1580	647	488	215	367	33	60
26	41	26	e29	e26	e60	1490	1820	559	143	127	85	56
27	38	26	e29	e26	73	1410	2370	472	77	126	75	56
28	37	26	e29	e25	e681	1320	2010	456	32	126	35	56
29	30	26	e29	e25	---	1200	1700	467	29	e120	67	54
30	27	26	e28	e25	---	1050	1980	448	28	e117	89	49
31	26	---	e28	e25	---	961	---	418	---	e114	89	---
TOTAL	2245	718.6	849	827	1420	47103	20308	20718	3939	23851	3104	2487
MEAN	72.4	24.0	27.4	26.7	50.7	1519	677	668	131	769	100	82.9
MAX	240	29	29	28	681	2200	2370	2150	468	2610	294	181
MIN	26	1.7	26	25	23	733	86	214	28	27	32	49
AC-FT	4450	1430	1680	1640	2820	93430	40280	41090	7810	47310	6160	4930
CFSM	.06	.02	.02	.02	.04	1.31	.58	.58	.11	.66	.09	.07

e Estimated.

MINNESOTA RIVER BASIN

05292000 MINNESOTA RIVER AT ORTONVILLE, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1938 - 1994, BY WATER YEAR (WY)

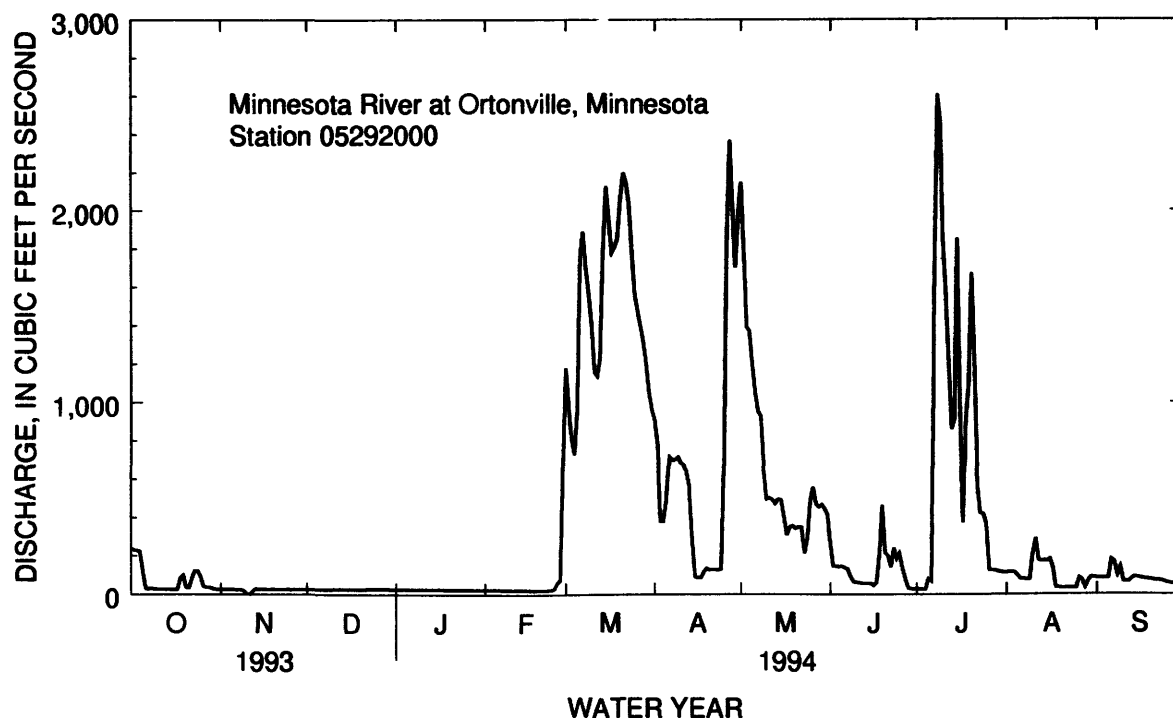
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	21.5	15.9	16.6	17.5	22.3	171	422	240	181	157	74.0	32.9
MAX	186	166	194	164	150	1519	2195	887	1034	1781	1299	250
(WY)	1987	1943	1943	1943	1943	1994	1952	1986	1962	1993	1993	1942
MIN	.20	.20	.20	.17	.16	1.14	1.27	.91	1.30	1.11	.25	.18
(WY)	1939	1939	1939	1940	1940	1941	1941	1941	1977	1977	1959	1988

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1938 - 1994

ANNUAL TOTAL	154013.1	127569.6	116a	
ANNUAL MEAN	422	350		
HIGHEST ANNUAL MEAN			415	1993
LOWEST ANNUAL MEAN			2.39	1977
HIGHEST DAILY MEAN	2890	2610	3050	Apr 13 1952
LOWEST DAILY MEAN	1.7	1.7	.00	Dec 13 1940
ANNUAL SEVEN-DAY MINIMUM	7.0	16	.08	Sep 12 1988
INSTANTANEOUS PEAK FLOW		2740	3060	Apr 13 1952
INSTANTANEOUS PEAK STAGE		9.23	12.92	Apr 13 1952
INSTANTANEOUS LOW FLOW		1.7	.00	Dec 13 1940
ANNUAL RUNOFF (AC-FT)	305500	253000	83860	
ANNUAL RUNOFF (CFSM)	.36	.30	.10	
10 PERCENT EXCEEDS	1740	1270	301	
50 PERCENT EXCEEDS	74	77	15	
90 PERCENT EXCEEDS	7.8	26	1.0	

a Median of annual mean discharges is 84 ft³/s.

MINNESOTA RIVER BASIN

05292704 NORTH FORK YELLOW BANK RIVER NEAR ODESSA

LOCATION.--Lat 45 11'21", long 96 24'54", in NW NW NW sec. 22, T. 120 N., R. 46 W., Lac qui Parle County, Hydrologic Unit 070200001, 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.--Undetermined.

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 fair.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	21	17	37	e20	e13	e150	109	727	35	44	27	16
2	17	19	36	e19	e14	e80	109	614	32	38	25	19
3	17	24	33	e19	e14	e50	112	363	29	34	24	25
4	16	22	32	e18	e14	e40	108	257	26	34	23	47
5	16	22	32	e18	e14	e100	92	203	25	37	21	62
6	15	22	31	e17	e14	e640	78	174	22	32	21	72
7	15	18	30	e15	e14	e650	74	157	21	577	20	57
8	14	19	28	e16	e14	e400	69	141	21	2300	19	46
9	15	19	29	e17	e12	e350	67	121	20	1600	24	40
10	17	22	30	e18	e13	e310	70	106	18	807	57	37
11	17	19	29	e18	e13	e270	71	95	16	402	114	35
12	17	21	30	e18	e13	e270	68	84	14	238	103	32
13	17	29	31	e18	e15	e350	62	74	14	168	74	32
14	17	30	31	e17	e16	e750	58	73	13	145	60	31
15	18	30	31	e17	e18	e1130	78	75	13	367	49	31
16	19	30	31	e17	e21	e900	119	73	14	161	42	29
17	18	33	32	e17	e22	604	125	64	19	124	38	27
18	19	39	33	e17	e23	456	90	58	99	110	35	26
19	20	43	33	e16	e30	396	72	52	314	293	32	24
20	21	42	e28	e16	e40	414	65	47	148	245	31	23
21	22	42	e26	e16	e50	536	69	43	108	149	28	21
22	22	42	e24	e18	e40	456	80	40	99	126	26	21
23	22	39	e20	e18	e25	373	72	40	138	97	23	20
24	21	40	e20	e18	e19	272	62	56	209	76	21	24
25	22	42	e25	e18	e18	235	65	114	165	63	20	21
26	22	36	e20	e17	e18	212	132	123	109	53	23	20
27	21	32	e18	e16	e23	202	558	75	83	46	19	20
28	22	30	e19	e15	e100	169	589	58	69	41	18	19
29	22	29	e20	e15	---	147	359	49	59	37	17	18
30	20	34	e20	e14	---	126	504	43	51	34	17	17
31	22	---	e20	e14	---	110	---	39	---	30	18	---
TOTAL	584	886	859	527	640	11148	4186	4238	2003	8508	1069	912
MEAN	18.8	29.5	27.7	17.0	22.9	360	140	137	66.8	274	34.5	30.4
MAX	22	43	37	20	100	1130	589	727	314	2300	114	72
MIN	14	17	18	14	12	40	58	39	13	30	17	16
AC-FT	1160	1760	1700	1050	1270	22110	8300	8410	3970	16880	2120	1810

e Estimated

MINNESOTA RIVER BASIN

05292704 NORTH FORK YELLOW BANK RIVER NEAR ODESSA--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1992 - 1993, BY WATER YEAR (WY)

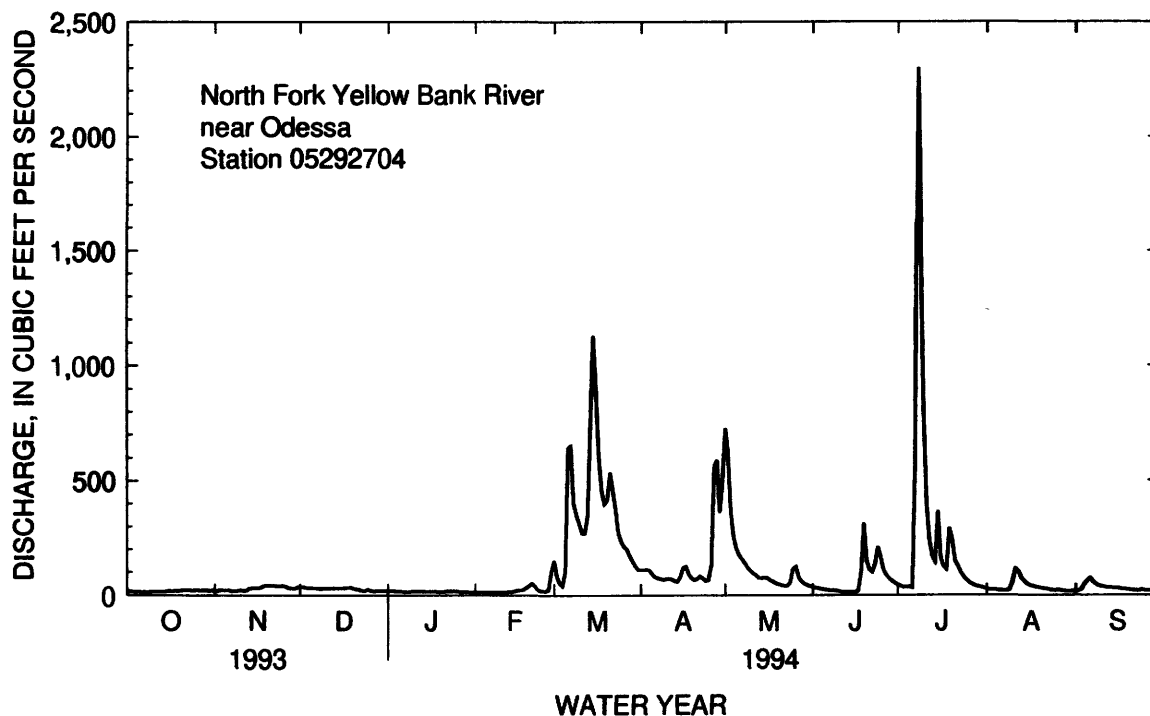
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	9.92	14.8	13.6	9.99	16.1	182	137	68.2	129	304	35.8	21.2
MAX	18.8	29.5	27.7	17.0	22.9	360	250	137	212	501	59.9	30.4
(WY)	1994	1994	1994	1994	1994	1994	1993	1994	1992	1993	1993	1994
MIN	3.98	5.59	5.79	6.28	5.55	36.9	21.8	9.14	66.8	135	13.0	6.23
(WY)	1993	1992	1992	1993	1993	1992	1992	1992	1994	1992	1992	1992

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1992 - 1994

ANNUAL TOTAL	38061.1		35560									
ANNUAL MEAN	104		97.4							78.9		
HIGHEST ANNUAL MEAN										99.6		1993
LOWEST ANNUAL MEAN										39.8		1992
HIGHEST DAILY MEAN	1260	Jul 26		2300	Jul 8					2300	Jul 8 1994	
LOWEST DAILY MEAN	4.8	Feb 16		12	Feb 9					3.0	Dec 3-5, 1991	
ANNUAL SEVEN-DAY MINIMUM	5.0	Feb 15		13	Feb 6					3.4	Nov 30 1991	
INSTANTANEOUS PEAK FLOW				2580	Jul 8					2580	Jul 8 1994	
INSTANTANEOUS PEAK STAGE				14.62	Jul 8					14.62	Jul 8 1994	
ANNUAL RUNOFF (AC-FT)	75490			70530						57170		
10 PERCENT EXCEEDS	315			241						185		
50 PERCENT EXCEEDS	33			31						21		
90 PERCENT EXCEEDS	6.1			16						5.3		



MINNESOTA RIVER BASIN

05293000 YELLOW BANK RIVER NEAR ODESSA, MN

LOCATION.--Lat 45°13'35", long 96°21'12", in SW1/4SW1/4 sec. 6, T. 120 N., R. 45 W., Lac qui Parle County, Hydrologic Unit 07020001, on left bank 150 ft downstream from highway bridge, 2.5 mi southwest of Odessa, and 4.5 mi upstream from mouth.

DRAINAGE AREA.--398 mi².

PERIOD OF RECORD.--October 1939 to current year.

REVISED RECORDS.--WSP 1388: 1947(M), 1950.

GAGE.--Water-stage recorder. Datum of gage is 953.34 ft above mean 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.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 300 ft³/s and maximum(*).

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Mar. 07	--	e1100	Ice jam	Jun 19	1200	354	5.16
Mar. 15	--	e900	Ice jam	Jul 09	0400	2900*	12.73*
Apr. 28	0500	1110	8.18	Jul 15	1500	476	5.84
May 01	1100	1180	8.40	Jul 20	0300	421	5.58
May 25	2400	379	5.27				

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	66	50	e84	e68	e68	e90	270	1130	104	97	90	61
2	64	50	e82	e68	e68	e97	259	1060	98	92	88	60
3	62	50	e80	e68	e68	e110	251	777	93	86	86	61
4	59	53	e79	e68	e68	e130	246	593	89	80	84	62
5	58	54	e78	e68	e68	e175	220	486	84	75	82	66
6	57	54	e77	e68	e68	e450	205	416	79	70	80	75
7	58	62	e77	e68	e68	e1100	196	368	77	162	79	86
8	59	65	e76	e68	e68	e900	190	333	77	1720	76	88
9	59	57	e75	e68	e68	e770	181	293	78	2550	75	85
10	60	51	e74	e68	e68	e680	175	259	77	1540	75	81
11	60	51	e73	e68	e68	e620	173	229	73	861	91	77
12	60	49	e72	e68	e68	e600	170	204	69	519	142	74
13	60	52	e70	e68	e69	e610	163	190	65	350	140	70
14	60	57	e69	e68	e70	e750	157	179	60	256	122	68
15	60	61	e68	e68	e71	e900	159	174	58	370	109	66
16	60	64	e68	e68	e73	e780	193	169	58	261	99	65
17	60	64	e68	e68	e75	e720	254	161	61	185	92	63
18	60	68	e68	e68	e76	e680	220	150	66	168	88	61
19	61	70	e68	e68	e79	e660	193	141	258	236	86	59
20	60	72	e68	e68	e81	e650	172	132	198	336	84	57
21	60	72	e68	e68	e83	e850	170	124	156	194	82	55
22	59	72	e68	e68	e84	e720	175	118	136	177	80	53
23	58	70	e68	e68	e84	e650	180	114	158	165	78	52
24	58	79	e68	e68	e84	e580	174	137	203	146	75	52
25	57	106	e68	e68	e84	548	172	270	198	130	73	53
26	57	e100	e68	e68	e84	482	252	344	169	120	72	53
27	56	e96	e68	e68	e84	458	623	229	133	112	71	52
28	56	e92	e68	e68	e84	399	1010	175	114	107	68	51
29	57	e89	e68	e68	---	353	694	142	109	102	65	51
30	55	e86	e68	e68	---	311	767	123	103	98	64	50
31	51	---	e68	e68	---	278	---	112	---	94	63	---
TOTAL	1827	2016	2222	2108	2081	17101	8264	9332	3301	11459	2659	1907
MEAN	58.9	67.2	71.7	68.0	74.3	552	275	301	110	370	85.8	63.6
MAX	66	106	84	68	84	1100	1010	1130	258	2550	142	88
MIN	51	49	68	68	68	90	157	112	58	70	63	50
AC-FT	3620	4000	4410	4180	4130	33920	16390	18510	6550	22730	5270	3780
.CFSM	.15	.17	.18	.17	.19	1.39	.69	.76	.28	.93	.22	.16

e Estimated.

MINNESOTA RIVER BASIN

05293000 YELLOW BANK RIVER NEAR ODESSA, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1940 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	13.4	17.5	9.93	6.19	11.8	158	235	98.0	103	64.4	29.0	16.0
MAX	104	201	71.7	68.0	117	653	1341	652	577	741	281	273
(WY)	1985	1972	1994	1994	1984	1986	1952	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 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

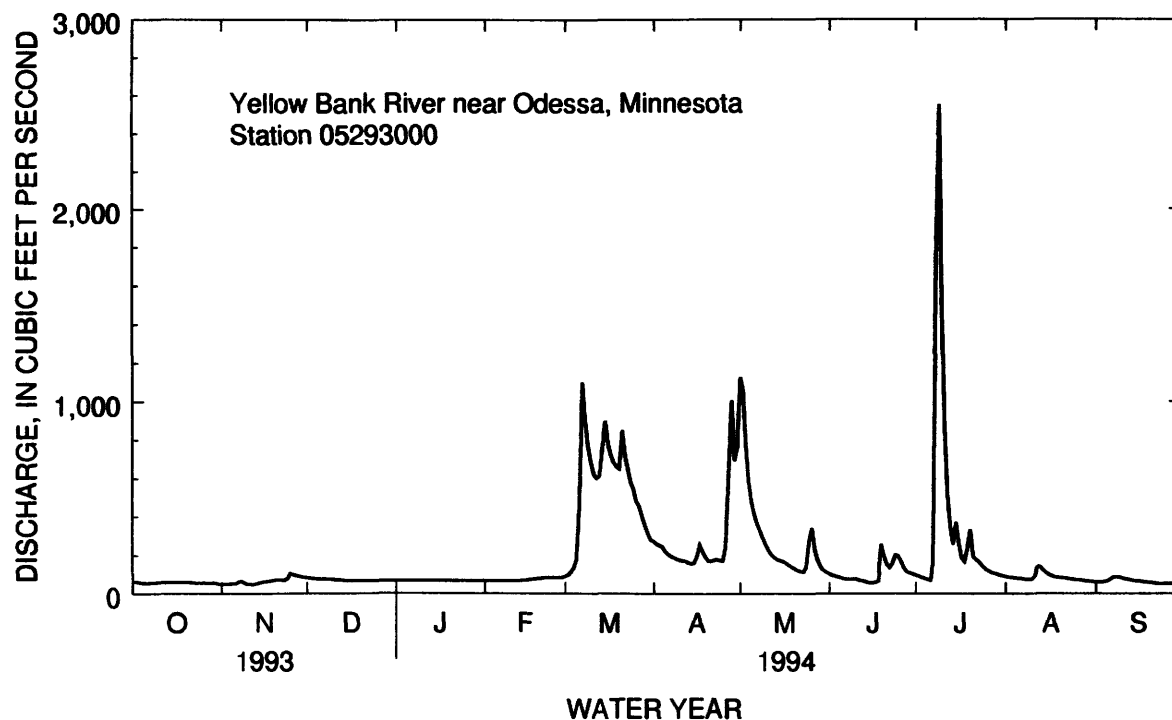
WATER YEARS 1940 - 1994

ANNUAL TOTAL	72636	64277	
ANNUAL MEAN	199	176	63.6 ^a
HIGHEST ANNUAL MEAN			225
LOWEST ANNUAL MEAN			3.98
HIGHEST DAILY MEAN	1760	2550	6640
LOWEST DAILY MEAN	10	49	.00 ^b
ANNUAL SEVEN-DAY MINIMUM	10	52	.00
INSTANTANEOUS PEAK FLOW		2900	6970
INSTANTANEOUS PEAK STAGE		12.73	19.07 ^c
INSTANTANEOUS LOW FLOW		47	
ANNUAL RUNOFF (AC-FT)	144100	127500	46060
ANNUAL RUNOFF (CFSM)	.50	.44	.16
10 PERCENT EXCEEDS	577	430	131
50 PERCENT EXCEEDS	81	79	9.5
90 PERCENT EXCEEDS	11	58	1.0

a Median of annual mean discharge is 49 ft³/s.

b Many days in several years.

c From floodmark.



MINNESOTA RIVER BASIN

05294000 POMME DE TERRE RIVER AT APPLETON, MN

LOCATION.--Lat 45°12'10", long 96°01'20", in SW 1/4 NW 1/4 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.--905 mi², approximately.

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 and concrete control. Datum of gage is 978.00 ft above mean 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. Flow affected by lakes above station. Occasional regulation at low flow by old milldam 500 ft upstream.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 200 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Mar. 22	1600	2,090	*9.33 ^a	May 2	0300	2,110	8.88
Mar. 27	0200	*2,220	9.07	July 9	1330	724	6.59

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	190	160	171	e100	e68	e90	1160	2060	264	161	137	85
2	188	154	166	e100	e68	e92	1050	2060	251	153	128	90
3	185	151	165	e99	e68	e93	964	1870	238	149	123	98
4	185	155	166	e97	e68	e95	893	1700	226	149	118	122
5	185	156	162	e95	e67	e97	823	1570	217	188	111	126
6	188	129	142	e93	e67	e99	770	1410	208	368	105	126
7	185	122	139	e91	e67	e100	733	1230	204	556	100	119
8	188	159	137	e89	e66	e105	689	1090	195	645	96	111
9	193	167	151	e87	e66	e105	656	961	184	710	108	105
10	193	145	140	e85	e66	e110	640	859	174	691	118	100
11	190	153	139	e84	e66	e110	625	774	168	617	120	94
12	185	151	125	e83	e66	e115	589	707	161	519	115	91
13	177	164	125	e81	e66	e115	536	648	161	429	119	92
14	174	184	142	e80	e66	e125	498	638	156	368	114	101
15	172	184	141	e79	e66	e134	503	595	160	333	108	107
16	169	179	136	e78	e67	e146	526	562	158	303	100	105
17	164	173	132	e77	e68	e172	524	513	163	276	95	100
18	e168	171	132	e77	e69	e199	515	471	185	274	94	97
19	e172	168	134	e76	e70	e244	491	433	172	261	94	90
20	e178	164	134	e76	e72	e406	459	400	165	258	93	86
21	e185	162	130	e75	e74	e740	433	381	167	249	92	87
22	e190	165	e79	e74	e75	e1950	423	367	178	255	93	86
23	e188	141	e105	e73	e76	e2040	412	361	188	256	90	88
24	e186	108	e115	e73	e79	e1660	398	392	194	237	84	88
25	e182	72	e120	e72	e81	e1440	436	379	189	213	88	82
26	e180	88	e115	e72	e83	1950	612	355	181	193	93	80
27	e176	91	e115	e72	e85	2110	1080	334	178	177	96	77
28	e173	123	e115	e71	e88	1780	1570	315	172	167	94	76
29	171	142	e110	e70	---	1560	1760	299	169	154	92	75
30	166	161	e105	e70	---	1410	1850	285	168	143	89	74
31	155	---	e105	e69	---	1270	---	272	---	150	85	---
TOTAL	5581	4442	4093	2518	1988	20662	22618	24291	5594	9602	3192	2858
MEAN	180	148	132	81.2	71.0	667	754	784	186	310	103	95.3
MAX	193	184	171	100	88	2110	1850	2060	264	710	137	126
MIN	155	72	79	69	66	90	398	272	156	143	84	74
AC-FT	11070	8810	8120	4990	3940	40980	44860	48180	11100	19050	6330	5670
CFSM	.20	.16	.15	.09	.08	.74	.83	.87	.21	.34	.11	.11

a Affected by backwater from ice.

MINNESOTA RIVER BASIN

05294000 POMME DE TERRE RIVER AT APPLETON, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	58.4	56.5	39.5	25.4	23.7	149	349	192	158	134	71.8	53.4
MAX	508	339	182	141	147	673	1587	846	516	1382	752	331
(WY)	1985	1985	1987	1987	1987	1985	1969	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

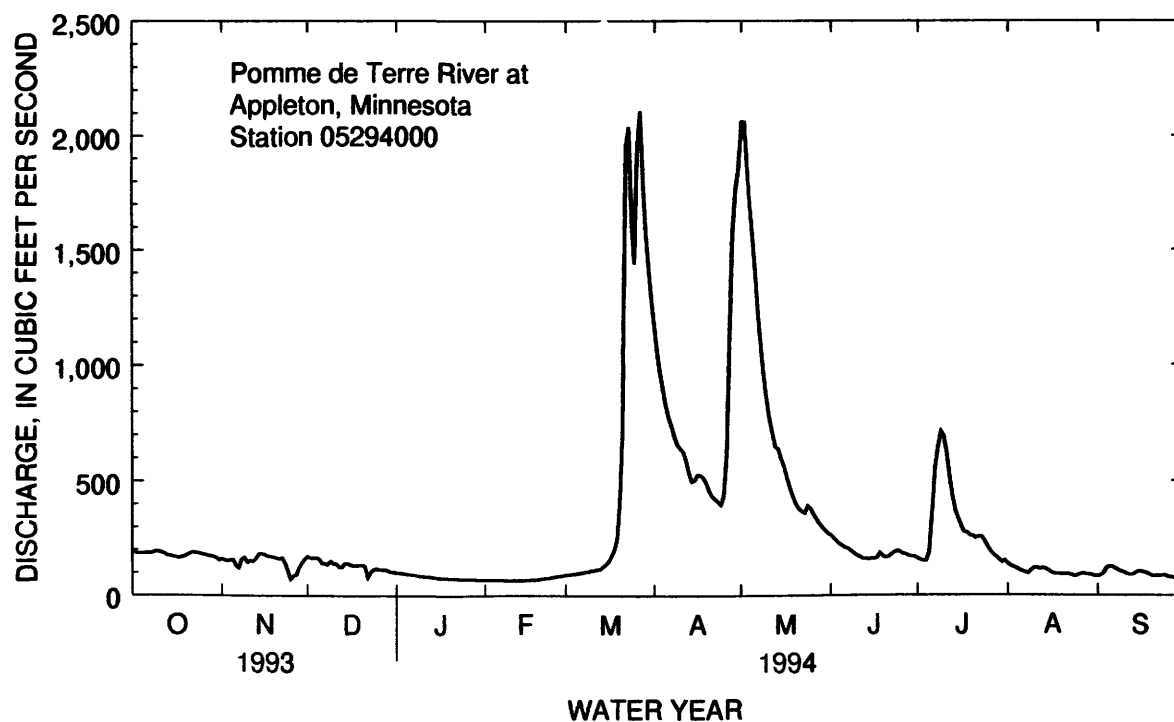
SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1931 - 1994

ANNUAL TOTAL	121456					107439						
ANNUAL MEAN	333					294				117		
HIGHEST ANNUAL MEAN										363		1986
LOWEST ANNUAL MEAN										21.1		1977
HIGHEST DAILY MEAN	2330	Jul 10				2110	Mar 27		5210		Apr 11	1969
LOWEST DAILY MEAN	15	Feb 15				66	Feb 8		.00		Aug 3	1934
ANNUAL SEVEN-DAY MINIMUM	16	Feb 12				66	Feb 8		.00		Feb 1	1936
INSTANTANEOUS PEAK FLOW						2220	Mar 27		5520		Apr 11	1969
INSTANTANEOUS PEAK STAGE						9.33a	Mar 22		14.58		Apr 9	1969
INSTANTANEOUS LOW FLOW						56	Nov 23					
ANNUAL RUNOFF (AC-FT)	240900					213100			84400			
ANNUAL RUNOFF (CFSM)	.37					.33			.13			
10 PERCENT EXCEEDS	724					690			263			
50 PERCENT EXCEEDS	186					155			45			
90 PERCENT EXCEEDS	18					76			6.0			

a Backwater from ice.



MINNESOTA RIVER BASIN

05300000 LAC QUI PARLE RIVER NEAR LAC QUI PARLE, MN

LOCATION.--Lat 44°59'42", long 95°55'09", in SW 1/4 SW 1/4 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.--983 mi².

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 951.98 ft above mean sea level (Minnesota Department of Transportation benchmark). 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 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e198	132	e180	e115	e72	e150	770	1460	232	1490	e116	165
2	e152	135	e180	e110	e74	e170	714	1520	215	1130	e106	196
3	e112	137	e180	e109	e75	e200	665	1510	198	931	e98	189
4	e105	140	e178	e105	e76	e250	623	1380	182	780	e90	227
5	e127	143	e172	e103	e77	e300	572	1230	172	771	e86	327
6	e155	e138	e170	e102	e79	e350	538	1100	168	556	155	385
7	e165	e130	e160	e100	e81	e370	497	1000	184	664	157	396
8	e161	143	e158	e78	e83	e375	479	930	220	742	e120	353
9	e155	138	e162	e96	e85	e370	461	862	248	621	e114	315
10	e152	e137	e160	e96	e88	e380	439	792	283	827	167	282
11	e141	143	e155	e94	e90	e400	426	711	280	758	332	253
12	e127	148	e150	e94	e92	e480	404	638	256	546	877	231
13	e118	176	e150	e93	e94	e580	388	576	245	389	1110	213
14	e114	188	e153	e92	e100	e780	382	517	240	641	1120	198
15	e112	220	e152	e90	e104	e980	432	471	278	461	1060	192
16	e109	249	e150	e90	e112	e1200	499	446	315	381	981	190
17	e110	260	e148	e87	e117	e1400	631	414	371	386	908	177
18	e143	254	e148	e84	e122	e1700	679	380	604	473	832	162
19	e191	248	e147	e81	e127	e2000	607	357	813	480	733	151
20	e256	247	e146	e78	e130	2180	549	332	1030	433	625	137
21	e273	241	e145	e74	e140	2180	528	310	1090	406	528	e129
22	e246	228	e130	e76	e150	1980	537	292	1330	361	451	e125
23	e217	223	e125	e80	e148	1830	540	298	1760	322	392	178
24	e191	165	e130	e81	e147	1720	515	555	2050	292	344	216
25	e180	81	e132	e82	e142	1570	535	460	2490	257	304	190
26	e161	e130	e130	e80	e138	1380	670	411	2690	222	266	172
27	e152	e160	e128	e78	e136	1240	855	393	2590	196	240	152
28	149	e170	e125	e74	e140	1120	989	354	2270	172	216	137
29	146	e180	e124	e72	---	1010	1170	314	2010	155	197	129
30	141	e182	e122	e68	---	914	1420	282	1600	140	182	122
31	135	---	e118	e70	---	833	---	252	---	127	165	---
TOTAL	4894	5266	4608	2732	3019	30392	18514	20547	26414	16110	13072	6289
MEAN	158	176	149	88.1	108	980	617	663	880	520	422	210
MAX	273	260	180	115	150	2180	1420	1520	2690	1490	1120	396
MIN	105	81	118	68	72	150	382	252	168	127	86	122
AC-FT	9710	10450	9140	5420	5990	60280	36720	40750	52390	31950	25930	12470
CFSM	.16	.18	.15	.09	.11	1.00	.63	.67	.90	.53	.43	.21

e Estimated.

MINNESOTA RIVER BASIN

05300000 LAC QUI PARLE RIVER NEAR LAC QUI PARLE, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1910 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	30.8	39.3	21.2	9.60	18.3	294	519	215	263	137	74.7	37.7
MAX	482	345	149	88.1	140	1634	3578	1028	1762	1613	765	535
(WY)	1985	1971	1994	1994	1984	1985	1969	1944	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 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1910 - 1994

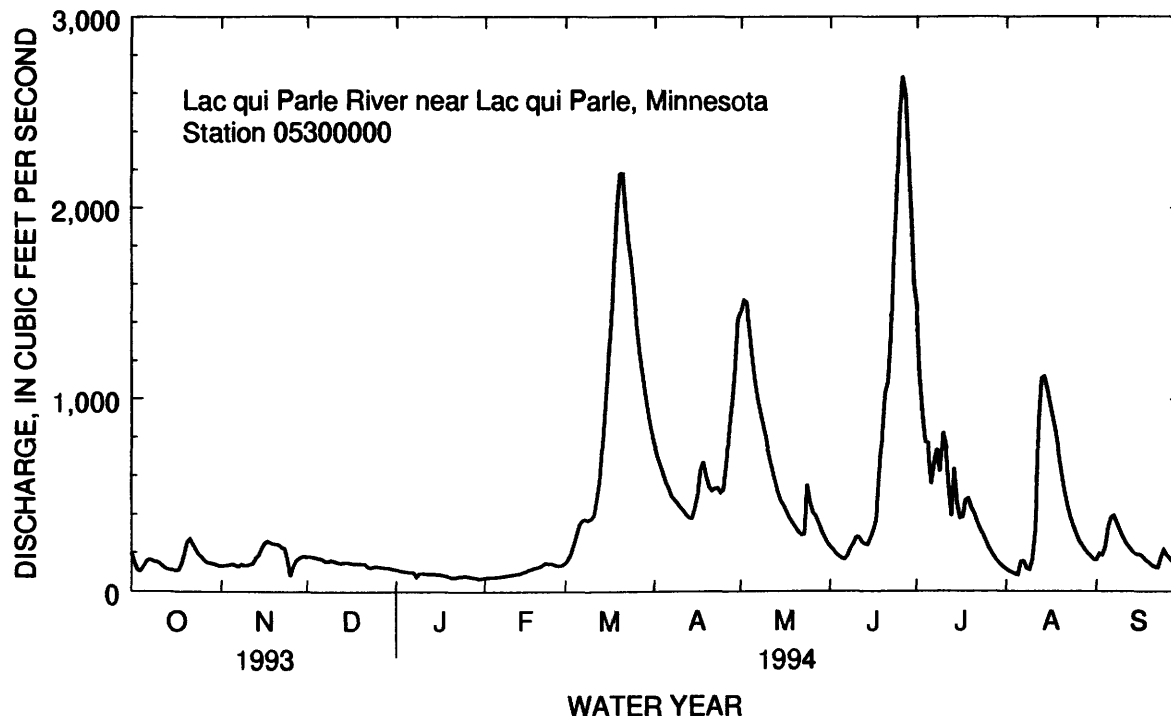
ANNUAL TOTAL	236257	151857	
ANNUAL MEAN	647	416	146 ^a
HIGHEST ANNUAL MEAN			625
LOWEST ANNUAL MEAN			.00
HIGHEST DAILY MEAN	4520	2690	16000
LOWEST DAILY MEAN	15	68	.00 ^b
ANNUAL SEVEN-DAY MINIMUM	15	72	.00
INSTANTANEOUS PEAK FLOW		2710	17100
INSTANTANEOUS PEAK STAGE		10.42 ^c	19.37 ^d
ANNUAL RUNOFF (AC-FT)	468600	301200	105900
ANNUAL RUNOFF (CFSM)	.66	.42	.15
10 PERCENT EXCEEDS	2140	1040	311
50 PERCENT EXCEEDS	244	200	18
90 PERCENT EXCEEDS	17	94	.40

a Median of annual mean discharges is 113 ft³/s.

b Many days, several years.

c Maximum observed, (backwater from ice).

d From floodmark (backwater from ice).



MINNESOTA RIVER BASIN

05301000 MINNESOTA RIVER NEAR LAC QUI PARLE, MN

LOCATION.--Lat 45°01'17", long 95°52'05", in NW 1/4 NE 1/4 sec.24, T.118 N., R.42 W., Chippewa County, Hydrologic Unit 07020004, on left bank 200 ft downstream from dam at Lac qui Parle Outlet, 2.4 mi northeast of city of Lac qui Parle, and 3.5 mi west of Watson.

DRAINAGE AREA.--4,050 mi², approximately.

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

REVISED RECORDS.--WDR MN-91-2: 1979.

GAGE.--Water-stage recorder. Datum of gage is 900.00 ft above mean 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 records, which are fair. Part of flow from 2,050 mi², 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 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1500	723	e950	436	e430	e520	7480	5990	1730	2310	1990	731
2	1450	345	e910	482	e430	e540	7020	5990	1540	2260	1830	608
3	1430	578	897	519	e430	e570	6560	5910	1530	2190	1680	490
4	1440	989	871	511	e425	e590	6180	6390	1520	2130	1610	489
5	1450	952	857	e510	e420	e630	5430	6650	1520	2070	1510	488
6	1460	943	886	e510	e420	e690	5590	6770	1520	2040	1420	533
7	1500	923	958	e510	e420	e780	5080	6780	1450	2090	1410	587
8	1490	817	968	e500	e420	e890	4770	6680	1350	2210	1450	601
9	1470	668	954	e500	e420	e1000	4590	6480	1350	2290	1500	593
10	1450	599	953	e500	e425	e1250	4280	6300	1390	2340	1510	594
11	1430	500	e930	e500	e430	e1610	3720	6120	1410	2430	1460	595
12	1440	505	e900	e500	e435	e2270	3310	5840	1370	2510	1480	595
13	1490	516	e880	e500	e445	e2650	2900	5520	1350	2580	1590	576
14	1470	524	849	e495	e455	e3160	2910	5320	1370	2660	1590	494
15	1460	571	845	e495	e465	e3750	3190	5050	1380	2710	1590	489
16	1450	658	844	e490	e470	e4360	3480	4600	1350	2740	1560	487
17	1430	784	817	e480	e490	e4960	3780	4330	1380	2750	1560	482
18	1380	887	781	e480	e500	5470	3500	4150	1440	2750	1560	480
19	1230	1030	780	e490	e500	5790	3450	3890	1430	2810	1560	476
20	1150	1110	e780	e490	e500	6260	3140	3360	1450	2790	1520	476
21	1120	1120	e770	e480	e500	6760	2780	2780	1470	2780	1480	476
22	1100	1110	e750	e460	e495	7580	2730	2290	1520	2740	1450	475
23	1080	1110	e730	e455	e480	8540	2690	2100	1540	2680	1480	474
24	1060	1000	e690	e440	e475	9380	2710	2310	1400	2610	1460	473
25	1040	e1000	e660	e435	e475	9800	2700	2660	1490	2540	1490	471
26	1000	e1000	e630	e440	e480	9900	2990	2680	1660	2470	1570	470
27	959	e1000	e610	e435	e485	9560	3670	2430	1810	2400	1530	468
28	952	e1000	e570	e435	e490	9110	4020	2080	2120	2320	1470	463
29	1040	e990	e550	e435	---	8850	4830	2060	2320	2240	1330	462
30	1240	e980	e510	e435	---	7440	5440	2010	2310	2140	912	459
31	1240	---	486	e435	---	7910	---	1900	---	2070	753	---
TOTAL	40401	24932	24566	14783	12810	142570	124920	137420	46470	75650	46305	15555
MEAN	1303	831	792	477	457	4599	4164	4433	1549	2440	1494	518
MAX	1500	1120	968	519	500	9900	7480	6780	2320	2810	1990	731
MIN	952	345	486	435	420	520	2690	1900	1350	2040	753	459
AC-FT	80140	49450	48730	29320	25410	282800	247800	272600	92170	150100	91850	30850
CFSM	.32	.21	.20	.12	.11	1.14	1.03	1.09	.38	.60	.37	.13
IN.	.37	.23	.23	.14	.12	1.31	1.15	1.26	.43	.69	.43	.14

e Estimated.

MINNESOTA RIVER BASIN

05301000 MINNESOTA RIVER NEAR LAC QUI PARLE, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1943 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	271	274	213	148	177	843	2593	1367	1140	985	537	272
MAX	2924	2327	1204	574	634	4599	10750	5771	4229	7024	6012	2402
(WY)	1987	1985	1985	1987	1987	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

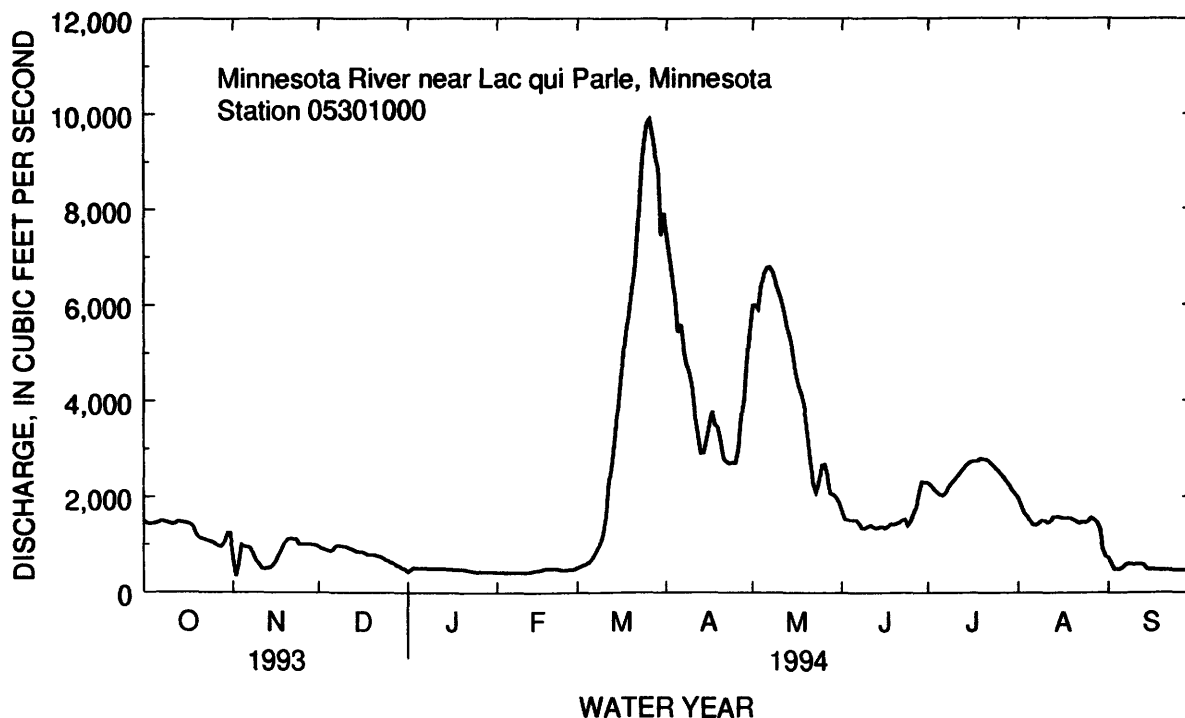
SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1943 - 1994

ANNUAL TOTAL	884731	706382	
ANNUAL MEAN	2424	1935	735
HIGHEST ANNUAL MEAN			2507
LOWEST ANNUAL MEAN			75.7
HIGHEST DAILY MEAN	10100	Aug 3	9900
LOWEST DAILY MEAN	129	Jan 22	345
ANNUAL SEVEN-DAY MINIMUM	129	Jan 22	421
INSTANTANEOUS PEAK FLOW			10100
INSTANTANEOUS PEAK STAGE			35.90
INSTANTANEOUS LOW FLOW			53
ANNUAL RUNOFF (AC-FT)	1755000	1401000	532800
ANNUAL RUNOFF (CFSM)	.60	.48	.18
ANNUAL RUNOFF (INCHES)	8.13	6.49	2.47
10 PERCENT EXCEEDS	6770	5060	1800
50 PERCENT EXCEEDS	1450	1380	213
90 PERCENT EXCEEDS	188	475	26

a Many days in several years.



MINNESOTA RIVER BASIN

05304500 CHIPPEWA RIVER NEAR MILAN, MN

LOCATION.--Lat 45°06'39", long 95°47'57", in SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec.16, T.119 N., R.41 W., Chippewa County, Hydrologic Unit 07020005, on right bank 800 ft upstream from bridge on State Highway 40, 2.0 mi upstream from small tributary, and 5.5 mi east of Milan.

DRAINAGE AREA.--1,870 mi², approximately.

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 mean sea level. Prior to June 15, 1942, nonrecording gage on bridge 800 ft downstream at same datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Flow regulated by several small lakes upstream from gage.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 400 ft³/s, and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Nov. 14	1001	748	3.45	Apr. 27	1000	3370	7.61
Mar. 23	1000	*5980	10.91	May 1	1600	3680	8.05
Apr. 16	1000	1820	5.34	July 8	1300	2740	6.84

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	804	450	e430	e205	e160	e175	1890	3620	965	433	404	243
2	768	441	e420	e200	e158	e180	1850	3520	922	410	390	248
3	740	437	e410	e195	e157	e185	1760	3180	866	393	374	286
4	732	441	e400	e185	e155	e190	1670	2860	821	387	371	341
5	711	441	e380	e180	e154	e190	1590	2630	787	690	378	374
6	688	399	e370	e175	e152	e190	1540	2440	756	2030	369	382
7	664	416	e380	e170	e150	e190	1500	2290	734	2320	351	370
8	648	424	e380	e170	e148	e192	1460	2160	695	2690	336	355
9	650	441	e375	e170	e147	e195	1440	2040	652	2430	337	331
10	649	437	e370	e170	e148	e200	1410	1950	618	1900	364	305
11	634	428	e360	e165	e149	e210	1390	1890	583	1540	378	284
12	618	441	e350	e165	e150	e220	1360	1840	553	1310	377	270
13	605	551	e340	e160	e152	e235	1350	1750	542	1140	376	261
14	597	722	e335	e155	e154	e265	1330	1730	521	1020	378	285
15	595	716	e330	e155	e156	e350	1470	1790	540	919	362	281
16	590	706	e325	e155	e160	e470	1790	1720	539	838	351	282
17	585	694	e325	e155	e162	e550	1680	1650	548	766	340	276
18	580	687	e325	e154	e164	e800	1570	1570	581	718	331	270
19	575	677	e320	e154	e165	e1470	1500	1500	602	718	302	266
20	575	636	e315	e154	e163	e2000	1460	1440	592	687	294	257
21	574	623	e315	e155	e162	e3000	1450	1370	580	647	288	253
22	567	609	e305	e156	e160	4250	1420	1320	577	624	279	257
23	557	547	e290	e157	e160	5840	1390	1280	575	616	280	265
24	555	472	e280	e158	e160	4990	1340	1540	570	587	273	272
25	548	416	e270	e160	e162	4030	1480	1450	543	547	267	276
26	530	e400	e260	e160	e164	3210	2760	1330	508	512	283	272
27	507	e440	e250	e162	e166	2790	3330	1260	494	483	298	267
28	497	e460	e240	e164	e170	2470	3100	1210	486	463	285	264
29	485	e470	e230	e164	---	2220	2880	1150	475	445	261	259
30	470	e455	e220	e162	---	2040	3330	1090	459	424	252	252
31	448	---	e210	e160	---	1930	---	1020	---	423	249	---
TOTAL	18746	15477	10110	5150	4408	45227	53490	57590	18684	29110	10178	8604
MEAN	605	516	326	166	157	1459	1783	1858	623	939	328	287
MAX	804	722	430	205	170	5840	3330	3620	965	2690	404	382
MIN	448	399	210	154	147	175	1330	1020	459	387	249	243
AC-FT	37180	30700	20050	10220	8740	89710	106100	114200	37060	57740	20190	17070
CFSM.	.32	.28	.17	.09	.08	.78	.95	.99	.33	.50	.18	.15
IN.	.37	.31	.20	.10	.09	.90	1.06	1.15	.37	.58	.20	.17

MINNESOTA RIVER BASIN

05304500 CHIPPEWA RIVER NEAR MILAN, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1938 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	199	176	109	61.7	58.4	379	941	622	560	411	247	211
MAX	1996	1318	655	425	404	2141	3661	2462	2248	1832	2183	2273
(WY)	1985	1985	1985	1987	1987	1985	1952	1986	1984	1993	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 1993 CALENDAR YEAR

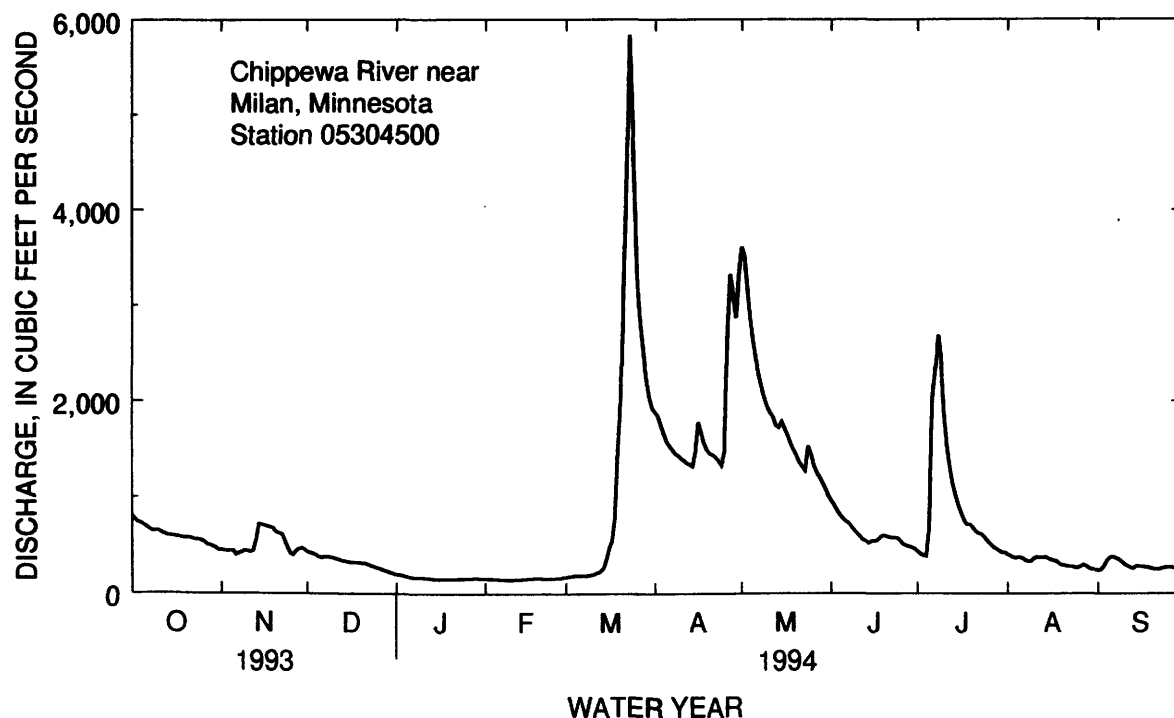
FOR 1994 WATER YEAR

WATER YEARS 1938 - 1994

ANNUAL TOTAL	334160		276774			332 ^a	
ANNUAL MEAN	916		758			1307	1986
HIGHEST ANNUAL MEAN						45.4	1940
LOWEST ANNUAL MEAN						10100	Apr 10 1969
HIGHEST DAILY MEAN	4760	Aug 2	5840	Mar 23		.00 ^b	Jan 4 1940
LOWEST DAILY MEAN	105	Feb 28	147	Feb 9		.00	Jan 4 1940
ANNUAL SEVEN-DAY MINIMUM	106	Feb 25	149	Feb 6		.00	Jan 4 1940
INSTANTANEOUS PEAK FLOW			5980	Mar 23		11400	Apr 9 1969
INSTANTANEOUS PEAK STAGE			10.91	Mar 23		15.45	Apr 9 1969
INSTANTANEOUS LOW FLOW						.00	Jan 4 1940
ANNUAL RUNOFF (AC-FT)	662800		549000			240300	
ANNUAL RUNOFF (CFSM)	.49		.41			.18	
ANNUAL RUNOFF (INCHES)	6.65		5.51			2.41	
10 PERCENT EXCEEDS	1920		1810			896	
50 PERCENT EXCEEDS	748		441			120	
90 PERCENT EXCEEDS	112		162			14	

a Median of annual mean discharges is 264 ft^3/s .

b Many days during 1940.



MINNESOTA RIVER BASIN

05311000 MINNESOTA RIVER AT MONTEVIDEO, MN

LOCATION.--Lat 44°56'00", long 95°44'00", in NW 1/4 NW 1/4, sec.19, T.117 N., R.40 W., Yellow Medicine County, Hydrologic Unit 07020004, on right bank 100 ft upstream from bridge on U.S. Highway 212, at Montevideo, and 400 ft downstream from Chippewa River.

DRAINAGE AREA.--6,180 mi², 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 mean sea level. July 22, 1909, to Feb. 4, 1932, nonrecording gage at bridge 600 ft downstream at present datum. Feb. 5, 1932, to Nov. 26, 1934, nonrecording gage at bridge 100 ft downstream at present datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair. 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 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1890	1190	e1260	e730	e505	e580	8700	6800	2430	2650	2470	987
2	1850	355	e1250	e710	e505	e600	8520	7300	2190	2610	2330	887
3	1810	684	e1240	e700	e505	e640	8050	6850	2120	2560	2130	645
4	1810	1100	e1230	e690	e500	e660	7560	7320	2090	2500	2040	606
5	1820	1220	e1220	e670	e490	e680	6980	7700	2070	2460	1970	603
6	1820	1190	e1220	e660	e490	e730	6420	7890	2070	2540	1860	624
7	1860	1150	e1250	e650	e490	e800	6310	8080	2020	2710	1810	870
8	1860	1130	e1210	e640	e490	e920	5870	8100	1890	2790	1820	905
9	1800	957	e1200	e630	e495	e1050	5570	7870	1840	2900	1920	785
10	1820	892	e1180	e620	e495	e1130	5310	7660	1850	2940	1990	687
11	1800	772	e1160	e610	e500	1870	5040	7490	1870	2950	1870	684
12	1780	753	e1140	e600	e500	2680	4680	7190	1830	2980	1860	681
13	1830	798	e1120	e590	e520	2950	4190	6840	1800	3010	e1870	671
14	1830	798	e1100	e580	e530	3330	3820	6510	1810	3040	e1890	589
15	1820	802	e1100	e580	e540	3750	3830	6190	1840	3080	1900	560
16	1670	879	e1100	e580	e560	4590	3940	5770	1820	3190	1890	560
17	1600	976	1080	e580	e580	5270	4410	5380	1830	3200	1860	661
18	1570	1130	1020	e560	e580	6490	4570	5160	1970	3250	1840	706
19	1350	1220	999	e580	e580	7110	4450	5010	1970	3290	e1780	700
20	1210	1360	988	e580	e590	7980	4360	4750	1950	3300	e1730	708
21	1170	1390	e988	e560	e590	9230	4040	4270	1950	3280	e1690	703
22	1160	1390	e988	e540	e580	9580	3700	3640	2050	3260	1680	673
23	1160	1380	e985	e520	e560	10200	3500	3120	2250	3210	1680	667
24	1160	1250	e970	e510	e550	11000	3410	2980	2020	3150	1690	685
25	1150	1300	e920	e505	e550	11300	3360	3130	1980	3090	1670	685
26	1140	e1300	e870	e505	e550	11200	3450	3240	2090	3020	1780	680
27	1130	e1300	e850	e505	e560	11100	3850	3250	2190	2980	e1800	675
28	1120	e1300	e810	e505	e570	10400	4360	3000	2360	2900	e1740	667
29	1050	e1280	e790	e505	---	10100	4950	2800	2570	2780	1570	660
30	572	e1270	e760	e505	---	9530	5920	2690	2630	2690	1290	648
31	573	---	e750	e505	---	8790	---	2560	---	2590	1040	---
TOTAL	46185	32516	32748	18205	14955	166240	153120	170540	61350	90900	56460	20862
MEAN	1490	1084	1056	587	534	5363	5104	5501	2045	2932	1821	695
MAX	1890	1390	1260	730	590	11300	8700	8100	2630	3300	2470	987
MIN	572	355	750	505	490	580	3360	2560	1800	2460	1040	560
AC-FT	91610	64500	64960	36110	29660	329700	303700	338300	121700	180300	112000	41380
CFSM	.24	.18	.17	.10	.09	.87	.83	.89	.33	.47	.29	.11

e Estimated.

MINNESOTA RIVER BASIN

05311000 MINNESOTA RIVER AT MONTEVIDEO, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	309	313	239	160	182	847	2445	1445	1234	1061	550	330
MAX	3171	3164	1352	760	740	5363	12550	7315	5088	7853	7084	2613
(WY)	1987	1985	1985	1987	1987	1994	1952	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 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1909 - 1994

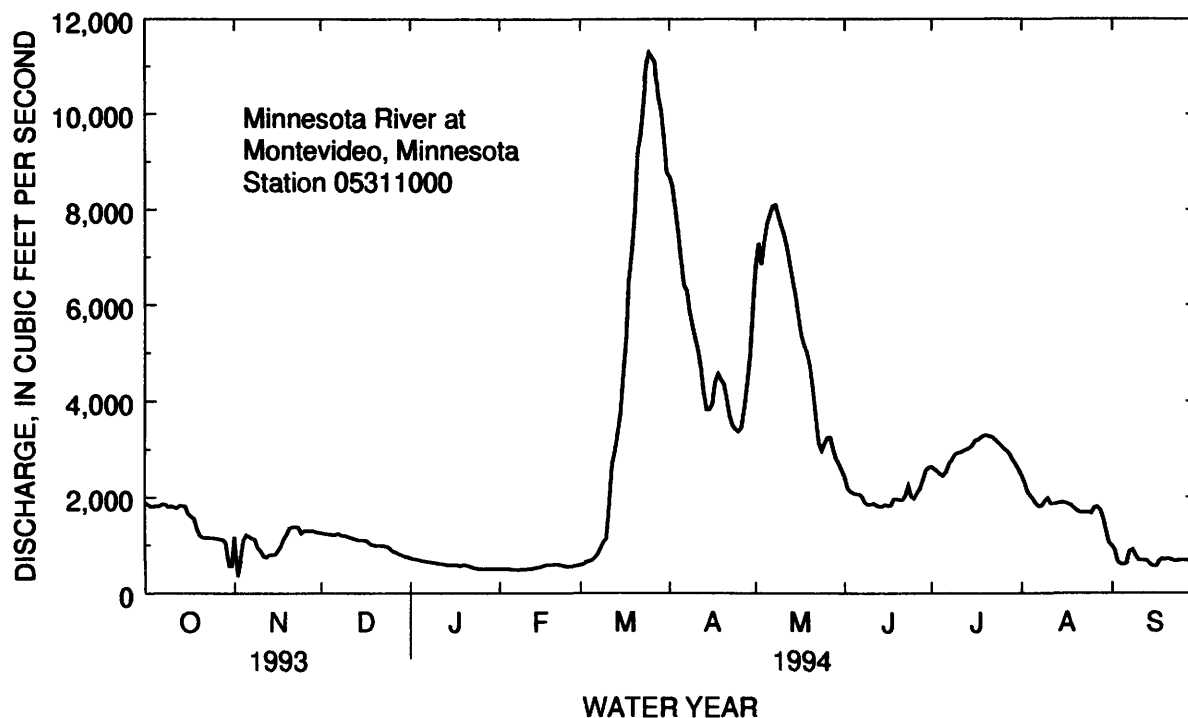
ANNUAL TOTAL	1068789					864081						
ANNUAL MEAN	2928					2367				798 ^a		
HIGHEST ANNUAL MEAN										2961		1986
LOWEST ANNUAL MEAN										4.43		1934
HIGHEST DAILY MEAN	11100	Aug 4				11300	Mar 25			34400	Apr 13	1969
LOWEST DAILY MEAN	190	Jan 14				355	Nov 2			.00 ^b	Aug 14	1933
ANNUAL SEVEN-DAY MINIMUM	190	Jan 14				493	Feb 4			.00	Jul 5	1934
INSTANTANEOUS PEAK FLOW						11300	Mar 25			35100	Apr 12	1969
INSTANTANEOUS PEAK STAGE						16.00 ^c	Mar 25			21.68 ^d	Apr 12	1969
ANNUAL RUNOFF (AC-FT)	2120000					1714000				578400		
ANNUAL RUNOFF (CFSM)	.47					.38				.13		
10 PERCENT EXCEEDS	7640					6030				2020		
50 PERCENT EXCEEDS	1820					1690				233		
90 PERCENT EXCEEDS	248					566				34		

a Median of annual mean discharges is 612 ft³/s.

b Occurred several days in 1933, 1934 and 1936.

c Maximum observed.

d From highwater mark.



MINNESOTA RIVER BASIN

05313500 YELLOW MEDICINE RIVER NEAR GRANITE FALLS, MN

LOCATION.--Lat 44°43'18", long 95°31'07", in SW 1/4 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.--653 mi².

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 mean 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.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in June 1919 reached a stage of 17.5 ft, from information by local residents, discharge, 25,200 ft³/s.

EXTREMES FOR CURRENT YEAR.--Peak discharge greater than base discharge of 300 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Mar. 09		*1900		Jun 10	0700	653	4.29
Apr. 17	1500	566	4.12	Jun 26	0400	1250	5.25
May 02	2300	942	4.79	Aug. 14	0900	1830	5.98
May 24	1400	596	4.18	Sept 06	0900	354	3.64

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	218	e108	e140	e64	e35	e120	364	772	221	600	47	114
2	197	e107	e137	e62	e35	e140	350	905	201	457	43	115
3	187	e105	e132	e60	e34	e170	335	912	182	380	41	117
4	175	e103	e128	e58	e34	e300	326	804	171	336	37	184
5	162	e100	e126	e57	e34	e500	304	708	189	306	33	288
6	152	e98	e125	e55	e33	e800	295	635	222	267	33	348
7	149	e97	e123	e54	e33	e1250	284	584	284	256	34	318
8	149	e96	e118	e53	e33	e1760	287	557	308	298	34	265
9	146	e95	e116	e52	e32	e1900	277	531	490	310	32	223
10	150	e94	e115	e50	e33	e1700	269	488	638	286	52	193
11	150	e92	e114	e49	e33	e1600	261	444	581	257	455	168
12	146	e120	e113	e48	e34	e1530	265	403	488	228	1180	152
13	141	e150	e112	e47	e35	e1450	274	374	411	206	1590	139
14	139	e225	e110	e45	e36	e1380	284	361	364	188	1790	128
15	142	e300	e109	e44	e37	e1350	360	344	329	167	1250	119
16	e140	e283	e108	e43	e40	e1330	430	336	316	154	754	110
17	e135	277	e106	e43	e43	e1320	542	322	352	188	564	100
18	e130	264	e105	e42	e46	e1320	527	303	352	197	457	91
19	e128	254	e104	e42	e52	1150	455	280	489	246	391	85
20	e126	245	e103	e41	e58	919	420	261	914	264	343	78
21	e124	235	e84	e41	e62	867	406	243	1060	e250	302	74
22	e122	233	e82	e40	e63	873	406	228	972	216	264	76
23	e120	232	e80	e40	e62	832	392	246	979	176	230	75
24	e118	210	e88	e41	e60	750	373	514	964	149	198	83
25	e117	161	e86	e41	e64	654	355	514	1140	128	171	84
26	e116	98	e80	e40	e70	580	377	470	1230	111	150	85
27	e114	174	e76	e40	e86	536	428	440	1050	94	134	80
28	e113	e158	e72	e39	e100	491	521	373	876	e83	121	74
29	e112	e151	e67	e38	---	450	577	321	756	e72	112	69
30	e111	e148	e66	e37	---	410	640	284	650	e62	111	66
31	e109	---	e65	e36	---	384	---	250	---	53	108	---
TOTAL	4338	5013	3190	1442	1317	28816	11384	14207	17179	6985	11061	4101
MEAN	140	167	103	46.5	47.0	930	379	458	573	225	357	137
MAX	218	300	140	64	100	1900	640	912	1230	600	1790	348
MIN	109	92	65	36	32	120	261	228	171	53	32	66
AC-FT	8600	9940	6330	2860	2610	57160	22580	28180	34070	13850	21940	8130
CFSM	.21	.26	.16	.07	.07	1.42	.58	.70	.88	.35	.55	.21
IN.	.25	.29	.18	.08	.08	1.64	.65	.81	.98	.40	.63	.23

e Estimated.

MINNESOTA RIVER BASIN

05313500 YELLOW MEDICINE RIVER NEAR GRANITE FALLS, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	33.4	38.7	23.0	11.9	15.8	217	448	183	277	135	67.0	42.6
MAX	409	274	135	75.5	97.1	933	3302	1087	2484	1600	510	1005
(WY)	1987	1971	1987	1987	1966	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 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

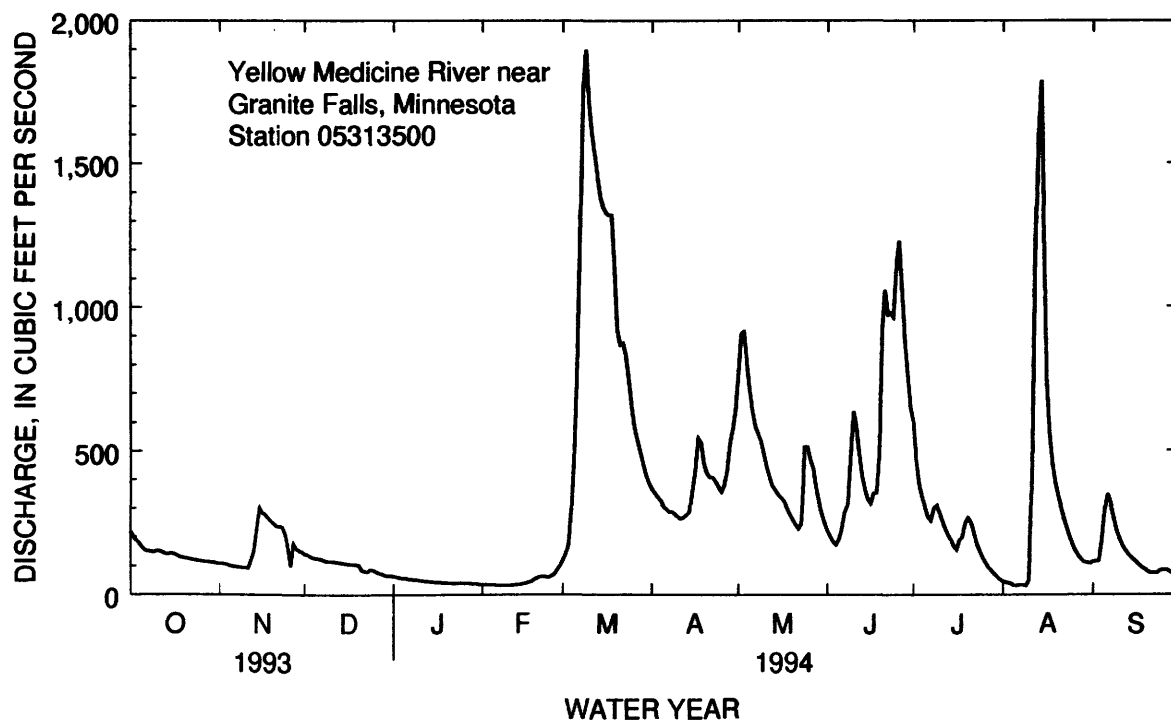
WATER YEARS 1931 - 1994

ANNUAL TOTAL	214200.8	109033	133 ^a	
ANNUAL MEAN	587	299		
HIGHEST ANNUAL MEAN			566	1993
LOWEST ANNUAL MEAN			8.32	1959
HIGHEST DAILY MEAN	8250	Jun 21	1900 ^b	Mar 9
LOWEST DAILY MEAN	9.4	Mar 21	32	Feb 9
ANNUAL SEVEN-DAY MINIMUM	9.5	Mar 16	33	Feb 5
INSTANTANEOUS PEAK FLOW			1900 ^b	Mar 9
INSTANTANEOUS PEAK STAGE			6.65	Mar 9
INSTANTANEOUS LOW FLOW			28	Aug 9
ANNUAL RUNOFF (AC-FT)	424900	216300	96600	
ANNUAL RUNOFF (CFSM)	.90	.46	.20	
ANNUAL RUNOFF (INCHES)	12.20	6.21	2.77	
10 PERCENT EXCEEDS	1540	755	285	
50 PERCENT EXCEEDS	199	161	17	
90 PERCENT EXCEEDS	10	42	2.2	

a Median of annual mean discharges is 85 ft³/s.

b Backwater from ice.

c Many days in several years.



MINNESOTA RIVER BASIN

05315000 REDWOOD RIVER NEAR MARSHALL, MN

LOCATION.--Lat 44°25'49", long 95°50'43", in SE 1/4 SW 1/4 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 mi².

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 mean 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 good except those for estimated daily discharges which are fair. 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 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	200	84	e103	e66	e47	e140	215	398	59	399	e54	e62
2	187	88	e103	e67	e47	e145	221	382	57	356	e51	e65
3	175	89	e102	e69	e47	e150	202	355	55	321	e48	e81
4	164	95	e100	e70	e47	e160	199	337	52	299	e44	e100
5	151	95	e99	e70	e46	e175	177	311	81	274	e43	e113
6	145	87	e99	e70	e46	e300	192	299	108	256	e41	e105
7	140	99	e99	e68	e47	e517	197	283	243	e260	e38	e93
8	136	103	e98	e64	e47	e560	216	268	330	e280	e39	e87
9	138	104	e98	e62	e47	e600	219	241	287	e305	e100	e79
10	136	107	e94	e62	e48	e640	199	215	238	e280	e257	e72
11	133	112	e88	e63	e49	e690	190	202	219	e240	e317	e67
12	129	121	e84	e64	e50	e700	193	180	201	e220	e291	e62
13	126	174	e82	e66	e51	e690	249	166	185	e210	e213	e55
14	123	197	e82	e67	e54	e670	262	168	168	e180	e194	e53
15	120	145	e80	e65	e57	e650	348	179	149	e165	e189	e51
16	120	137	e78	e63	e62	e480	405	169	135	e160	e172	e50
17	118	150	e77	e60	e70	460	334	152	173	e155	e160	e49
18	117	176	e76	e57	e80	507	304	147	703	e165	e147	e48
19	113	e173	e75	e53	e92	484	272	127	895	e190	e135	e50
20	112	e170	e74	e51	e105	449	251	116	737	e200	e123	e53
21	111	e166	e74	e50	e120	409	240	107	522	e180	e113	e66
22	108	e160	e74	e49	e135	396	239	103	772	e150	e106	e80
23	106	e158	e73	e52	e160	372	212	95	1390	e140	e97	e90
24	104	e150	e72	e56	e170	316	204	96	1340	e125	e94	e88
25	102	e125	e70	e58	e160	317	187	100	1080	e110	e87	e85
26	99	e100	e67	e55	e150	302	214	98	777	e95	e79	e78
27	96	e115	e66	e53	e140	287	253	90	637	e85	e74	e73
28	95	e110	e66	e49	e140	261	245	83	553	e72	e70	e67
29	93	e107	e66	e48	---	249	253	76	487	e66	e66	e62
30	87	e105	e66	e47	---	230	306	69	439	e62	e69	e56
31	84	---	e66	e47	---	225	---	63	---	e57	e65	---
TOTAL	3868	3802	2551	1841	2314	12531	7198	5675	13072	6057	3576	2140
MEAN	125	127	82.3	59.4	82.6	404	240	183	436	195	115	71.3
MAX	200	197	103	70	170	700	405	398	1390	399	317	113
MIN	84	84	66	47	46	140	177	63	52	57	38	48
AC-FT	7670	7540	5060	3650	4590	24860	14280	11260	25930	12010	7090	4240
CFSM	.48	.49	.32	.23	.32	1.56	.93	.71	1.68	.75	.45	.28

e Estimated.

MINNESOTA RIVER BASIN

05315000 REDWOOD RIVER NEAR MARSHALL, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1940 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	22.2	22.1	13.0	7.75	13.2	118	211	112	115	68.3	31.7	25.7
MAX	222	153	82.3	59.4	101	571	1152	1205	936	1161	610	292
(WY)	1969	1980	1994	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 1993 CALENDAR YEAR

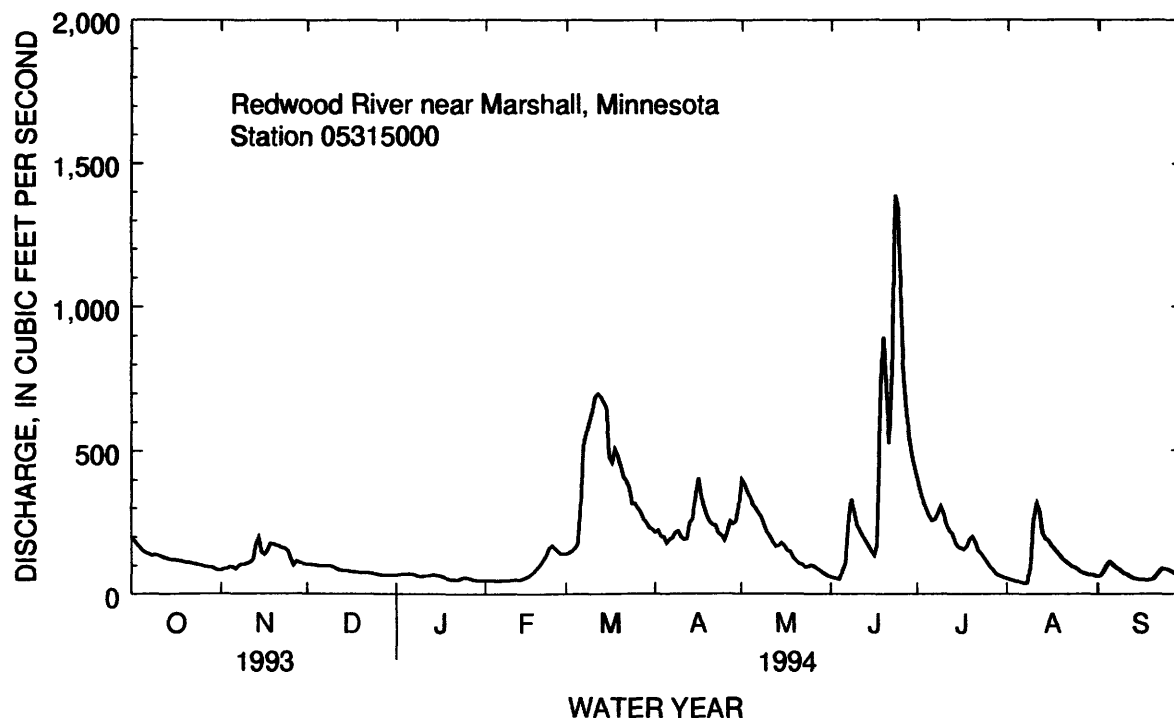
FOR 1994 WATER YEAR

WATER YEARS 1940 - 1994

ANNUAL TOTAL	159782	64625	
ANNUAL MEAN	438	177	63.9 ^a
HIGHEST ANNUAL MEAN			421
LOWEST ANNUAL MEAN			5.13
HIGHEST DAILY MEAN	5300	May 9	1390
LOWEST DAILY MEAN	14	Jan 14	38
ANNUAL SEVEN-DAY MINIMUM	14	Jan 13	43
INSTANTANEOUS PEAK FLOW			1490
INSTANTANEOUS PEAK STAGE			13.24
INSTANTANEOUS LOW FLOW			38
ANNUAL RUNOFF (AC-FT)	316900	128200	46280
ANNUAL RUNOFF (CFSM)	1.69	.68	.25
10 PERCENT EXCEEDS	1250	351	144
50 PERCENT EXCEEDS	194	113	10
90 PERCENT EXCEEDS	16	53	1.8

a Median of annual mean discharges is 42 ft³/s.

b Many days in several years.



MINNESOTA RIVER BASIN

05316500 REDWOOD RIVER NEAR REDWOOD FALLS, MN

LOCATION.--Lat 44°31'25", long 95°10'20", in SE 1/4 NE 1/4 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 mi².

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. 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 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Mar. 13		e1500		Jun 07	1900	874	4.06
Apr. 15	2200	959	4.24	Jun 29	0200	1130	4.61
May 01	1100	902	4.12	Aug. 11	0100	*1930	6.04
May 24	1100	705	3.70	Sep 05	0900	550	3.37

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	387	184	e220	e162	e62	e180	372	892	202	773	73	102
2	355	184	e218	e155	e62	e182	364	896	190	669	69	98
3	334	190	e210	e152	e62	e187	348	896	181	586	67	210
4	316	194	e209	e153	e61	e195	347	850	172	520	64	358
5	300	178	e207	e155	e61	e205	326	780	359	465	59	530
6	282	168	e205	e150	e61	e235	316	719	616	422	57	499
7	269	178	e203	e142	e61	e275	296	676	702	392	57	423
8	260	181	e200	e138	e61	e350	311	646	851	362	56	335
9	257	178	e200	e135	e62	e475	323	605	813	397	52	274
10	253	178	e200	e130	e64	e720	331	570	777	395	1410	236
11	253	178	e195	e120	e67	e950	310	540	688	362	1800	204
12	253	166	e190	e108	e70	e1200	319	501	601	320	1490	188
13	253	e240	e185	e100	e73	e1500	457	467	535	283	1370	203
14	250	e300	e183	e95	e79	e1350	505	445	476	260	1350	189
15	245	e330	e180	e91	e85	e1300	780	443	418	238	1310	174
16	245	388	e180	e89	e95	e1160	894	430	372	217	1010	163
17	245	365	e180	e90	e100	1090	834	424	344	209	776	147
18	245	344	e178	e90	e115	957	778	394	330	209	610	132
19	245	337	e178	e88	e130	828	696	372	531	182	489	119
20	245	324	e178	e83	e140	823	633	348	711	268	383	109
21	242	315	e178	e80	e170	776	605	322	788	267	307	110
22	238	294	e177	e77	e200	743	566	307	804	236	251	114
23	237	283	e177	e74	e250	707	549	293	765	213	214	175
24	233	274	e176	e76	e225	647	507	549	835	188	185	182
25	229	207	e176	e78	e205	588	482	495	931	165	161	175
26	222	e200	e175	e77	e190	527	516	402	1030	141	142	166
27	215	e190	e170	e72	e182	517	570	345	1100	117	125	160
28	210	e210	e175	e70	e180	481	609	307	1110	97	112	149
29	203	e230	e180	e67	---	439	662	274	1120	89	101	137
30	194	e225	e175	e65	---	399	808	245	961	82	110	127
31	187	---	e172	e63	---	386	---	219	---	78	114	---
TOTAL	7902	7213	5830	3225	3173	20372	15414	15652	19313	9202	14374	6188
MEAN	255	240	188	104	113	657	514	505	644	297	464	206
MAX	387	388	220	162	250	1500	894	896	1120	773	1800	530
MIN	187	166	170	63	61	180	296	219	172	78	52	98
AC-FT	15670	14310	11560	6400	6290	40410	30570	31050	38310	18250	28510	12270
CFSM	.41	.38	.30	.17	.18	1.04	.82	.80	1.02	.47	.74	.33
IN.	.47	.43	.34	.19	.19	1.20	.91	.93	1.14	.54	.85	.37

e Estimated.

MINNESOTA RIVER BASIN

05316500 REDWOOD RIVER NEAR REDWOOD FALLS, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	47.4	53.3	30.1	14.4	18.9	228	395	202	251	144	75.3	51.3
MAX	395	541	245	104	167	1289	2880	1530	2724	1994	934	673
(WY)	1987	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 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

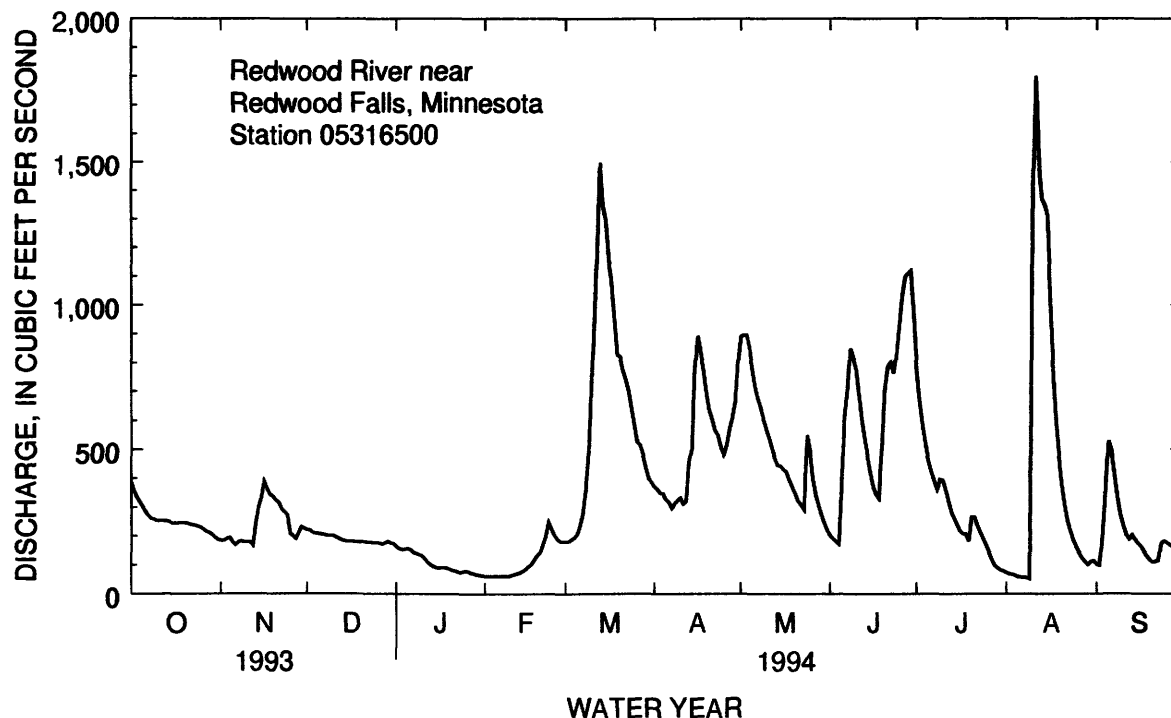
WATER YEARS 1909 - 1994

ANNUAL TOTAL	296674	127858	
ANNUAL MEAN	813	350	140 ^a
HIGHEST ANNUAL MEAN			789
LOWEST ANNUAL MEAN			10.8
HIGHEST DAILY MEAN	11400	1800	13200
LOWEST DAILY MEAN	34	52	.00 ^b
ANNUAL SEVEN-DAY MINIMUM	34	59	.01
INSTANTANEOUS PEAK FLOW		1930	19700
INSTANTANEOUS PEAK STAGE		10.80	15.92 ^c
ANNUAL RUNOFF (AC-FT)	588500	253600	101500
ANNUAL RUNOFF (CFSM)	1.29	.56	.22
ANNUAL RUNOFF (INCHES)	17.55	7.56	3.03
10 PERCENT EXCEEDS	1930	780	293
50 PERCENT EXCEEDS	337	237	24
90 PERCENT EXCEEDS	35	83	2.0

a Median of annual mean discharges is 91 ft³/s.

b Occurred several days in 1940 and 1959.

c From floodmark.



MINNESOTA RIVER BASIN

05317000 COTTONWOOD RIVER NEAR NEW ULM, MN

LOCATION.--Lat 44°17'29", long 94°26'24", in SW $\frac{1}{4}$ NE $\frac{1}{4}$ 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.--1,280 mi², approximately.

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 mean 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 1,300 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Feb. 22		1400	B.W. ice	Apr. 27	0300	*4750	*11.33
Mar. 06		3710	B.W. ice	May 25	0600	1860	6.69
Mar. 15		1970	B.W. ice	Jun 08	2000	2950	8.65
Apr. 16	2400	2830	8.65	Jun 23	0900	2100	7.20

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	709	428	753	e280	e160	e650	633	3030	923	1340	244	152
2	671	416	736	e275	e160	e640	627	2890	884	1150	223	151
3	635	426	685	e270	e160	e850	608	2650	831	1000	202	151
4	602	431	650	e260	e156	e1400	590	2400	786	918	190	154
5	564	429	642	e255	e156	e2800	583	2150	773	895	177	194
6	538	430	620	e250	e156	e3710	569	1960	1330	875	166	268
7	520	412	541	e245	e156	e3930	562	1800	2140	840	156	351
8	508	394	526	e240	e156	e3280	558	1690	2700	770	146	404
9	509	399	565	e235	e156	e2840	588	1590	2800	704	136	412
10	532	426	614	e230	e160	e2440	600	1480	2410	654	187	393
11	670	417	553	e225	e160	e2000	603	1390	2130	618	433	356
12	711	409	423	e220	e160	e1850	633	1300	1910	578	1190	649
13	696	437	513	e215	e160	e1710	967	1210	1730	537	1210	1240
14	662	542	572	e210	e160	e1740	1590	1160	1510	509	1090	1030
15	639	917	583	e205	e160	e1970	1850	1120	1350	477	958	779
16	621	1130	614	e200	e160	e2070	2640	1070	1210	444	792	711
17	609	1070	643	e200	e160	1900	2790	1020	1100	418	712	644
18	593	984	662	e195	e160	1590	2470	964	1030	402	621	569
19	577	924	673	e190	e180	1370	2120	922	1160	392	519	493
20	566	880	675	e185	e270	1270	1840	913	1520	406	436	426
21	555	839	617	e185	e500	1210	1640	900	1470	917	367	373
22	538	809	524	e180	e1400	1140	1530	886	1650	838	316	338
23	529	775	e390	e175	e1200	1060	1420	878	2070	774	278	317
24	523	746	e335	e170	e980	991	1340	908	1910	688	244	310
25	517	729	e325	e170	e900	891	1290	1750	1840	603	216	310
26	513	671	e315	e165	e850	833	3040	1590	1890	518	205	310
27	496	531	e310	e160	e760	789	4500	1400	1840	447	188	313
28	486	421	e305	e160	e700	757	3560	1230	1770	385	174	313
29	476	617	e300	e160	---	715	2900	1110	1680	337	161	308
30	464	736	e290	e160	---	675	2880	1010	1500	299	156	295
31	447	---	e285	e160	---	645	---	955	---	270	155	---
TOTAL	17676	18775	16239	6430	10596	49716	47521	45326	47847	20003	12248	12714
MEAN	570	626	524	207	378	1604	1584	1462	1595	645	395	424
MAX	711	1130	753	280	1400	3930	4500	3030	2800	1340	1210	1240
MIN	447	394	285	160	156	640	558	878	773	270	136	151
AC-FT	35060	37240	32210	12750	21020	98610	94260	89900	94900	39680	24290	25220
CFSM	.45	.49	.41	.16	.30	1.25	1.24	1.14	1.25	.50	.31	.33

MINNESOTA RIVER BASIN

05317000 COTTONWOOD RIVER NEAR NEW ULM, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1994, BY WATER YEAR (WY)

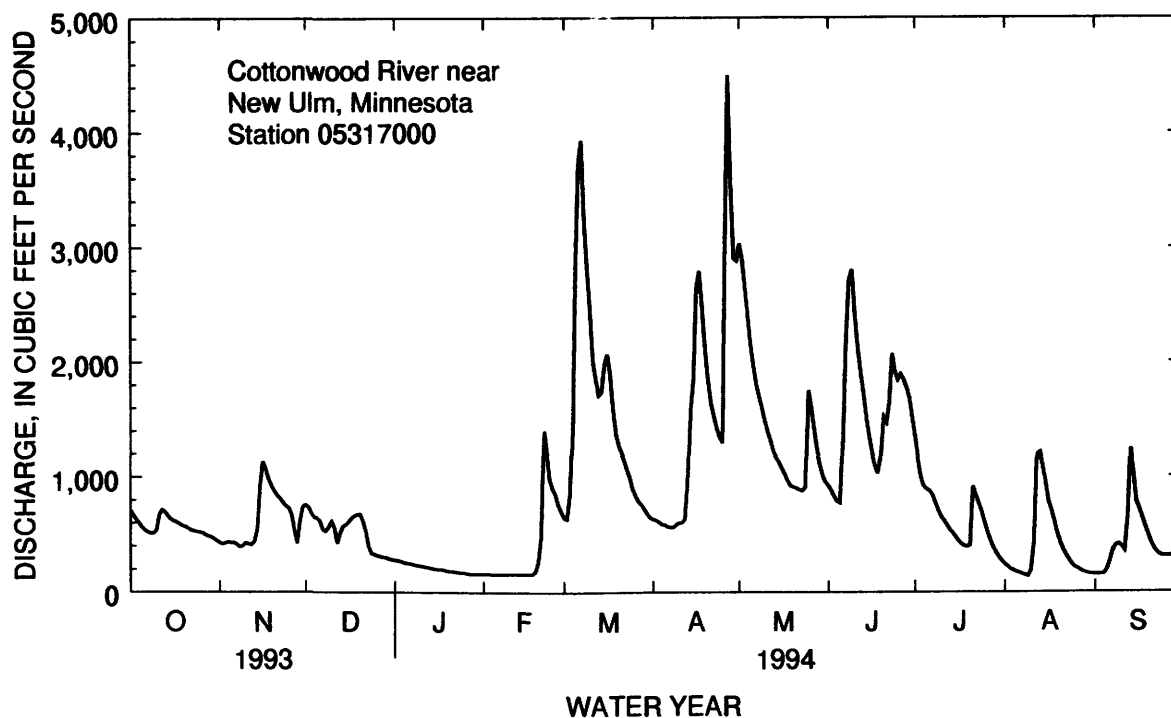
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	168	147	97.3	52.1	92.4	624	952	547	589	336	179	155
MAX	3208	1099	572	282	628	2236	7075	3497	5831	3815	1791	2438
(WY)	1969	1980	1980	1992	1983	1983	1969	1993	1993	1993	1993	1986
MIN	4.57	7.97	5.77	1.61	1.47	13.9	40.0	7.57	8.58	4.37	1.05	3.28
(WY)	1934	1940	1936	1940	1940	1965	1959	1934	1911	1934	1934	1933

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1909 - 1994

ANNUAL TOTAL	645564	305091	355 ^a	
ANNUAL MEAN	1769	836	1796	1993
HIGHEST ANNUAL MEAN			41.1	1940
LOWEST ANNUAL MEAN				
HIGHEST DAILY MEAN	21800	Jun 19	4500	Apr 27
LOWEST DAILY MEAN	95	Feb 28	136	Aug 9
ANNUAL SEVEN-DAY MINIMUM	96	Feb 25	154	Aug 29
INSTANTANEOUS PEAK FLOW			4750	Apr 27
INSTANTANEOUS PEAK STAGE			11.33	Apr 27
INSTANTANEOUS LOW FLOW			132	Aug 10
ANNUAL RUNOFF (AC-FT)	1280000	605100	257400	
ANNUAL RUNOFF (CFSM)	1.38	.65	.28	
10 PERCENT EXCEEDS	3630	1840	795	
50 PERCENT EXCEEDS	797	614	72	
90 PERCENT EXCEEDS	122	170	11	

a Median of annual mean discharges is 232 ft³/s.

MINNESOTA RIVER BASIN

05317000 COTTONWOOD RIVER NEAR NEW ULM, MN--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1961-62, 1964-68, 1971-72, 1974-76, 1989-92, 1994.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

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, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS ORTHOPHOS- PHATE DIS- SOLVED (MG/L AS P) (00671)
APR 05...	1145	631	1050	7.9	3.0	13.2	0.020	5.20	0.030	0.060
MAY 25...	1500	1750	672	7.9	18.0	8.6	<0.010	<0.050	<0.010	<0.010

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MINNESOTA RIVER BASIN

05317200 LITTLE COTTONWOOD RIVER NEAR COURTLAND, MN

LOCATION.--Lat 44°14'47", long 94°20'19", in SW¼, NE¼, 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.--230 mi², approximately.

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 mean sea level.

REMARKS.--Records fair.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 180 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Mar. 11		450a	Backwater ice	June 21	0400	208	4.54
Apr. 16	0900	225	4.72	Jul 06	0730	228	4.71
Apr. 30	1330	289	5.06	Aug. 10	2000	396	5.69
May 28	0200	206	4.51	Sept. 12	1800	*701	*6.96
June 07	0800	335	5.25				

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	91	55	53	e36	e16	e95	89	277	114	117	23	32
2	85	54	53	e36	e16	e97	89	262	101	93	22	33
3	81	54	52	e35	e16	e105	85	256	94	80	21	42
4	81	54	52	e34	e16	e115	83	243	87	71	20	54
5	78	54	52	e33	e16	e150	82	226	128	87	19	55
6	75	50	49	e31	e16	e200	83	207	150	174	17	58
7	71	47	43	e30	e16	e220	81	193	217	120	15	55
8	69	50	53	e29	e16	e250	81	182	276	80	14	55
9	69	53	54	e28	e16	e290	82	171	215	68	14	55
10	69	52	53	e27	e16	e350	83	161	202	57	266	48
11	69	52	38	e26	e16	e450	81	154	203	53	287	44
12	68	50	43	e25	e16	e390	98	145	193	49	189	403
13	68	55	53	e24	e16	e360	180	139	179	46	165	627
14	67	58	49	e23	e16	e360	169	132	165	44	150	477
15	67	66	51	e23	e16	e365	191	125	153	44	130	354
16	66	73	52	e22	e16	e280	220	109	147	43	109	274
17	65	72	56	e21	e16	247	209	103	132	40	92	216
18	64	71	63	e20	e16	221	211	94	127	38	79	181
19	64	71	66	e19	e18	200	208	92	121	38	71	162
20	64	69	57	e19	e30	189	192	88	168	40	63	139
21	66	68	43	e18	e120	173	188	85	202	45	56	118
22	64	66	46	e18	e115	163	171	88	188	48	51	132
23	63	63	46	e18	e108	150	157	90	184	47	44	147
24	63	62	e46	e18	e104	136	148	116	185	47	39	151
25	63	58	e45	e18	e100	122	147	151	174	43	40	147
26	62	35	e44	e18	e97	116	175	172	154	38	36	142
27	61	46	e43	e17	e96	110	195	194	138	36	35	132
28	60	62	e42	e17	e95	103	205	200	125	32	34	126
29	58	57	e40	e17	---	100	235	181	109	28	33	111
30	57	54	e38	e17	---	95	281	151	97	27	36	104
31	56	---	e37	e17	---	92	---	128	---	26	36	---
TOTAL	2104	1731	1512	734	1171	6294	4499	4915	4728	1799	2206	4674
MEAN	67.9	57.7	48.8	23.7	41.8	203	150	159	158	58.0	71.2	156
MAX	91	73	66	36	120	450	281	277	276	174	287	627
MIN	56	35	37	17	16	92	81	85	87	26	14	32
AC-FT	4170	3430	3000	1460	2320	12480	8920	9750	9380	3570	4380	9270
CFSM	.30	.25	.21	.10	.18	.88	.65	.69	.69	.25	.31	.68
IN.	.34	.28	.24	.12	.19	1.02	.73	.79	.76	.29	.36	.76

a Daily discharge.

e Estimated.

MINNESOTA RIVER BASIN

05317200 LITTLE COTTONWOOD RIVER NEAR COURTLAND, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1974 - 1994, BY WATER YEAR (WY)

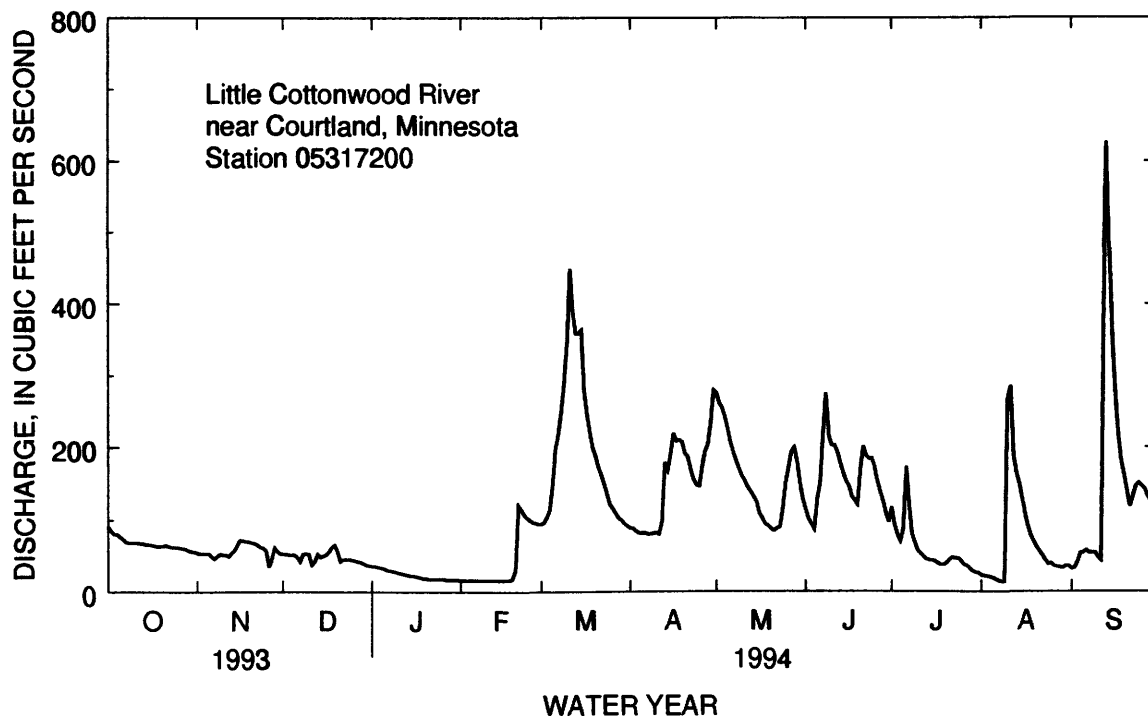
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	35.7	42.1	25.5	13.5	19.5	118	158	115	134	86.2	52.4	47.2
MAX	163	134	118	80.1	105	360	463	418	750	553	248	262
(WY)	1987	1983	1992	1992	1983	1992	1983	1993	1993	1993	1993	1986
MIN	.75	.70	.21	.15	.38	5.79	9.64	4.17	2.39	.63	.81	.54
(WY)	1976	1977	1977	1977	1977	1975	1990	1981	1976	1988	1976	1976

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1974 - 1994

ANNUAL TOTAL	84916	36367	
ANNUAL MEAN	233	99.6	70.7
HIGHEST ANNUAL MEAN			239
LOWEST ANNUAL MEAN			9.18
HIGHEST DAILY MEAN	2850	627	2850
LOWEST DAILY MEAN	13	14	.02
ANNUAL SEVEN-DAY MINIMUM	13	16	.08
INSTANTANEOUS PEAK FLOW		701	3520
INSTANTANEOUS PEAK STAGE		6.96	10.45
INSTANTANEOUS LOW FLOW		13	.01
ANNUAL RUNOFF (AC-FT)	168400	72130	51250
ANNUAL RUNOFF (CFSM)	1.01	.43	.31
ANNUAL RUNOFF (INCHES)	13.73	5.88	4.18
10 PERCENT EXCEEDS	621	204	191
50 PERCENT EXCEEDS	89	69	22
90 PERCENT EXCEEDS	18	19	1.1



MINNESOTA RIVER BASIN

05319500 WATONWAN RIVER NEAR GARDEN CITY, MN

LOCATION.--Lat 44°02'47", long 94°11'43", in SW 1/4 NE 1/4 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.--812 mi².

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.

GAGE.--Water-stage recorder. Datum of gage is 905.05 ft above mean sea level. Prior to September 30, 1945, nonrecording gage at site 200 ft upstream and at datum 0.17 ft higher.

REMARKS.--Records good except those for the periods of estimated daily discharge, which are fair.

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 ft³/s.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 900 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Mar. 06	--	e1600	--	Jun 21	2300	1710	4.91
Apr. 17	1200	1200	4.00	July 1	1700	900	3.37
May 01	1600	1720	4.95	July 7	2100	*2090	*5.52
May 24	2100	1010	3.63	July 18	1300	915	3.38
Jun 06	0900	1510	4.60	Aug. 13	1400	2060	5.41
Jun 13	1400	1310	4.22				

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	546	192	304	e175	e83	e400	e398	1720	438	844	175	130
2	520	186	270	e170	e82	e450	391	1700	401	770	163	123
3	483	191	257	e165	e80	e600	380	1570	370	598	140	141
4	447	190	255	e160	e78	e900	365	1420	646	527	127	224
5	424	190	257	e155	e76	e1300	362	1280	1360	488	119	311
6	409	186	210	e152	e75	e1600	344	1150	1500	712	107	332
7	394	166	186	e148	e74	e1550	343	1060	1420	1580	98	331
8	379	161	290	e142	e73	e1450	343	982	1340	1520	90	291
9	361	174	286	e138	e72	e1350	357	914	1290	1140	81	253
10	356	169	243	e135	e72	e1300	365	805	1210	843	556	216
11	348	164	103	e130	e72	e1200	361	710	1050	653	1600	187
12	347	170	194	e128	e72	e1170	408	653	997	550	1940	167
13	331	201	287	e123	e72	e1400	757	619	1260	482	2040	183
14	317	243	276	e120	e72	e1600	1040	600	1190	485	1960	202
15	310	264	294	e118	e72	e1500	1140	566	1010	520	1640	200
16	299	285	290	e115	e72	e1300	1160	523	849	550	1280	183
17	293	303	306	e111	e76	e1150	1190	486	802	792	1020	166
18	284	297	318	e109	e85	e1050	1140	456	1220	901	817	147
19	280	291	354	e108	e110	e950	1030	435	1380	855	684	131
20	274	290	361	e105	e140	e880	908	411	1530	743	600	122
21	267	272	248	e102	e300	e820	829	395	1650	790	516	119
22	258	262	e240	e100	e500	e750	760	388	1690	803	436	137
23	249	247	e230	e98	e560	e735	695	503	1510	717	369	209
24	250	238	e225	e96	e520	659	661	903	1310	607	316	315
25	245	236	e215	e94	e490	597	810	1010	1170	501	269	359
26	242	180	e210	e92	e460	547	1150	992	1030	414	235	364
27	235	385	e205	e90	e425	522	1500	861	1010	349	209	364
28	226	501	e195	e88	e410	495	1580	722	870	289	187	346
29	229	446	e190	e86	---	465	1620	631	751	242	168	318
30	220	370	e185	e85	---	436	1690	554	652	214	156	286
31	203	---	e180	e84	---	e409	---	489	---	197	143	---
TOTAL	10026	7450	7664	3722	5273	29535	24077	25508	32906	20676	18241	6857
MEAN	323	248	247	120	188	953	803	823	1097	667	588	229
MAX	546	501	361	175	560	1600	1690	1720	1690	1580	2040	364
MIN	203	161	103	84	72	400	343	388	370	197	81	119
AC-FT	19890	14780	15200	7380	10460	58580	47760	50600	65270	41010	36180	13600
CFSM	.40	.31	.30	.15	.23	1.17	.99	1.01	1.35	.82	.72	.28

e Estimated.

MINNESOTA RIVER BASIN

05319500 WATONWAN RIVER NEAR GARDEN CITY, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1940 - 1994, BY WATER YEAR (WY)

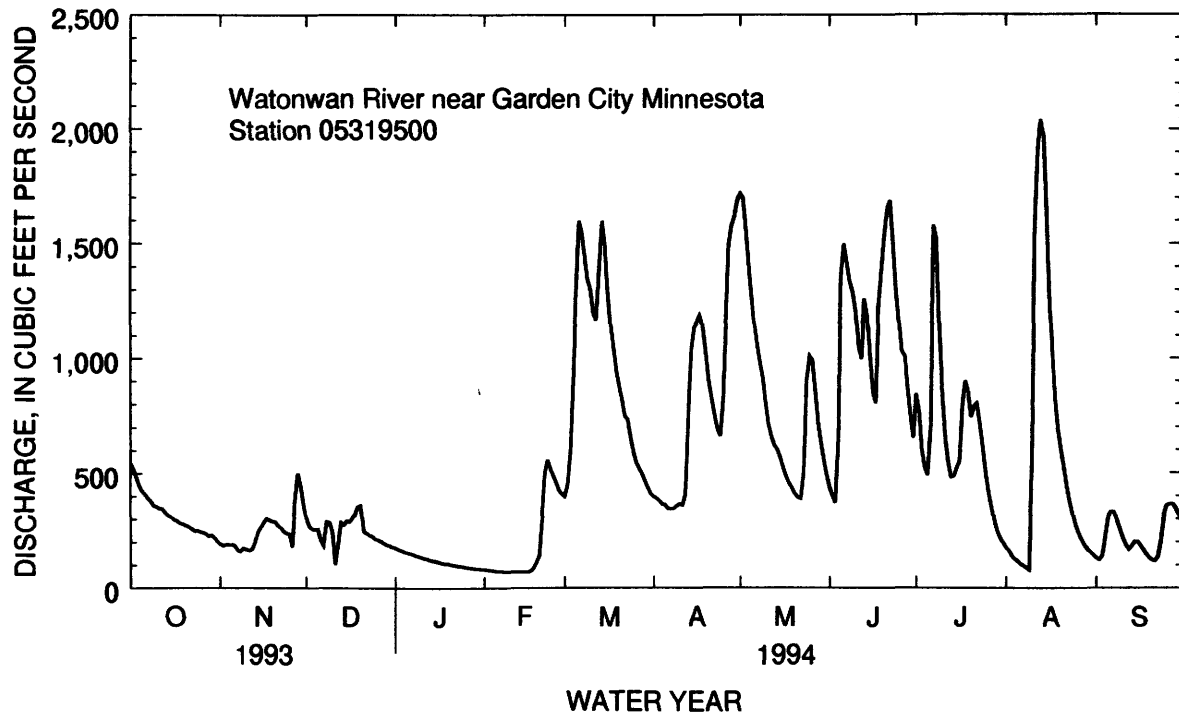
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN*	188	227	141	66.9	97.8	579	833	593	871	436	232	219
MAX	686	826	530	319	626	2105	2696	2025	4494	2389	1095	819
(WY)	1993	1993	1992	1992	1983	1992	1993	1993	1993	1993	1979	1993
MIN	5.37	7.69	3.76	2.70	2.39	19.3	33.7	16.1	17.3	8.27	6.56	3.63
(WY)	1990	1977	1990	1977	1977	1940	1990	1940	1989	1940	1989	1976

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1940 - 1994

ANNUAL TOTAL	453616	191935	
ANNUAL MEAN	1243	526	388
HIGHEST ANNUAL MEAN			1330
LOWEST ANNUAL MEAN			43.7
HIGHEST DAILY MEAN	13400	2040	13400
LOWEST DAILY MEAN	71	72	1.8
ANNUAL SEVEN-DAY MINIMUM	72	72	1.9
INSTANTANEOUS PEAK FLOW		2090	13900
INSTANTANEOUS PEAK STAGE		5.52	15.91
ANNUAL RUNOFF (AC-FT)	899700	380700	281000
ANNUAL RUNOFF (CFSM)	1.53	.65	.48
10 PERCENT EXCEEDS	3080	1280	1040
50 PERCENT EXCEEDS	501	357	123
90 PERCENT EXCEEDS	93	109	10



MINNESOTA RIVER BASIN

05320000 BLUE EARTH RIVER NEAR RAPIDAN, MN

LOCATION.--Lat 44°05'44", long 94°06'33", in SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec.6, T.107 N., R.27 W., Blue Earth County, Hydrologic Unit 07020009, on left bank 0.2 mi downstream from powerplant (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.--2,430 mi², approximately.

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.

REVISED RECORDS.--WSP 895: Drainage area. WSP 1508: 1910.

GAGE.--Water-stage recorder. Datum of gage is 807.83 ft above mean 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.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2260	981	839	753	244	708	1170	4160	1370	3310	1620	615
2	2220	916	1170	807	244	742	1050	4070	1180	3030	1500	602
3	2110	788	776	822	244	748	1130	3850	1190	2440	1350	502
4	1900	777	776	707	244	1120	1200	3540	987	2210	1250	685
5	1900	873	776	707	244	1990	1100	3510	1230	1980	1040	737
6	1790	643	637	683	244	3730	1040	3190	2280	2260	1000	896
7	1640	775	604	582	240	4500	975	3180	2690	3080	854	768
8	1630	844	606	582	230	4660	1040	3160	2730	3490	978	730
9	1540	757	749	582	225	5030	777	2970	2580	3730	752	715
10	1530	753	886	490	225	5260	963	2770	2530	3550	1430	496
11	1510	732	490	428	225	4840	1070	2530	2420	3050	3200	608
12	1480	750	301	432	225	4670	964	2380	2090	2450	4160	692
13	1450	601	617	436	225	4380	1490	2230	2160	2170	4580	448
14	1390	819	724	436	225	4530	2480	2080	2760	2040	4510	424
15	1370	894	885	436	249	5490	3090	2030	2990	2470	4250	490
16	1340	1000	816	436	230	4890	2980	1850	2850	3140	3650	514
17	1280	864	915	436	210	3940	2970	1790	2390	3950	2910	300
18	1270	935	1010	403	234	3320	2950	1660	2170	4150	2570	386
19	1250	748	1180	337	521	2930	2710	1570	2660	4150	2300	466
20	1170	865	1370	409	749	2710	2530	1510	3510	4100	2030	413
21	1170	924	1140	329	777	2430	2300	1420	3970	4240	1760	310
22	1150	752	1100	320	979	2300	2210	1290	3980	4610	1660	408
23	1080	870	623	312	1140	2260	2080	1280	4160	5040	1460	456
24	1080	743	283	298	1300	1850	2020	1330	3920	5140	1330	1310
25	1050	803	484	290	1120	1920	2350	1800	4000	4660	1130	1860
26	1080	593	534	307	975	1650	2960	2170	4540	3880	890	1810
27	1060	366	540	301	916	1610	3680	2050	4800	3120	890	1650
28	1060	440	544	304	893	1490	3830	1980	4760	2630	858	1490
29	949	653	544	272	---	1450	3710	1760	4180	2210	800	1420
30	797	804	546	244	---	1350	3950	1580	3290	2080	745	1300
31	797	---	850	244	---	1220	---	1420	---	1760	700	---
TOTAL	43303	23263	23315	14125	13577	89718	62769	72110	86367	100120	58157	23501
MEAN	1397	775	752	456	485	2894	2092	2326	2879	3230	1876	783
MAX	2260	1000	1370	822	1300	5490	3950	4160	4800	5140	4580	1860
MIN	797	366	283	244	210	708	777	1280	987	1760	700	300
AC-FT	85890	46140	46250	28020	26930	178000	124500	143000	171300	198600	115400	46610
CFSM	.57	.32	.31	.19	.20	1.19	.86	.96	1.18	1.33	.77	.32
IN.	.66	.36	.36	.22	.21	1.37	.96	1.10	1.32	1.53	.89	.36

e Estimated.

MINNESOTA RIVER BASIN

05320000 BLUE EARTH RIVER NEAR RAPIDAN, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	534	524	335	199	244	1388	2621	1677	2052	1297	677	546
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 1993 CALENDAR YEAR

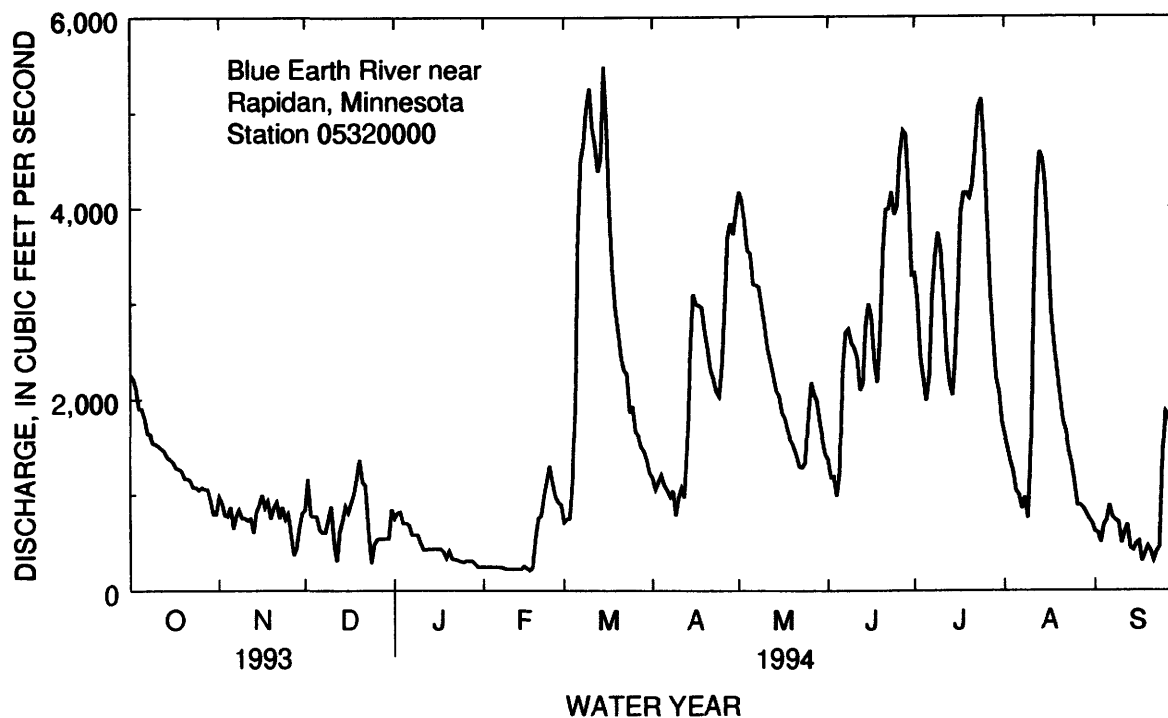
FOR 1994 WATER YEAR

WATER YEARS 1909 - 1994

ANNUAL TOTAL	1543641	610325	
ANNUAL MEAN	4229	1672	
HIGHEST ANNUAL MEAN			4518 1993
LOWEST ANNUAL MEAN			105 1940
HIGHEST DAILY MEAN	19800 Jun 20	5490 Mar 15	42500 Apr 9 1965
LOWEST DAILY MEAN	283 Dec 24	210 Feb 17	7.4 Oct 28 1955
ANNUAL SEVEN-DAY MINIMUM	329 Feb 27	226 Feb 8	8.1 Oct 24 1955
INSTANTANEOUS PEAK FLOW		8450 ^a Mar 16	43100 Apr 9 1965
INSTANTANEOUS PEAK STAGE		8.15 ^a Mar 16	21.36 ^b Apr 9 1965
INSTANTANEOUS LOW FLOW		145 Dec 23	6.9 Oct 12 1955
ANNUAL RUNOFF (AC-FT)	3062000	1211000	743500
ANNUAL RUNOFF (CFSM)	1.74	.69	.42
ANNUAL RUNOFF (INCHES)	23.63	9.34	5.74
10 PERCENT EXCEEDS	10100	3900	2680
50 PERCENT EXCEEDS	2880	1190	330
90 PERCENT EXCEEDS	495	396	38

a Result of regulation.

b From floodmark.



MINNESOTA RIVER BASIN

05320500 LE SUEUR RIVER NEAR RAPIDAN, MN

LOCATION.--Lat 44°06'40", long 94°02'28", in SW 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.--1,100 mi², approximately.

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 mean 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 fair to poor.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,300 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Mar. 07		2000 ^a		Jul 08	1800	2900	5.89
Apr. 29	0700	*3520	*6.65	Jul 17	0700	1960	4.70
Jun 09	1600	2950	5.95	Aug. 11	0100	3340	6.39
Jun 20	0400	2540	5.46	Sep. 25	1500	1790	4.44

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	703	277	244	e220	e120	e530	e348	2920	438	966	340	351
2	659	270	231	e210	e130	e520	316	2520	408	962	311	323
3	605	261	228	e210	e120	e520	305	2220	380	869	275	331
4	564	260	231	e205	e120	e540	291	2050	529	762	289	385
5	554	260	231	e200	e120	e580	288	1870	771	712	275	457
6	514	258	221	e190	e115	e620	271	1720	1770	984	249	506
7	490	242	197	e180	e110	e660	270	1580	2110	1240	236	480
8	481	232	196	e170	e115	e700	268	1420	2330	2230	230	422
9	462	231	198	e170	e115	e680	280	1260	2580	2030	208	379
10	445	231	198	e160	e120	e670	287	1150	2460	1600	1980	332
11	415	231	172	e160	e120	e640	281	1040	2210	1470	3190	310
12	395	231	189	e160	e125	e620	326	947	2180	1240	3070	394
13	395	234	227	e160	e130	e660	713	886	2180	1060	2780	524
14	388	238	226	e150	e130	e740	1070	825	2020	1000	2330	397
15	367	241	256	e150	e135	e800	1200	760	1770	1030	1900	358
16	367	244	332	e140	e135	e860	1240	700	1530	1320	1530	394
17	366	244	514	e140	e140	e900	1270	646	1350	1830	1240	589
18	349	247	734	e140	e150	982	1200	609	1520	1680	1030	673
19	337	245	803	e130	e275	823	1050	579	2130	1370	1010	542
20	337	244	803	e130	e300	742	1040	532	2280	1120	1010	457
21	337	247	693	e130	e400	700	1080	502	1730	961	911	430
22	333	247	559	e125	e550	691	1030	487	1440	1130	784	446
23	328	247	500	e130	e680	661	975	534	1250	1160	744	823
24	324	247	449	e130	e650	641	1680	587	1090	1010	629	1550
25	320	244	e250	e130	e620	596	2700	649	966	876	541	1670
26	349	167	e220	e140	e580	533	3280	645	858	754	473	1620
27	331	148	e200	e130	e560	503	3240	626	846	643	424	1500
28	316	245	e190	e130	e550	482	3370	618	803	538	397	1330
29	299	247	e200	e130	---	475	3470	577	725	459	366	1180
30	290	246	e210	e130	---	443	3240	521	685	410	356	1040
31	286	---	e220	e120	---	e394	---	473	---	374	381	---
TOTAL	12706	7206	10122	4800	7415	19906	36379	32453	43339	33790	29489	20193
MEAN	410	240	327	155	265	642	1213	1047	1445	1090	951	673
MAX	703	277	803	220	680	982	3470	2920	2580	2230	3190	1670
MIN	286	148	172	120	110	394	268	473	380	374	208	310
AC-FT	25200	14290	20080	9520	14710	39480	72160	64370	85960	67020	58490	40050
CFSM	.37	.22	.29	.14	.24	.58	1.09	.94	1.30	.98	.86	.61

a Daily mean discharge.

e Estimated.

MINNESOTA RIVER BASIN

05320500 LE SUEUR RIVER NEAR RAPIDAN, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1940 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	296	258	143	79.4	124	807	1317	904	933	599	391	257
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

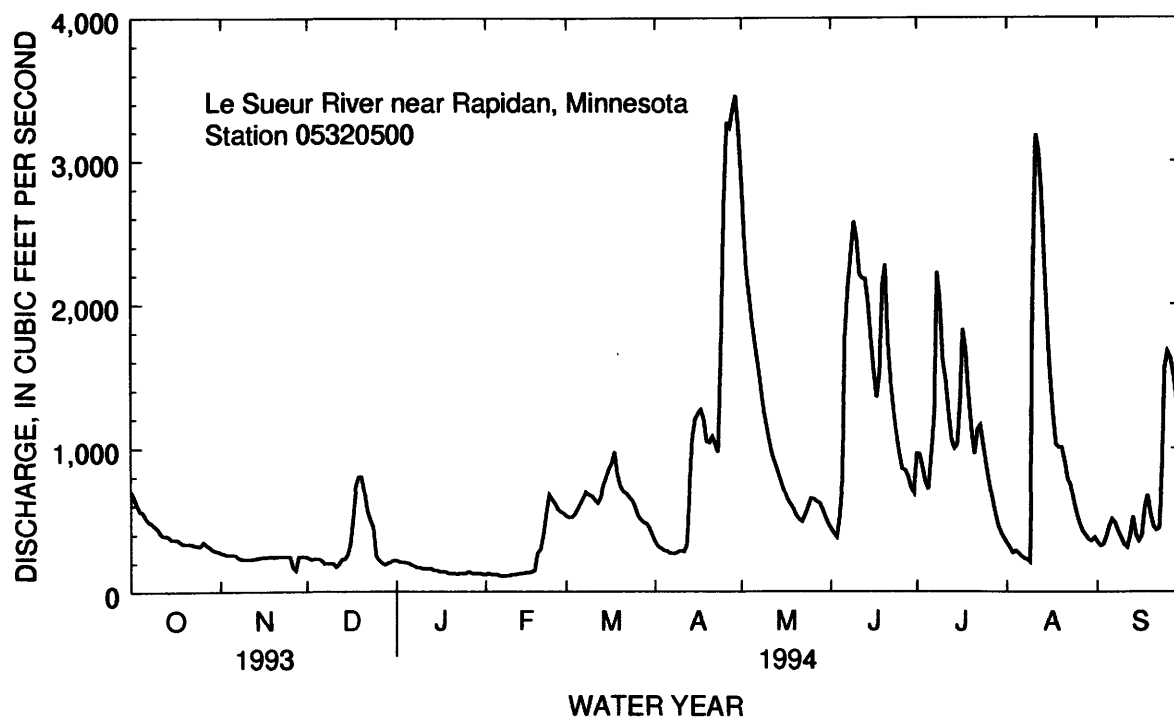
SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1940 - 1994

ANNUAL TOTAL	661280	257798	511
ANNUAL MEAN	1812	706	2035
HIGHEST ANNUAL MEAN			51.4
LOWEST ANNUAL MEAN			23400
HIGHEST DAILY MEAN	11300	Jun 21	3470
LOWEST DAILY MEAN	148	Nov 27	110
ANNUAL SEVEN-DAY MINIMUM	152	Feb 27	116
INSTANTANEOUS PEAK FLOW			3520
INSTANTANEOUS PEAK STAGE			6.65
ANNUAL RUNOFF (AC-FT)	1312000	511300	370100
ANNUAL RUNOFF (CFSM)	1.63	.64	.46
10 PERCENT EXCEEDS	4310	1670	1410
50 PERCENT EXCEEDS	924	480	138
90 PERCENT EXCEEDS	187	150	16

a From floodmark.



MINNESOTA RIVER BASIN

05325000 MINNESOTA RIVER AT MANKATO, MN

LOCATION(REVISED).--Lat 44°10'08", long 94°00'11", in SE 1/4 SW 1/4 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 mi², 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 good except those for estimated daily discharges, which are fair.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage known, 29.9 ft, Apr. 26, 1881, present site and datum, from floodmark (discharge, 110,000 ft³/s).

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7980	3800	3790	e3100	e1420	e3300	15900	21200	8140	10500	5420	4170
2	7650	3800	4280	e3000	e1410	e3100	15500	20900	7410	10200	5180	3940
3	7320	3760	4260	e2900	e1400	e3000	15000	20300	6960	8890	4980	3580
4	6900	3750	4320	e2800	e1400	e3200	14500	19800	6430	8240	4810	3730
5	6670	3640	4320	e2700	e1400	e3500	13800	19800	6910	7710	4470	4140
6	6430	3250	4260	e2600	e1390	e4300	13200	19600	8250	8510	4220	4490
7	6170	3270	4110	e2500	e1380	e5300	12600	19300	11900	9340	3810	4250
8	6050	3490	3930	e2450	e1370	e7000	12100	18900	13000	11200	3880	4110
9	5920	3420	3970	e2350	e1360	e9000	11400	18300	13400	11100	3480	3940
10	5820	3440	4090	e2250	e1340	e10500	11200	17600	13800	10300	7710	3610
11	5810	3430	3750	e2200	e1340	e13000	10700	17100	13300	9370	12600	3470
12	5830	3420	3420	e2100	e1340	e14500	10500	16500	11900	8360	14300	4790
13	5750	3420	3640	e2000	e1340	15900	11700	16000	11200	7800	14900	6050
14	5630	3540	3820	e1950	e1340	16700	13300	15400	11300	7490	14200	5500
15	5530	3990	4150	e1900	e1340	17100	14800	15000	10800	7670	13300	4890
16	5470	4520	4240	e1850	e1340	17200	15100	14400	10000	8550	11900	4410
17	5400	4670	4480	e1800	e1340	16100	15600	13600	8900	9940	10500	4000
18	5310	4590	4810	e1750	e1370	15700	16100	13000	8100	9950	9720	3700
19	5240	4450	4890	e1700	e1400	15600	15800	12500	8280	9580	9050	3470
20	5070	4520	5130	e1650	e1500	15900	15300	11900	10500	9330	8200	3180
21	4990	4420	4530	e1620	e2000	16000	14400	11300	12000	9590	7170	3110
22	4820	4460	4060	e1600	e2400	15800	13500	10700	11400	10300	6360	3150
23	4600	4400	e4000	e1590	e2600	15500	12800	10300	11900	10700	5720	3550
24	4470	4370	e3850	e1580	e3100	15000	12300	10400	11600	10600	5230	4970
25	4380	4410	e3750	e1570	e3800	15100	13200	10900	11400	9960	4830	5850
26	4360	4050	e3700	e1560	e3800	15300	15300	11600	12000	8890	4550	5790
27	4260	3230	e3600	e1550	e3700	15500	19000	10900	12300	7760	4640	5500
28	4190	2800	e3500	e1520	e3600	15800	21500	10600	12200	6980	4740	5110
29	4090	3220	e3350	e1500	---	16000	21700	10000	11600	6420	4450	4810
30	3880	3580	e3250	e1470	---	16300	21400	9380	10400	6100	4220	4490
31	3750	---	e3200	e1420	---	16200	---	8700	---	5700	4150	---
TOTAL	169740	115110	124450	62530	52520	382400	439200	455880	317280	277030	222690	129750
MEAN	5475	3837	4015	2017	1876	12340	14640	14710	10580	8936	7184	4325
MAX	7980	4670	5130	3100	3800	17200	21700	21200	13800	11200	14900	6050
MIN	3750	2800	3200	1420	1340	3000	10500	8700	6430	5700	3480	3110
AC-FT	336700	228300	246800	124000	104200	758500	871200	904200	629300	549500	441700	257400
CFSM	.37	.26	.27	.14	.13	.83	.98	.99	.71	.60	.48	.29

e Estimated.

MINNESOTA RIVER BASIN

05325000 MINNESOTA RIVER AT MANKATO, MN—Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1903 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	1522	1439	947	585	723	4377	8745	5470	5881	4360	2270	1650
MAX	14600	7225	4770	3009	4505	18230	44780	22540	34230	33130	23520	11070
(WY)	1969	1993	1983	1992	1983	1983	1969	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 1993 CALENDAR YEAR

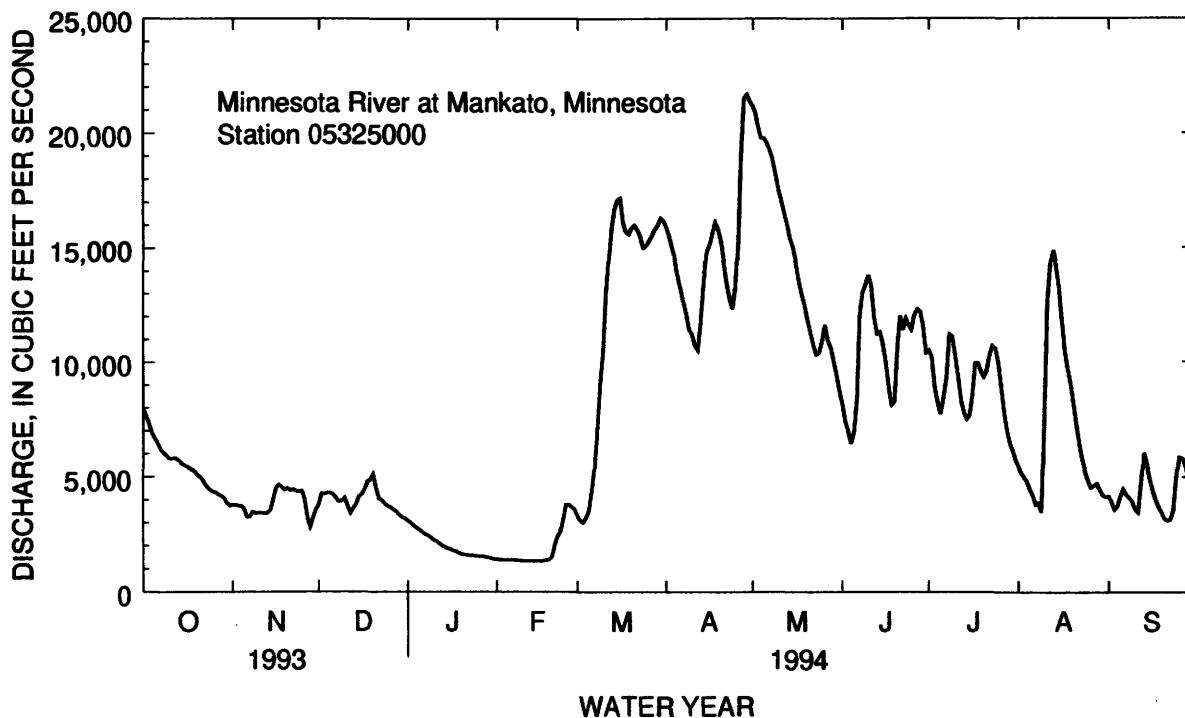
FOR 1994 WATER YEAR

WATER YEARS 1903 - 1994

ANNUAL TOTAL	5334860	2748580	3289 ^a	
ANNUAL MEAN	14620	7530	14890	1993
HIGHEST ANNUAL MEAN			136	1934
LOWEST ANNUAL MEAN			92700	Apr 10 1965
HIGHEST DAILY MEAN	75100	Jun 21	31	Aug 3 1934
LOWEST DAILY MEAN	1020	Jan 31	33	Jul 29 1934
ANNUAL SEVEN-DAY MINIMUM	1020	Jan 31	21800	Apr 10 1965
INSTANTANEOUS PEAK FLOW			15.78	Apr 28 1993
INSTANTANEOUS PEAK STAGE			30.11	Jun 21 1993
INSTANTANEOUS LOW FLOW			26 ^b	Aug 4 1934
ANNUAL RUNOFF (AC-FT)	10580000	5452000	2382000	
ANNUAL RUNOFF (CFSM)	.98	.51	.22	
10 PERCENT EXCEEDS	35300	15500	8520	
50 PERCENT EXCEEDS	8160	5400	1160	
90 PERCENT EXCEEDS	1040	1880	182	

a Median of annual mean discharges is 2590 ft³/s.

b Minimum observed.



MINNESOTA RIVER BASIN

05325000 MINNESOTA RIVER AT MANKATO, MN--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

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 DEMAND, BIO- CHEM- ICAL, 5 DAY (MG/L) (00310)	RESIDUE TOTAL AT 105 DEG. C, SUS- PENDED (MG/L) (00530)	RESIDUE VOLA- TILE, SUS- PENDED (MG/L) (00535)
MAR										
04...	1150	e4000	744	8.1	1.5	745	13.6	3.7	38	8
09...	1130	e15000	497	7.3	1.0	749	13.5	5.6	110	22
16...	1150	e16200	603	8.2	1.5	745	13.5	4.3	278	50
23...	1100	15200	701	7.8	5.5	728	12.2	2.1	92	14
30...	1120	15700	774	7.6	3.0	750	14.0	4.0	87	15
APR										
05...	1345	13900	747	8.0	4.0	745	12.3	3.5	68	9
13...	1445	12000	786	8.2	8.0	730	15.4	4.2	164	22
20...	1130	15300	869	7.6	12.0	748	12.3	--	90	12
26...	1345	15200	884	8.3	14.5	721	10.6	--	484	84
MAY										
03...	1115	20200	927	8.3	10.5	746	13.3	--	124	28
09...	1015	18400	962	8.0	13.5	744	12.3	--	95	26
16...	1145	14400	869	7.5	18.5	748	9.6	--	83	24
25...	1130	10800	875	8.0	22.0	739	8.7	--	116	20
JUN										
01...	1200	8110	957	7.8	22.5	748	7.2	--	142	32
09...	1220	13400	714	8.0	19.5	748	8.3	--	336	40
16...	1135	10100	1010	7.7	23.5	743	7.1	--	190	50
22...	1210	11300	805	8.0	23.5	741	7.2	--	246	--
29...	1130	11600	971	7.9	22.0	740	8.2	--	142	18
JUL										
06...	1400	8550	954	7.5	25.0	742	7.7	--	238	30
14...	1430	7460	947	7.8	22.5	744	7.1	--	130	25
20...	1230	9320	895	7.6	23.5	740	8.0	--	260	26
27...	1400	7630	915	8.0	23.5	743	7.9	--	195	28
AUG										
04...	1140	4810	881	7.7	25.0	747	7.3	--	101	20
11...	1135	12800	559	7.6	18.5	745	8.4	--	324	--
16...	1345	11800	748	8.1	21.0	740	8.0	--	162	38
24...	1400	5170	915	8.1	23.0	738	7.9	--	64	16
SEP										
01...	1200	4130	908	7.6	20.5	752	8.8	--	116	18

MINNESOTA RIVER BASIN

05325000 MINNESOTA RIVER AT MANKATO, MN--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DATE	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)	PHOS- PHORUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHORUS ORTH- DIS- SOLVED (MG/L AS P) (00671)	CHLOR- ACHLOR- B PHYTO- PLANK- TON CHROMO FLUOROM (UG/L) (70953)	CHLOR- ACHLOR- B PHYTO- PLANK- TON CHROMO FLUOROM (UG/L) (70954)
MAR										
04...	0.050	4.00	0.480	1.3	1.3	0.300	0.220	0.200	1.60	<0.100
09...	0.140	3.90	0.500	1.3	2.0	0.480	0.310	0.300	2.90	0.100
16...	0.070	3.80	0.330	1.0	2.1	0.460	0.170	0.150	4.70	0.300
23...	0.070	3.20	0.210	0.80	1.2	0.290	0.160	0.150	4.70	0.500
30...	0.050	3.00	0.130	0.70	1.1	0.220	0.110	0.110	6.20	0.800
APR										
05...	0.040	3.20	0.030	0.70	1.1	0.110	0.080	0.080	16.0	1.10
13...	0.020	2.80	0.030	--	--	0.190	--	<0.010	60.0	0.700
20...	0.030	6.90	0.030	--	--	0.160	--	0.020	58.0	0.500
26...	0.030	5.70	0.070	--	--	0.400	--	0.030	58.0	8.00
MAY										
03...	0.020	7.40	0.020	--	--	0.240	--	0.030	34.0	5.10
09...	0.020	5.80	0.020	--	--	0.120	--	<0.010	42.0	<0.100
16...	0.010	1.90	0.020	--	--	0.110	--	<0.010	43.0	1.20
25...	0.040	3.30	0.020	--	--	0.150	--	<0.010	14.0	<0.100
JUN										
01...	0.070	5.20	0.080	--	--	0.230	--	0.070	20.0	1.10
09...	0.070	9.00	0.080	--	--	0.350	--	0.110	7.20	1.40
16...	0.040	8.00	0.110	--	--	0.260	--	0.070	9.00	0.700
22...	0.050	8.30	0.050	--	--	0.350	--	0.110	5.80	0.600
29...	0.030	5.10	0.050	--	--	0.210	--	0.100	8.50	1.00
JUL										
06...	0.020	3.90	<0.010	--	--	0.370	--	0.080	14.0	1.40
14...	0.020	4.60	0.020	0.60	1.2	0.250	0.110	0.100	8.70	0.900
20...	0.020	4.60	0.050	0.80	0.90	0.390	0.110	0.100	18.0	1.20
27...	0.010	2.20	<0.010	--	--	0.440	--	0.100	24.0	1.30
AUG										
04...	0.010	1.50	0.030	--	--	0.240	--	0.050	38.0	4.30
11...	0.010	3.50	0.050	--	--	0.640	--	0.140	25.0	1.80
16...	0.020	4.60	0.030	--	--	0.270	--	0.130	9.20	1.00
24...	<0.010	1.40	0.020	--	--	0.250	--	0.060	17.0	2.00
SEP										
01...	0.010	1.40	0.040	--	--	0.210	--	0.040	32.0	5.50

MINNESOTA RIVER BASIN

05325000 MINNESOTA RIVER AT MANKATO, MN--Continued

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 good. During the winter period, daily sediment concentrations and loads are based primarily on concentrations of sediment in samples that were collected monthly and on daily water-discharge records. Sediment records for the winter period are considered fair. Water temperatures were obtained by the observer approximately daily during the open-water period and monthly by U.S. Geological Survey personnel during the winter period. Some temperatures are not published because of questionable values.

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 each year.

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, 26.0°C, July 5-6, Aug. 1; minimum observed, 0.0°C, many days during winter..

SEDIMENT CONCENTRATIONS: Maximum daily mean, 1420 mg/L, June 21; minimum daily mean, 30 mg/L, Feb. 8-18, Mar 1.

SEDIMENT LOADS: Maximum daily, 44,100 tons, June 7; minimum daily, 109 tons, Feb. 10-17.

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY INSTANTANEOUS VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	13.0	5.0	1.0	---	---	.0	7.0	9.0	22.0	24.0	26.0	19.0
2	11.0	5.0	1.0	---	---	1.0	6.0	11.0	23.0	23.0	---	18.0
3	14.0	5.0	.0	---	---	1.0	5.5	12.0	22.0	---	25.0	19.0
4	13.0	5.0	1.0	---	---	.5	5.0	14.0	23.0	25.0	25.0	18.0
5	13.0	1.0	1.0	---	---	---	5.0	11.0	23.0	26.0	24.0	20.0
6	12.0	---	.0	---	---	.5	6.0	10.0	24.0	26.0	23.0	20.0
7	11.0	---	.0	---	---	.0	6.0	---	20.0	25.0	25.0	22.0
8	12.0	2.0	.0	---	---	.0	6.0	14.0	20.0	22.0	22.0	22.0
9	11.0	2.0	.0	---	---	---	6.5	14.0	19.0	22.0	20.0	22.0
10	11.0	2.0	.0	---	---	.0	7.0	17.0	---	24.0	17.0	22.0
11	11.0	2.0	1.0	---	---	.0	10.5	---	---	24.0	19.0	24.0
12	10.0	1.0	1.0	---	---	.0	8.0	18.0	21.0	23.0	19.0	23.0
13	10.0	---	1.0	---	---	1.0	10.0	17.0	22.0	---	18.0	23.0
14	12.0	2.0	1.0	---	---	2.0	9.0	---	24.0	23.0	25.0	23.0
15	11.0	2.0	1.0	---	---	1.0	10.0	18.0	25.0	24.0	20.0	---
16	11.0	2.0	1.0	---	---	2.0	10.0	20.0	25.0	22.0	21.0	20.0
17	11.0	2.0	.5	---	---	2.5	12.0	20.0	25.0	22.0	22.0	---
18	12.0	3.0	---	---	---	---	14.0	20.0	24.0	23.0	22.0	21.0
19	12.0	3.0	---	---	---	---	14.0	22.0	25.0	23.0	22.0	---
20	9.0	3.0	.0	---	---	---	11.0	21.0	23.0	24.0	22.0	20.0
21	10.0	3.0	.0	---	---	---	8.0	21.0	25.0	24.0	---	17.0
22	10.0	3.0	.0	---	---	---	12.0	23.0	23.0	24.0	---	17.0
23	12.0	2.0	---	---	---	---	13.0	23.0	23.0	24.0	---	17.0
24	10.0	1.0	---	---	---	---	17.0	22.0	24.0	24.0	---	---
25	---	---	---	---	---	---	16.0	21.0	24.0	23.0	---	17.0
26	10.0	.0	---	---	---	---	13.0	19.0	24.0	22.0	23.0	14.0
27	10.0	.0	---	---	---	---	11.0	21.0	24.0	23.0	23.0	15.0
28	7.0	.0	---	---	.0	---	10.0	21.0	23.0	24.0	23.0	15.0
29	6.0	.0	---	---	---	3.5	6.0	---	23.0	25.0	22.0	---
30	4.0	1.0	---	---	---	4.0	7.0	---	24.0	---	22.0	15.0
31	4.0	---	---	---	---	7.0	---	23.0	---	25.0	21.0	---
MEAN	---	---	---	---	---	---	9.4	---	---	---	---	---
MAX	---	---	---	---	---	---	17.0	---	---	---	---	---
MIN	---	---	---	---	---	---	5.0	---	---	---	---	---

MINNESOTA RIVER BASIN

05325000 MINNESOTA RIVER AT MANKATO, MN--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

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	190	4090	93	701	148	1520	60	502	38	146	30	267
2	189	3940	114	850	151	1740	54	437	37	141	31	259
3	185	3670	123	897	156	1790	51	399	36	136	36	292
4	162	3010	98	704	149	1740	48	363	35	132	69	596
5	148	2630	108	898	147	1720	47	343	34	129	230	2170
6	141	2400	130	1150	143	1650	46	323	33	124	415	4820
7	136	2200	119	1060	139	1540	45	304	32	119	389	5570
8	134	2110	135	1280	135	1430	45	298	30	111	325	6140
9	140	2140	94	873	133	1430	45	286	30	110	195	4740
10	145	2160	70	656	137	1510	45	273	30	109	176	4990
11	143	2110	75	699	147	1490	45	267	30	109	305	10700
12	140	2050	99	920	135	1250	44	249	30	109	330	12900
13	136	1950	88	817	78	767	44	238	30	109	330	14200
14	134	1860	127	1220	80	825	44	232	30	109	410	18500
15	134	1810	145	1570	103	1150	44	226	30	109	445	20500
16	136	1800	147	1800	177	2020	44	220	30	109	490	22800
17	139	1800	139	1760	209	2510	43	209	30	109	481	20600
18	137	1720	144	1800	202	2600	43	203	30	111	462	19300
19	127	1560	158	1910	190	2490	43	197	36	136	430	18000
20	127	1490	156	1910	178	2440	43	192	50	202	406	17200
21	140	1600	136	1630	165	1990	42	184	58	313	380	16200
22	146	1590	119	1440	117	1260	42	181	60	389	357	15000
23	145	1490	114	1360	75	810	42	180	59	414	340	14000
24	138	1360	116	1370	71	738	42	179	56	469	310	12300
25	130	1240	122	1460	70	709	42	178	51	523	280	11300
26	127	1190	127	1390	69	689	42	177	44	451	254	10300
27	122	1100	126	1100	67	651	41	172	36	360	226	9340
28	119	1040	113	857	66	624	41	168	32	311	199	8330
29	117	989	114	994	65	588	41	166	---	---	175	7420
30	105	828	134	1300	64	562	40	159	---	---	155	6650
31	91	686	---	---	63	544	40	153	---	---	141	6050
TOTAL	---	59613	---	36376	---	42777	---	7658	---	5699	---	321434

MINNESOTA RIVER BASIN

05325000 MINNESOTA RIVER AT MANKATO, MN--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

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	131	5520	326	18300	250	5240	340	9180	222	2890	118	1130
2	125	5100	297	16400	319	6070	378	9930	235	2890	115	1040
3	125	4960	263	14100	321	5690	330	7560	210	2460	119	977
4	120	4570	233	12100	310	5000	288	6110	175	1960	125	1070
5	142	5180	206	10700	735	12900	275	5450	190	1960	158	1510
6	162	5640	190	9800	1110	23600	380	8330	198	1920	168	1760
7	171	5680	175	8880	1420	44100	755	18200	185	1610	168	1660
8	185	5890	163	8140	840	28300	605	17600	170	1510	155	1470
9	202	6050	158	7640	559	19500	381	10900	165	1310	156	1420
10	188	5530	152	7060	535	19200	300	7990	860	16800	159	1320
11	179	5030	148	6630	520	18100	259	6270	780	25500	140	1110
12	226	6220	145	6260	408	12600	255	5490	540	20100	520	5980
13	281	8650	146	6110	430	12500	208	4170	440	17100	510	7700
14	270	9480	155	6240	470	13700	190	3650	360	13300	225	3010
15	229	8900	180	7050	360	10000	218	4300	279	9640	181	2090
16	219	8750	211	7920	305	7900	338	7450	215	6620	178	1830
17	211	8660	212	7560	300	6890	341	8770	200	5450	165	1530
18	198	8390	210	7140	305	6360	275	7080	190	4770	170	1460
19	200	8320	209	6770	345	7360	295	7300	180	4200	165	1320
20	222	8930	206	6400	479	13100	372	8950	180	3800	158	1160
21	235	8880	202	5940	640	19900	348	8620	178	3250	142	1010
22	201	7160	199	5530	560	16500	302	8050	178	2820	155	1110
23	180	6070	195	5240	455	14000	285	7930	178	2480	361	2970
24	179	5750	180	4840	435	13200	280	7710	179	2230	428	5080
25	270	9330	180	5100	395	11600	281	7240	180	2030	322	4670
26	640	25700	310	9290	370	11600	270	6200	179	1890	259	3710
27	850	42500	256	7260	360	11500	241	4800	178	1920	238	3190
28	549	31100	235	6470	320	10100	221	3930	180	1980	236	2870
29	380	21800	228	5920	275	8240	205	3290	159	1640	230	2610
30	354	20000	227	5510	290	7800	202	3040	125	1220	218	2300
31	---	---	228	5120	---	---	202	2800	121	1160	---	---
TOTAL YEAR	---	313740 1904034	---	247420	---	402550	---	228290	---	168410	---	70067

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MINNESOTA RIVER BASIN

05327000 HIGH ISLAND CREEK NEAR HENDERSON, MN

LOCATION.--Lat 44°34'19", long 93°55'18", in NE¼NW¼, 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.--237 mi².

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.

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.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 300 ft³/s and maximum (*):

Date	Time	Discharge (ft³/s)	Gage height (ft)	Date	Time	Discharge (ft³/s)	Gage height (ft)
Mar. 15	0600	*849	8.06	Jul 01	0900	491	5.61
Apr. 15	2200	538	5.99	Jul 08	0830	499	5.65
Apr. 30	0700	649	6.49	Jul 20	0100	381	5.04
Jun 05	1800	340	4.87	Aug 26	1000	503	5.63
Jun 08	0600	322	4.78	Sept. 03	1930	753	6.87
Jun 20	1600	389	5.11	Sept. 14	0530	595	6.08
Jun 28	1100	318	4.74				

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	126	34	95	e39	e18	e48	144	613	77	438	18	600
2	106	32	89	e38	e18	e43	146	581	64	294	12	629
3	98	31	73	e37	e18	e37	131	547	53	185	14	685
4	96	30	72	e36	e18	e100	130	524	46	131	17	698
5	86	33	74	e35	e18	e250	119	494	197	189	e23	705
6	80	28	63	e35	e17	e270	105	452	222	226	e30	665
7	77	19	70	e34	e17	e230	104	406	251	205	e40	637
8	68	31	76	e33	e17	e210	98	353	312	433	e52	600
9	71	31	66	e32	e17	e200	95	293	292	344	e70	571
10	64	24	57	e31	e17	e210	93	250	260	284	116	538
11	64	25	69	e31	e16	e235	93	225	223	226	122	485
12	61	28	96	e30	e16	e260	109	192	186	169	104	437
13	55	90	68	e29	e16	e330	202	174	164	138	136	471
14	53	183	59	e28	e16	e450	206	167	140	128	119	534
15	53	194	60	e27	e15	e720	361	151	114	112	89	477
16	54	205	64	e27	e15	544	421	144	97	99	67	468
17	55	183	77	e26	e15	461	399	128	96	87	52	454
18	54	160	92	e25	e14	407	412	109	94	88	42	438
19	49	149	95	e25	e60	393	413	100	87	155	37	402
20	51	122	73	e24	e100	366	388	90	242	272	29	360
21	49	138	e65	e23	e135	322	330	79	256	152	22	326
22	46	123	e58	e23	e120	287	280	86	198	126	17	344
23	45	116	e53	e22	e100	226	257	88	192	102	12	384
24	43	102	e50	e21	e92	210	244	113	162	81	6.7	380
25	44	67	e47	e21	e85	211	244	131	163	64	18	390
26	39	88	e46	e20	e70	205	356	135	245	49	415	395
27	39	133	e44	e20	e62	198	379	143	291	42	372	389
28	37	157	e43	e20	e55	189	405	160	308	36	387	368
29	36	147	e42	e19	---	175	493	147	283	31	425	345
30	30	113	e41	e19	---	157	633	118	229	26	567	311
31	29	---	e40	e18	---	146	---	95	---	22	612	---
TOTAL	1858	2816	2017	848	1177	8090	7790	7288	5544	4934	4042.7	14486
MEAN	59.9	93.9	65.1	27.4	42.0	261	260	235	185	159	130	483
MAX	126	205	96	39	135	720	633	613	312	438	612	705
MIN	29	19	40	18	14	37	93	79	46	22	6.7	311
AC-FT	3690	5590	4000	1680	2330	16050	15450	14460	11000	9790	8020	28730
CFSM	.25	.40	.27	.12	.18	1.10	1.10	.99	.78	.67	.55	2.04
IN.	.29	.44	.32	.13	.18	1.27	1.22	1.14	.87	.77	.63	2.27

e Estimated.

MINNESOTA RIVER BASIN

05327000 HIGH ISLAND CREEK NEAR HENDERSON, MN—Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1974 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	71.9	63.3	37.0	15.7	21.3	162	237	152	173	125	78.0	119
MAX	298	219	111	72.5	121	547	593	506	991	989	353	592
(WY)	1986	1993	1983	1992	1984	1992	1983	1993	1993	1993	1993	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

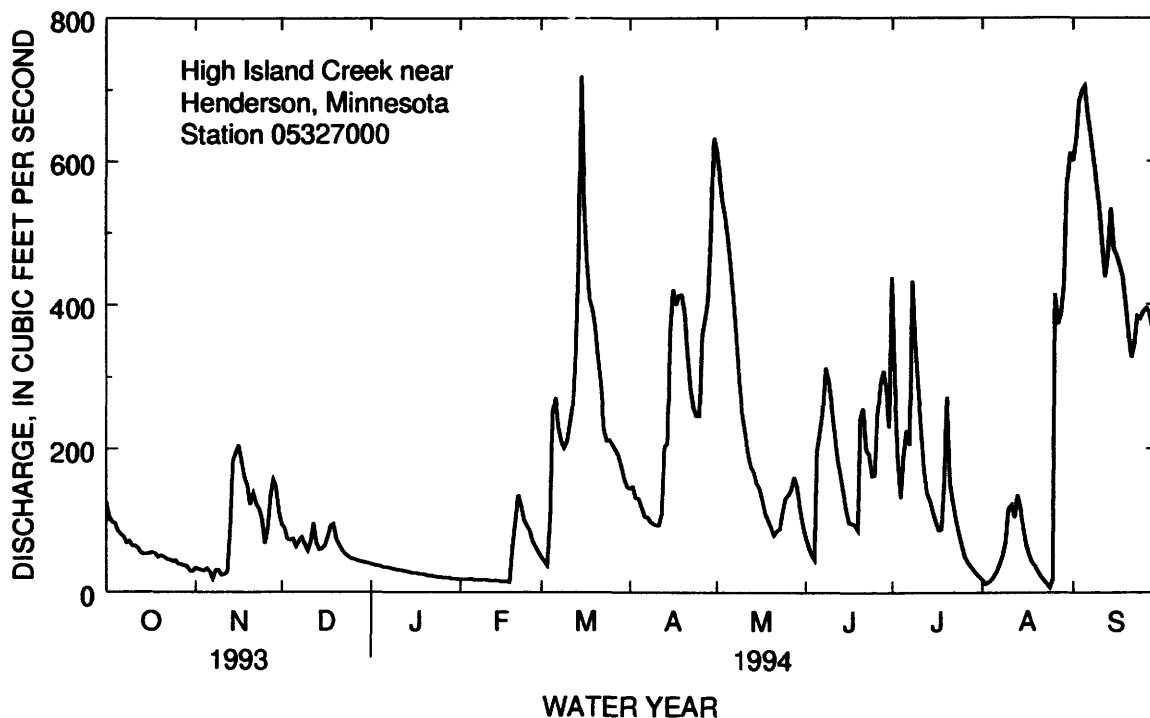
SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1974 - 1994

ANNUAL TOTAL	119664	60890.7	
ANNUAL MEAN	328	167	105
HIGHEST ANNUAL MEAN			346
LOWEST ANNUAL MEAN			9.23
HIGHEST DAILY MEAN	2190	Jun 23	720
LOWEST DAILY MEAN	19	Nov 7	6.7
ANNUAL SEVEN-DAY MINIMUM	22	Feb 27	15
INSTANTANEOUS PEAK FLOW			849
INSTANTANEOUS PEAK STAGE			8.06
INSTANTANEOUS LOW FLOW			1.1
ANNUAL RUNOFF (AC-FT)	237400	120800	75950
ANNUAL RUNOFF (CFSM)	1.38	.70	.44
ANNUAL RUNOFF (INCHES)	18.78	9.56	6.01
10 PERCENT EXCEEDS	966	417	300
50 PERCENT EXCEEDS	149	100	28
90 PERCENT EXCEEDS	24	22	1.7

a Result of freezeup.



MINNESOTA RIVER BASIN

05330000 MINNESOTA RIVER NEAR JORDAN, MN

LOCATION.--Lat 44°41'35", long 93°38'30", in NW 1/4 SW 1/4 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 upstream from Mississippi River.

DRAINAGE AREA.--16,200 mi², 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 690.00 ft above National Geodetic Vertical Datum of 1929. 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 except those for estimated daily discharges, which are fair.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9780	4480	4150	e3750	e1850	e4400	16500	21600	10200	12300	6190	6100
2	9260	4480	4590	e3650	e1800	e4150	16500	22200	9490	11900	5810	5920
3	8780	4480	4970	e3550	e1800	e4100	16400	22200	8790	11400	5540	5770
4	8420	4460	5180	e3400	e1750	e4100	16200	22000	8190	10500	5370	5760
5	7990	4520	5170	e3300	e1750	e4500	15900	21500	7980	9660	5130	5900
6	7680	4550	5100	e3200	e1750	e5600	15500	21100	9400	9210	4830	6050
7	7390	4230	4880	e3100	e1750	e8300	15000	20800	10900	9640	4580	6070
8	7110	4080	4760	e2950	e1750	e10500	14400	20400	12400	10900	4330	5790
9	6920	4250	4750	e2850	e1750	e12600	13800	20100	14000	12300	4200	5490
10	6770	4270	4670	e2800	e1750	e13900	13200	19800	14700	12700	4930	5160
11	6670	4260	4540	e2700	e1750	e15600	12600	19500	15000	12200	9860	4780
12	6620	4250	4140	e2550	e1750	e17000	12200	19000	15200	11200	13000	4540
13	6630	4470	3970	e2500	e1750	e18400	12300	18600	15000	10100	14400	5860
14	6500	4770	4330	e2400	e1750	e20000	13000	18100	14000	9280	15000	7940
15	6340	4840	4560	e2350	e1750	20000	13900	17600	13200	8810	15300	7680
16	6250	5150	4780	e2250	e1800	19400	15000	17000	12600	8690	15100	6800
17	6190	5630	5020	e2200	e1800	19000	15900	16500	12000	9140	14300	5980
18	6110	5850	5330	e2200	e1800	18700	16400	15900	11100	10000	12900	5400
19	6000	5820	5730	e2150	e1850	18200	16800	15100	10000	10500	11400	4890
20	5960	5680	5900	e2100	e2050	17700	17000	14300	9650	10700	10300	4540
21	5820	5610	5690	e2100	e2350	17400	17100	13500	11100	10600	9330	4260
22	5720	5500	5280	e2050	e2800	17200	16900	12900	12400	10500	8240	4210
23	5580	5520	4500	e2000	e3200	17100	16500	12400	12800	10800	7210	4310
24	5390	5370	e4560	e2000	e3800	17000	15800	12100	12800	11000	6420	4700
25	5230	5420	e4470	e1950	e4600	16700	15100	12100	12800	11100	5810	5690
26	5160	5270	e4330	e1950	e4750	16400	15000	12400	12700	10700	5900	6740
27	5120	4760	e4250	e1900	e4650	16300	15700	12700	12700	9860	6410	6870
28	5030	4050	e4150	e1900	e4550	16200	16800	12700	12900	8710	6620	6600
29	4940	3530	e4050	e1850	---	16200	18500	12300	13000	7790	6570	6160
30	4830	3690	e3950	e1850	---	16300	20100	11700	12700	7090	6240	5790
31	4640	---	e3850	e1850	---	16400	---	10900	---	6620	6160	---
TOTAL	200830	143240	145600	77350	66450	439350	466000	519000	359700	315900	257380	171750
MEAN	6478	4775	4697	2495	2373	14170	15530	16740	11990	10190	8303	5725
MAX	9780	5850	5900	3750	4750	20000	20100	22200	15200	12700	15300	7940
MIN	4640	3530	3850	1850	1750	4100	12200	10900	7980	6620	4200	4210
AC-FT	398300	284100	288800	153400	131800	871500	924300	1029000	713500	626600	510500	340700
CFSM	.40	.29	.29	.15	.15	.87	.96	1.03	.74	.63	.51	.35
IN.	.46	.33	.33	.18	.15	1.01	1.07	1.19	.83	.73	.59	.39

e Estimated.

MINNESOTA RIVER BASIN

05330000 MINNESOTA RIVER NEAR JORDAN, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1935 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	2051	1968	1397	846	920	5036	11440	7497	7326	5604	3160	2283
MAX	16030	7989	5216	3344	3992	21170	48210	25510	41460	38640	25660	14460
(WY)	1969	1993	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

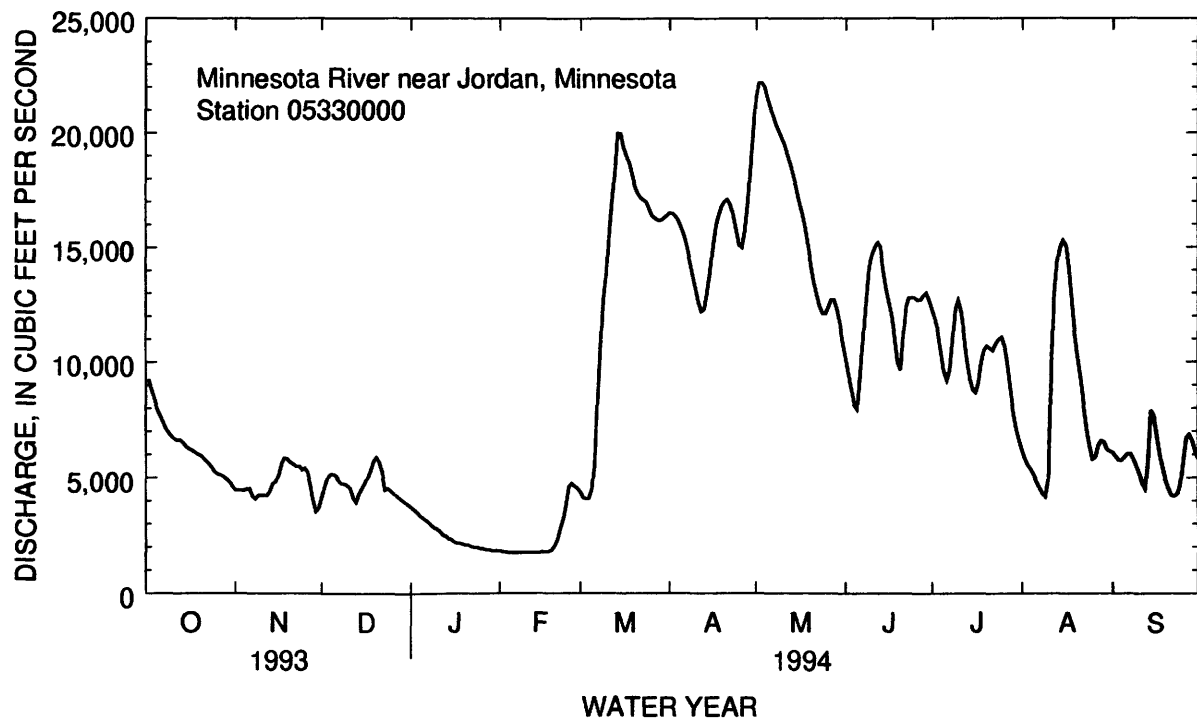
SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1935 - 1994

ANNUAL TOTAL	6095040	3162550	
ANNUAL MEAN	16700	8665	4134 ^a
HIGHEST ANNUAL MEAN			16910
LOWEST ANNUAL MEAN			687
HIGHEST DAILY MEAN	90900	Jun 25	22200
LOWEST DAILY MEAN	1480	Feb 24	1750
ANNUAL SEVEN-DAY MINIMUM	1490	Feb 19	1750
INSTANTANEOUS PEAK FLOW			22400
3 INSTANTANEOUS PEAK STAGE			23.05
INSTANTANEOUS LOW FLOW			79
ANNUAL RUNOFF (AC-FT)	12090000	6273000	2995000
ANNUAL RUNOFF (CFSM)	1.03	.53	.26
ANNUAL RUNOFF (INCHES)	14.00	7.26	3.47
10 PERCENT EXCEEDS	37100	16700	10900
50 PERCENT EXCEEDS	10900	6420	1630
90 PERCENT EXCEEDS	1510	2310	300

^a Median of annual mean discharges is 3380 ft³/s.



MINNESOTA RIVER BASIN

05330000 MINNESOTA RIVER NEAR JORDAN, MN--Continued
(National stream-quality accounting network station)

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1952, 1963-69, 1972 to current year.

REMARKS.--Letter K indicates non-ideal colony count.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

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)	TUR-BID-ITY (NTU) (00076)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML) (31625)	
OCT 26...	1130	5180	938	956	8.2	8.1	10.0	6.4	735	10.7	K7	
MAR 15...	1400	20000	509	--	7.6	--	1.0	--	745	11.8	K24	
MAY 19...	1100	15200	878	869	8.2	8.2	19.5	30	745	8.8	K13	
AUG 16...	1323	15000	702	679	8.0	7.9	20.0	40	747	7.8	--	
DATE		STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	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)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY WAT DIS TOT IT FIELD (MG/L AS CACO3) (39086)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)	CAR-BONATE WATER DIS IT FIELD (MG/L AS CO3) (00452)	BICAR-BONATE WATER DIS IT FIELD (MG/L AS HCO3) (00453)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)
OCT 26...	K21	120	120	51	22	4.7	308	307	0	376	190	23
MAR 15...	170	--	--	--	--	--	162	--	0	198	--	--
MAY 19...	20	90	90	49	19	4.9	218	223	0	266	220	19
AUG 16...	--	84	84	30	12	4.0	--	227	--	--	100	15
DATE		FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA + DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN,AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	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)	SEDI-MENT, SUS-PENDED (MG/L) (80154)
OCT 26...	0.40	16	16	636	0.010	4.20	0.020	0.70	0.040	<0.010	0.010	96
MAR 15...	--	--	--	--	0.110	3.60	0.420	1.9	0.440	0.210	0.210	222
MAY 19...	0.30	3.9	3.9	584	0.020	3.70	0.010	1.3	0.130	<0.010	<0.010	169
AUG 16...	0.30	21	21	453	0.020	5.70	0.030	1.3	0.320	0.140	0.120	63

MISSISSIPPI RIVER MAIN STEM

05331000 MISSISSIPPI RIVER AT ST. PAUL, MN

LOCATION.--Lat 44°56'40", long 93°05'20", in SE 1/4 NE 1/4 sec.6, T.28 N., R.22 W., Ramsey County, Hydrologic Unit 07010206, on left bank in St. Paul, 300 ft upstream from Robert Street Bridge, 6 mi downstream from Minnesota River, and at mile 839.3 upstream from Ohio River.

DRAINAGE AREA.--36,800 mi², 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 mean sea level. Prior to Mar. 18, 1925, nonrecording gage at several sites within 300 ft of present site at present datum. Mar. 18, 1925, to Mar. 10, 1933, water-stage recorder and Mar. 11, 1933, to Sept. 14, 1939, nonrecording gage, at present site and datum. Since September 1938, auxiliary water-stage recorder 5.6 mi downstream.

REMARKS.--Records good. Slight regulation except during extreme floods by reservoirs on headwaters and by power plants. Beginning July 20, 1938, sewage from Minneapolis and St. Paul, which formerly entered above station, was diverted to a sewage-disposal plant, thence to river below station. Figures do not include this diversion.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	19700	12400	10700	11500	8200	11800	36200	52800	22400	27200	15300	12200
2	19100	12400	11800	12600	8260	11500	36000	54900	21300	26700	14600	12400
3	18500	12400	12700	12000	7990	11000	36100	56900	19600	25400	14100	11700
4	17500	12600	13400	11400	8070	10800	36000	58300	18400	24300	13300	11500
5	17200	12600	14000	10900	7690	11000	35600	58900	17200	26100	13600	12000
6	16400	12900	14100	11100	7920	11900	34900	58400	17300	23700	13700	11400
7	16200	13200	14100	10200	7740	13300	34200	57600	18700	22400	11800	12100
8	15800	12800	13100	10800	7410	16400	34000	56100	20100	22900	12400	11900
9	15800	12200	13500	10100	7410	19000	33000	54100	21200	27300	12500	11300
10	15300	12000	13600	9860	7360	21800	31500	52300	22800	28200	12800	11200
11	14800	12500	13300	10200	7730	23600	30500	50400	22800	28000	13400	10600
12	14700	12800	12800	10600	7740	25600	30500	48200	23100	27500	18400	10100
13	15100	12600	11800	9410	7740	27400	31000	46200	22600	26600	21400	9700
14	14600	13500	12300	9640	8000	28100	30700	44300	22200	25200	22800	11400
15	14700	15000	12900	9400	7610	29800	32200	42500	21700	23900	23400	13300
16	14300	15200	13300	8950	7720	30900	34800	41400	20300	22600	22900	13700
17	14600	16600	13600	9440	7470	32600	37100	39600	20400	22200	22300	13200
18	14200	16900	14200	10500	7970	33400	39200	38200	19300	22000	21300	12500
19	14100	16800	14500	9100	8030	34400	40700	36800	19800	22300	20000	12100
20	13900	17100	14800	7710	9020	34500	41600	35200	17900	22300	17500	11800
21	14100	16600	15100	7920	10500	34200	42100	33400	18700	24000	16900	11500
22	14000	16300	13700	8760	9430	34800	42300	32000	22300	25400	15500	11600
23	14000	15800	13100	9220	9890	35800	41900	30100	24400	23900	14100	12500
24	13900	15900	11900	9050	12200	37100	41200	28400	25800	24300	13100	12100
25	13600	13600	10300	9020	12400	36400	42200	28000	26800	23600	12500	12700
26	13800	13900	10700	8840	12300	37200	43600	27500	27300	23000	11300	14000
27	13800	12800	9440	8490	13000	37600	43900	27100	27400	22100	12200	15700
28	13800	11000	10400	8290	12400	37900	45800	26600	27500	20500	12800	15000
29	13200	10900	10500	8300	---	37800	48500	25700	27300	19100	12500	14000
30	13500	10300	10500	8410	---	37400	50500	24800	27500	17600	13300	14100
31	13100	---	10800	8030	---	37000	---	23700	---	16000	12400	---
TOTAL	467300	411600	390940	299740	249200	842000	1137800	1290400	664100	736300	484100	369300
MEAN	15070	13720	12610	9669	8900	27160	37930	41630	22140	23750	15620	12310
MAX	19700	17100	15100	12600	13000	37900	50500	58900	27500	28200	23400	15700
MIN	13100	10300	9440	7710	7360	10800	30500	23700	17200	16000	11300	9700
AC-FT	926900	816400	775400	594500	494300	1670000	2257000	2560000	1317000	1460000	960200	732500
CFSM	.41	.37	.34	.26	.24	.74	1.03	1.13	.60	.65	.42	.33
IN.	.47	.42	.40	.30	.25	.85	1.15	1.30	.67	.74	.49	.37

e Estimated.

MISSISSIPPI RIVER MAIN STEM

05331000 MISSISSIPPI RIVER AT ST. PAUL, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1892 - 1994, BY WATER YEAR (WY)

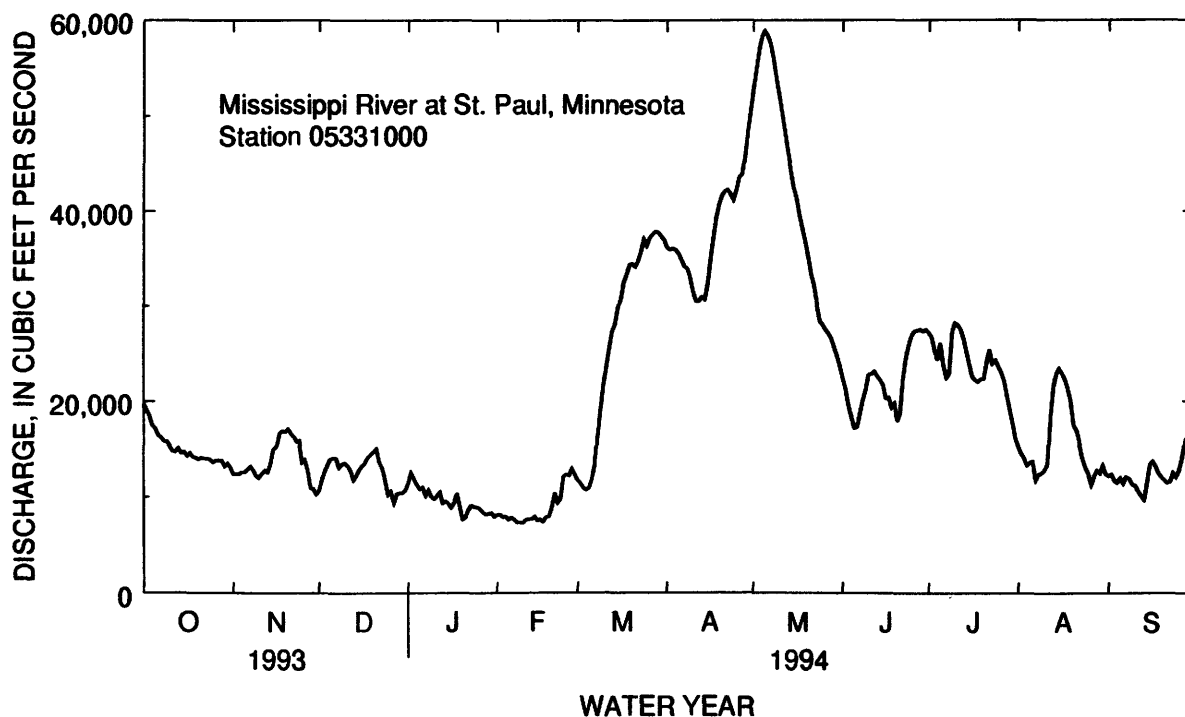
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	8327	7535	5432	4436	4392	10860	24960	20300	17890	14050	8687	8056
MAX	38210	27660	16080	11500	14700	43240	91610	66470	57170	73590	42550	34380
(WY)	1987	1972	1983	1983	1966	1983	1969	1986	1993	1993	1993	1986
MIN	1289	1348	1277	1097	1300	1757	3421	3085	1980	1272	864	1143
(WY)	1937	1937	1935	1935	1895	1940	1895	1934	1934	1934	1934	1934

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1892 - 1994

ANNUAL TOTAL	10802610	7342780	
ANNUAL MEAN	29600	20120	11290
HIGHEST ANNUAL MEAN			29580
LOWEST ANNUAL MEAN			1935
HIGHEST DAILY MEAN	104000	Jun 26	58900
LOWEST DAILY MEAN	4350	Jan 30	7360
ANNUAL SEVEN-DAY MINIMUM	4810	Feb 24	7590
INSTANTANEOUS PEAK FLOW			59100
INSTANTANEOUS PEAK STAGE			11.93
ANNUAL RUNOFF (AC-FT)	21430000	14560000	8183000
ANNUAL RUNOFF (CFSM)	.80	.55	.31
ANNUAL RUNOFF (INCHES)	10.92	7.42	4.17
10 PERCENT EXCEEDS	62100	37100	26700
50 PERCENT EXCEEDS	20900	14800	6900
90 PERCENT EXCEEDS	5470	9420	2660



MISSISSIPPI RIVER MAIN STEM

05331570 MISSISSIPPI RIVER AT NININGER, MN
(National stream-quality accounting network station)

WATER-QUALITY RECORDS

LOCATION.--Lat 44°46'22", long 92°54'07", NE 1/4 NE 1/4 sec. 18, T. 115 N., R. 17 W., Dakota County, Hydrologic Unit 07010206, on right bank at the end of Jason Avenue, and at mile 817.8 upstream from Ohio River.

DRAINAGE AREA.--37,000 mi² (95,000 km²), approximately.

PERIOD OF RECORD.--January 1977 to current year.

REMARKS.--Water-discharge computed on the basis of discharge for Mississippi River at St. Paul (station 05331000) adjusted for inflow and travel time. Letter K indicates non-ideal colony count.

WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DATE	TIME	DIS- CHARGE, IN CUBIC FEET PER SECOND (00060)	SPE- CIFIC CON- DUCT- ANCE LAB (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)	OXYGEN, DIS- SOLVED (MG/L) (00300)	COLI-STREP- FORM, TOCOC- CI FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	FECAL, KF AGAR (COLS. PER 100 ML) (31673)
OCT												
20...	1230	14700	656	672	8.5	8.2	11.5	3.7	743	11.1	48	K12
MAR												
18...	1300	33400	485	503	7.8	7.7	2.0	9.0	735	12.8	58	130
MAY												
19...	1130	37500	626	623	8.2	8.1	19.0	14	752	9.5	K17	K16
AUG												
25...	1200	13700	635	613	8.0	8.2	23.5	28	743	7.3	K42	180

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)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)	ALKA- LITY LAB (MG/L AS CACO3) (90410)	CAR- BONATE WATER DIS IT FIELD MG/L AS CO3 (00452)	BICAR- BONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)
OCT												
20...	81	32	18	3.1	239	243	11	292	86	21	0.30	12
MAR												
18...	61	20	10	4.5	221	174	0	265	57	15	0.20	13
MAY												
19...	66	30	14	3.7	185	191	0	226	110	18	0.20	4.3
AUG												
25...	74	28	17	4.5	196	208	0	239	93	20	0.30	16

MISSISSIPPI RIVER MAIN STEM

05331570 MISSISSIPPI RIVER AT NININGER, MN--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DATE	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	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)	SEDI- MENT, SUS- PENDEED (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)	ALUM- INUM, DIS- SOLVED (UG/L AS AL) (01106)
OCT 20...	359	0.020	2.30	0.060	0.90	0.190	0.100	0.100	61	79	<10
MAR 18...	317	0.090	2.90	0.330	1.2	0.220	0.140	0.140	52	100	10
MAY 19...	373	0.020	2.10	0.010	1.3	0.140	0.020	0.020	82	80	<10
AUG 25...	406	0.050	2.20	0.040	0.50	0.150	0.180	0.250	71	99	<10

DATE	BARIUM, DIS- SOLVED (UG/L AS BA) (01005)	COBALT, DIS- SOLVED (UG/L AS CO) (01035)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	LITHIUM DIS- SOLVED (UG/L AS LI) (01130)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, DIS- SOLVED (UG/L AS AG) (01075)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)	VANA- DIUM, DIS- SOLVED (UG/L AS V) (01085)
OCT 20...	61	<3	28	19	21	10	2	1	<1.0	230	<6
MAR 18...	48	<3	56	13	49	<10	2	<1	<1.0	160	<6
MAY 19...	59	<3	26	19	15	<10	2	1	<1.0	210	<6
AUG 25...	65	<3	5	18	21	<10	2	1	<1.0	230	<6

ST. CROIX RIVER BASIN

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 900 ft downstream from abandoned powerplant dam, 1.8 mi south of Sandstone.

DRAINAGE AREA.--863 mi².

PERIOD OF RECORD.--October 1967 to current year.

GAGE.--Water-stage recorder and crest-stage gage. Datum of gage is 931.50 ft above mean 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 ft³/s.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 3,600 ft³/s and maximum (*)

Date	Time	Discharge (ft³/s)	Gage height (ft)	Date	Time	Discharge (ft³/s)	Gage height (ft)
April 17	0530	*5,990	*9.08	April 28	0400	5,900	9.02

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	234	266	316	e250	e215	e203	1010	4640	655	1090	478	205
2	232	266	325	e248	e213	e204	1430	4190	584	1290	500	195
3	226	266	317	e245	e211	e206	1570	3500	524	1030	423	186
4	222	271	312	e242	e209	e207	1550	2900	470	852	396	186
5	226	290	310	e240	e206	e208	1350	2410	443	748	369	200
6	230	295	301	e240	e204	e209	1310	2030	426	680	331	203
7	230	277	253	e240	e202	e210	1280	1750	419	611	354	195
8	230	307	302	e240	e201	e211	1310	1530	384	586	324	188
9	226	292	298	e240	e200	e213	1520	1330	348	575	286	182
10	220	286	296	e240	e200	e218	1770	1180	320	536	286	175
11	222	285	291	e240	e200	e220	1860	1060	307	495	273	165
12	222	281	284	e240	e200	e230	1910	952	315	459	254	159
13	222	329	290	e239	e200	e250	1910	865	309	414	250	157
14	222	360	286	e238	e200	e321	1870	812	289	379	233	182
15	225	372	295	e235	e200	e395	2310	910	291	354	214	838
16	230	379	303	e232	e200	e656	4700	1070	346	328	205	2040
17	230	381	e305	e230	e200	734	5830	997	772	309	199	1600
18	230	373	e300	e230	e200	656	5110	904	908	287	190	1270
19	236	380	e300	e230	e200	576	4410	820	751	283	193	1090
20	242	334	e295	e228	e200	553	3680	751	910	360	195	921
21	253	365	281	e225	e200	585	2970	686	1440	393	191	810
22	268	359	e279	e225	e200	820	2390	625	1220	485	185	854
23	291	304	e275	e224	e200	1200	1980	578	1030	549	187	955
24	295	300	e270	e223	e200	1170	1690	543	870	516	181	972
25	292	257	e265	e222	e200	1070	1510	536	749	444	182	917
26	289	293	e260	e221	e200	1140	2310	519	966	387	213	850
27	287	302	e256	e220	e200	1020	4980	484	1210	351	207	754
28	292	301	e252	e219	e202	976	5680	453	1100	325	246	651
29	293	322	e250	e218	---	914	5130	444	1150	298	237	588
30	281	319	e250	e217	---	834	4740	434	1120	277	230	534
31	270	---	e250	e216	---	856	---	524	---	273	222	---
TOTAL	7668	9412	8867	7197	5663	17265	81070	40427	20626	15964	8234	18222
MEAN	247	314	286	232	202	557	2702	1304	688	515	266	607
MAX	295	381	325	250	215	1200	5830	4640	1440	1290	500	2040
MIN	220	257	250	216	200	203	1010	434	289	273	181	157
AC-FT	15210	18670	17590	14280	11230	34250	160800	80190	40910	31660	16330	36140
CFSM	.29	.36	.33	.27	.23	.65	3.13	1.51	.80	.60	.31	.70
IN.	.33	.41	.38	.31	.24	.74	3.49	1.74	.89	.69	.35	.79

e Estimated.

ST. CROIX RIVER BASIN

05336700 KETTLE RIVER BELOW SANDSTONE, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1968 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	750	594	277	178	171	519	2318	1284	917	673	376	588
MAX	2652	2414	652	411	417	1742	4653	3168	2799	2869	2094	3065
(WY)	1969	1972	1984	1984	1984	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

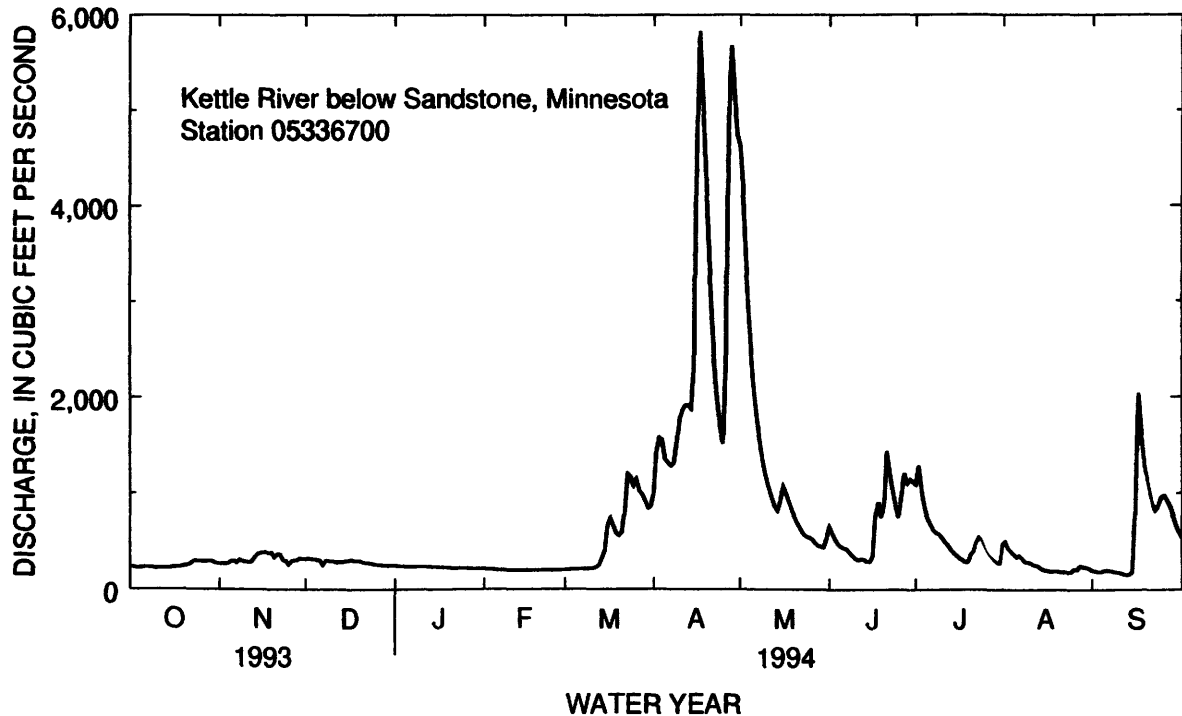
SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1968 - 1994

ANNUAL TOTAL	298528	240615	
ANNUAL MEAN	818	659	720
HIGHEST ANNUAL MEAN			1390
LOWEST ANNUAL MEAN			254
HIGHEST DAILY MEAN	7910	Jun 25	5830
LOWEST DAILY MEAN	165	Feb 14	157
ANNUAL SEVEN-DAY MINIMUM	165	Feb 14	173
INSTANTANEOUS PEAK FLOW			5990
INSTANTANEOUS PEAK STAGE			9.08
INSTANTANEOUS LOW FLOW			152
ANNUAL RUNOFF (AC-FT)	592100	477300	521800
ANNUAL RUNOFF (CFSM)	.95	.76	.83
ANNUAL RUNOFF (INCHES)	12.87	10.37	11.34
10 PERCENT EXCEEDS	2090	1380	1780
50 PERCENT EXCEEDS	305	300	286
90 PERCENT EXCEEDS	185	200	126

a Occurred Nov.11,12,1977, result of freezeup.



ST. CROIX RIVER BASIN

05337400 KNIFE RIVER NEAR MORA, MN

LOCATION.--Lat 45°55'12", long 93°18'26", in SW $\frac{1}{4}$ SW $\frac{1}{4}$ 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 mi².

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 mean sea level (Kanabec County bench mark).

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

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 500 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Apr. 16	1600	*682	*4.70	Apr. 27	0430	514	4.33

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16	14	26	e22	e16	e15	166	392	19	25	7.4	5.8
2	14	14	25	e22	e15	e16	215	363	14	20	6.3	4.8
3	12	15	24	e21	e15	e16	244	307	11	16	20	4.5
4	14	23	24	e20	e15	17	248	269	9.4	15	22	5.4
5	11	35	24	e20	e15	18	225	223	13	16	13	7.3
6	13	27	e25	e19	e15	20	203	186	14	19	9.6	7.6
7	17	28	e24	e19	e15	21	185	162	14	26	8.4	6.9
8	16	25	e24	e19	e15	e23	180	142	9.0	39	9.7	6.3
9	12	24	23	e18	e15	e25	197	131	6.0	38	6.9	6.2
10	9.0	24	e23	e18	e15	e27	214	112	5.3	31	6.6	6.0
11	8.8	23	e22	e18	e15	e28	219	105	5.1	28	6.6	5.2
12	10	24	e22	e18	e15	e29	213	87	6.0	25	6.3	9.2
13	9.0	40	21	e17	e15	33	200	72	5.8	21	7.2	19
14	8.9	43	24	e17	e15	42	183	84	5.4	17	6.3	37
15	9.8	46	24	e17	e15	61	306	92	7.2	15	5.3	50
16	11	48	23	e17	e15	83	627	83	8.7	21	4.6	44
17	10	49	23	e17	16	96	554	73	38	43	4.8	38
18	10	49	25	e16	16	98	424	65	54	35	5.7	30
19	12	47	25	e16	e16	96	320	58	41	38	6.3	23
20	14	44	25	e16	e16	96	248	51	51	34	8.2	18
21	16	44	e25	e16	16	105	206	46	47	34	6.1	17
22	16	43	e25	e16	e16	128	174	50	41	36	5.2	25
23	16	39	e25	e16	e16	180	143	40	38	29	4.9	20
24	17	37	e25	e16	e16	202	143	38	33	23	5.4	16
25	18	e36	e24	e16	e15	188	148	37	33	18	6.6	17
26	17	e34	e24	e16	e15	183	219	30	45	15	13	15
27	16	e32	e23	e16	e15	168	414	23	40	13	11	9.9
28	15	e31	e23	e16	e15	156	488	21	37	9.8	9.1	8.6
29	18	e30	e23	e16	---	148	430	24	36	8.7	6.9	7.8
30	16	e29	e22	e16	---	141	387	23	28	7.2	7.4	8.6
31	14	---	e22	e16	---	147	---	24	---	6.8	6.6	---
TOTAL	416.5	997	737	543	429	2606	8123	3413	714.9	722.5	253.4	479.1
MEAN	13.4	33.2	23.8	17.5	15.3	84.1	271	110	23.8	23.3	8.17	16.0
MAX	18	49	26	22	16	202	627	392	54	43	22	50
MIN	8.8	14	21	16	15	15	143	21	5.1	6.8	4.6	4.5
AC-FT	826	1980	1460	1080	851	5170	16110	6770	1420	1430	503	950
CFSM	.13	.33	.23	.17	.15	.82	2.65	1.08	.23	.23	.08	.16
IN.	.15	.36	.27	.20	.16	.95	2.96	1.24	.26	.26	.09	.17

e Estimated.

ST. CROIX RIVER BASIN

05337400 KNIFE RIVER NEAR MORA, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1974 - 1994, BY WATER YEAR (WY)

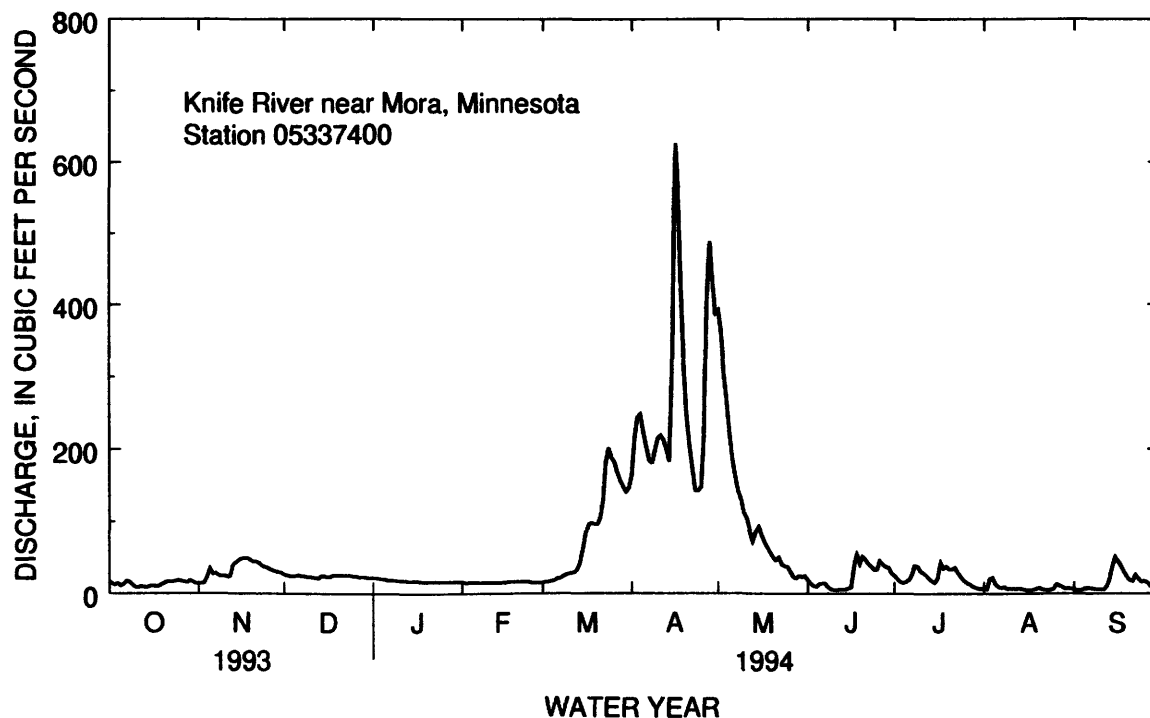
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	50.9	41.1	25.3	13.1	13.5	67.5	218	107	64.0	57.9	24.1	39.5
MAX	242	206	109	28.8	48.9	238	472	338	233	171	120	257
(WY)	1985	1978	1978	1984	1984	1983	1986	1986	1984	1975	1986	1986
MIN	1.84	1.38	1.17	1.14	1.16	14.3	30.5	12.5	3.06	.98	1.86	2.15
(WY)	1977	1990	1990	1977	1990	1975	1977	1980	1988	1988	1976	1987

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1974 - 1994

ANNUAL TOTAL	18454.4	19434.4	
ANNUAL MEAN	50.6	53.2	60.3
HIGHEST ANNUAL MEAN			135
LOWEST ANNUAL MEAN			16.8
HIGHEST DAILY MEAN	429	627	1610
LOWEST DAILY MEAN	7.4	4.5	.76
ANNUAL SEVEN-DAY MINIMUM	8.9	5.7	.86
INSTANTANEOUS PEAK FLOW		682	1840
INSTANTANEOUS PEAK STAGE		4.70	6.69
INSTANTANEOUS LOW FLOW		4.0	.74 ^a
ANNUAL RUNOFF (AC-FT)	36600	38550	43700
ANNUAL RUNOFF (CFSM)	.50	.52	.59
ANNUAL RUNOFF (INCHES)	6.73	7.09	8.04
10 PERCENT EXCEEDS	142	170	145
50 PERCENT EXCEEDS	24	21	21
90 PERCENT EXCEEDS	10	7.2	4.6

^a Occurred July 6,7,28,29, 1988.

ST. CROIX RIVER BASIN
05337400 KNIFE RIVER NEAR MORA, MN--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1989-90, 1992-94.

REMARKS.--Letter K indicates non-ideal colony count.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

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)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)
FEB 28...	1300	21	227	7.5	0.0	12.8	K9

DATE	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)
FEB 28...	K3	<0.010	0.290	0.230	0.060	0.020

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ST. CROIX RIVER BASIN

05338500 SNAKE RIVER NEAR PINE CITY, MN

LOCATION.--Lat 45°50'30", long 92°56'00", in SE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 26, T. 39 N., R. 21 W., Pine County, Hydrologic Unit 07030004, on left bank at site of former powerplant and dam, 0.5 mi downstream from Cross Lake and 1.5 mi northeast of Pine City.

DRAINAGE AREA.--958 mi².

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 mean 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.

EXTREMES OUTSIDE PERIOD OF RECORD.--A discharge measurement of 12,500 ft³/s was made May 9, 1950.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	226	190	270	e180	e130	e130	1340	3310	251	309	373	163
2	195	190	283	e175	e128	e145	1330	3480	236	257	321	154
3	191	190	270	e172	e128	e170	1380	3520	225	240	315	143
4	176	197	262	e171	e128	192	1480	3450	203	245	322	141
5	156	220	260	e170	e128	201	1570	3240	193	262	341	162
6	164	226	247	e170	e127	221	1620	2950	191	253	338	156
7	151	203	184	e170	e126	250	1630	2620	143	274	340	148
8	170	247	249	e170	e125	269	1610	2300	140	371	329	145
9	185	229	243	e172	e124	300	1630	1960	146	436	294	144
10	179	221	240	e174	e124	330	1570	1650	145	463	285	144
11	177	220	240	e170	e123	341	1600	1430	141	493	275	145
12	164	215	230	e168	e122	353	1630	1190	133	469	249	178
13	154	282	238	e164	e122	364	1710	1020	125	402	240	285
14	156	332	232	e160	e120	411	1720	924	114	364	220	374
15	150	353	245	e157	e119	505	1900	842	127	321	190	512
16	159	364	255	e155	e120	621	2080	769	125	314	177	630
17	162	366	277	e154	e119	730	2350	732	148	459	162	685
18	169	354	e277	e152	e116	828	2780	714	175	625	160	699
19	181	366	e270	e150	e114	881	3150	659	225	896	177	671
20	195	291	e260	e149	e115	924	3370	598	351	1530	161	612
21	218	341	e251	e148	e116	975	3430	539	406	1660	153	555
22	194	332	e241	e145	e117	1070	3310	500	449	1590	143	527
23	216	245	e242	e141	e118	1250	3020	453	477	1460	138	475
24	220	240	e225	e141	e118	1400	2640	425	469	1370	146	470
25	217	184	e219	e144	e119	1520	2290	396	454	1220	154	451
26	213	234	e210	e142	e116	1620	2110	360	468	1040	191	432
27	211	243	e210	e141	e116	1650	2180	348	420	874	196	420
28	221	240	e210	e140	e120	1610	2350	331	410	726	196	379
29	223	271	e208	e138	---	1540	2710	331	373	605	175	329
30	209	271	e190	e136	---	1460	3030	308	326	506	173	298
31	195	---	e185	e132	---	1380	---	307	---	435	172	---
TOTAL	5797	7857	7423	4851	3398	23641	64520	41656	7789	20469	7106	10627
MEAN	187	262	239	156	121	763	2151	1344	260	660	229	354
MAX	226	366	283	180	130	1650	3430	3520	477	1660	373	699
MIN	150	184	184	132	114	130	1330	307	114	240	138	141
AC-FT	11500	15580	14720	9620	6740	46890	128000	82620	15450	40600	14090	21080
CFSM	.20	.27	.25	.16	.13	.80	2.24	1.40	.27	.69	.24	.37
IN.	.23	.31	.29	.19	.13	.92	2.51	1.62	.30	.79	.28	.41

e Estimated.

ST. CROIX RIVER BASIN

05338500 SNAKE RIVER NEAR PINE CITY, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1913 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	405	399	208	126	124	449	1980	1166	857	748	322	304
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	206	193	100	34.9	37.8
(WY)	1977	1977	1977	1977	1977	1965	1959	1977	1992	1961	1976	1976

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

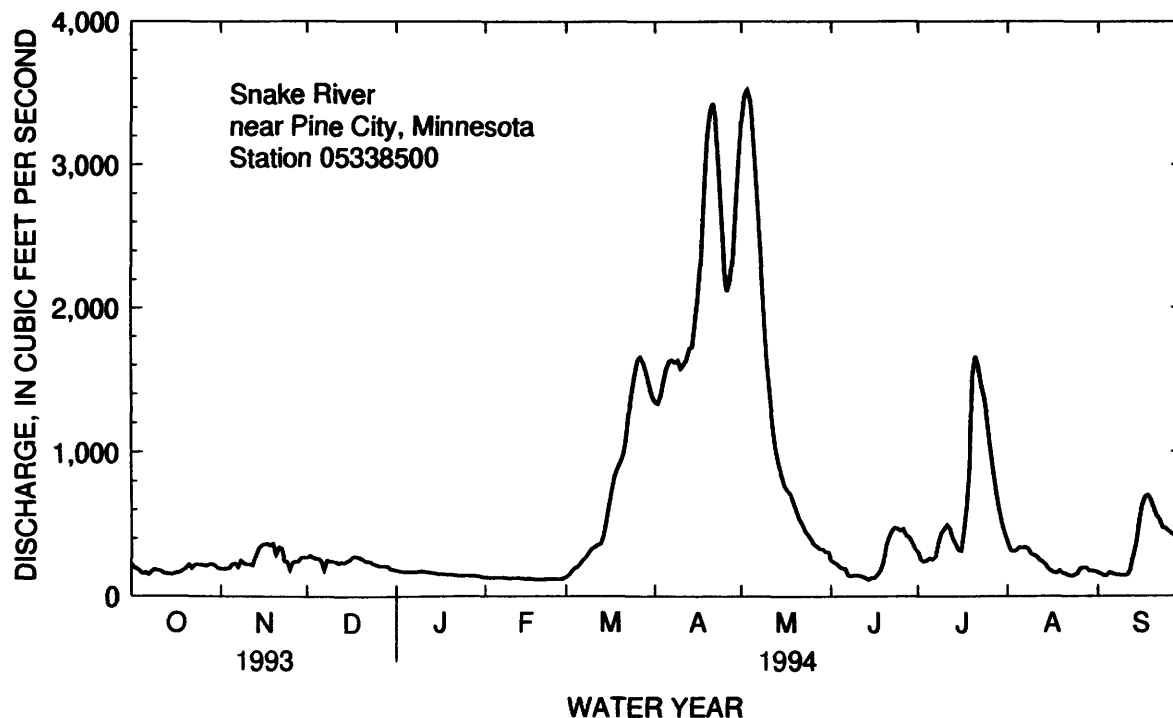
FOR 1994 WATER YEAR

WATER YEARS 1913 - 1994

ANNUAL TOTAL	189777		205134									
ANNUAL MEAN	520		562							586 ^a		
HIGHEST ANNUAL MEAN										1223		1972
LOWEST ANNUAL MEAN										177		1959
HIGHEST DAILY MEAN	2310	Jun 29		3520	May 3					14200		Jul 27 1972
LOWEST DAILY MEAN	88	Feb 26		114	Feb 19					26		Aug 29 1976
ANNUAL SEVEN-DAY MINIMUM	89	Feb 24		116	Feb 18					28		Jan 21 1977
INSTANTANEOUS PEAK FLOW				3520	May 2-3					14300		Jul 27 1972
INSTANTANEOUS PEAK STAGE				6.17	May 2-3					10.38		Jul 27 1972
INSTANTANEOUS LOW FLOW				99	Jun 14					5.5 ^b		Oct 1 1964
ANNUAL RUNOFF (AC-FT)	376400			406900						424600		
ANNUAL RUNOFF (CFSM)	.54			.59						.61		
ANNUAL RUNOFF (INCHES)	7.37			7.97						8.31		
10 PERCENT EXCEEDS	1470			1610						1450		
50 PERCENT EXCEEDS	251			247						216		
90 PERCENT EXCEEDS	105			137						73		

a Median of annual mean discharges is 528 ft³/s.

b Result of dam rehabilitation.



ST. CROIX RIVER BASIN

05338500 SNAKE RIVER NEAR PINE CITY, MN--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1963, 1965, 1967-68, 1975-83, 1985, 1992, 1993, 1994.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

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)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)
MAR 04...	1305	191	284	7.4	2.0	9.6	34

DATE	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)
MAR 04...	40	<0.010	0.460	0.170	0.050	0.020

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ST. CROIX RIVER BASIN

05340500 ST. CROIX RIVER AT ST. CROIX FALLS, WI

LOCATION.--Lat 45°24'25", long 92°38'49", in SW 1/4 NW 1/4 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 powerplant of Northern States Power Co., in St. Croix Falls, and at mile 52.2.

DRAINAGE AREA.--6,240 mi².

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 mean 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 Powerplant. February 1940 to Sept. 30, 1979, water-stage recorder at site 300 ft downstream at same datum.

REMARKS.--No estimated daily discharges. Records good. Diurnal fluctuation caused by St. Croix Falls Powerplant 1,500 ft upstream. Data-collection platform at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3170	2990	2580	2660	2470	3180	6770	20800	4120	4460	3240	2440
2	2710	3270	3230	2860	2500	2940	6950	20200	4450	4230	3090	2650
3	2730	3220	3420	2730	2500	2410	7730	19400	4130	4580	3920	2360
4	2490	3220	4180	2720	2910	3520	8140	17900	3660	4640	3730	2550
5	2850	3420	4210	2770	2600	3070	8270	15700	3360	4360	3750	2430
6	2550	3560	4250	2640	2490	3340	8020	13900	3500	3890	3670	2540
7	2820	3320	3930	2780	2990	3720	7760	12300	3290	4120	3250	2760
8	2610	3390	3550	2800	2210	3710	7490	10800	2690	4580	3210	2520
9	2780	3440	3380	2860	2500	3660	7820	9660	2590	4930	2870	2520
10	2570	3340	3520	2700	2780	3840	8230	8620	2990	5220	3230	2030
11	2730	3370	3110	2770	2520	3830	8680	8040	2440	5130	2950	2080
12	3360	3220	2960	2650	2410	3760	9020	7210	2320	4320	3040	2810
13	2750	3960	3280	2760	2470	3740	9300	6200	2830	3940	2510	2870
14	1890	4740	3450	2700	2380	3850	9290	6190	2600	3440	2520	3920
15	2800	4990	3480	2830	2380	4530	9860	6200	2590	3180	2170	5310
16	2760	5060	3870	2720	2420	5020	12100	6430	2500	3140	2410	9160
17	2790	4980	4200	2550	2450	5550	15900	6540	2920	2890	2330	13600
18	2770	3790	3980	2740	2630	5710	18500	6310	3770	2920	2200	15600
19	2770	5230	3800	2700	3120	5730	18600	6220	5440	3620	2370	15000
20	3210	5140	3740	2520	3090	5090	17200	5430	5430	4200	2310	12700
21	3110	4590	3390	2740	3400	5830	15100	5330	6020	6850	2020	11300
22	3050	4670	3190	2490	3500	6710	13300	4770	6300	9240	2270	10900
23	3190	4270	2960	2030	3440	6990	11800	4470	5460	8180	2330	10100
24	3230	3910	2490	2790	3660	7410	10700	4200	4960	7070	2320	9600
25	3160	3970	2700	2540	3520	7470	9940	3930	4390	6260	2280	8820
26	3080	2850	2510	2570	3340	7710	10000	4170	4010	5610	2240	8050
27	3100	2180	2330	2630	3270	7850	13100	3670	4030	4350	2590	7440
28	3280	2410	2390	2710	3130	7320	16700	3490	4420	3980	2610	7130
29	3120	3070	2350	2760	---	7210	20100	3240	4170	3800	3130	6700
30	3310	3080	2700	2380	---	7010	21200	3730	4410	3060	3050	5810
31	3260	---	2860	2530	---	6910	---	3480	---	3090	2680	---
TOTAL	90000	112650	101990	82630	79080	158620	347570	258530	115790	143280	86290	193700
MEAN	2903	3755	3290	2665	2824	5117	11590	8340	3860	4622	2784	6457
MAX	3360	5230	4250	2860	3660	7850	21200	20800	6300	9240	3920	15600
MIN	1890	2180	2330	2030	2210	2410	6770	3240	2320	2890	2020	2030
CFSM	.47	.60	.53	.43	.45	.82	1.86	1.34	.62	.74	.45	1.03
IN.	.54	.67	.61	.49	.47	.95	2.07	1.54	.69	.85	.51	1.15

ST. CROIX RIVER BASIN

05340500 ST. CROIX RIVER AT ST. CROIX FALLS, WI--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1902 - 1994, BY WATER YEAR (WY)

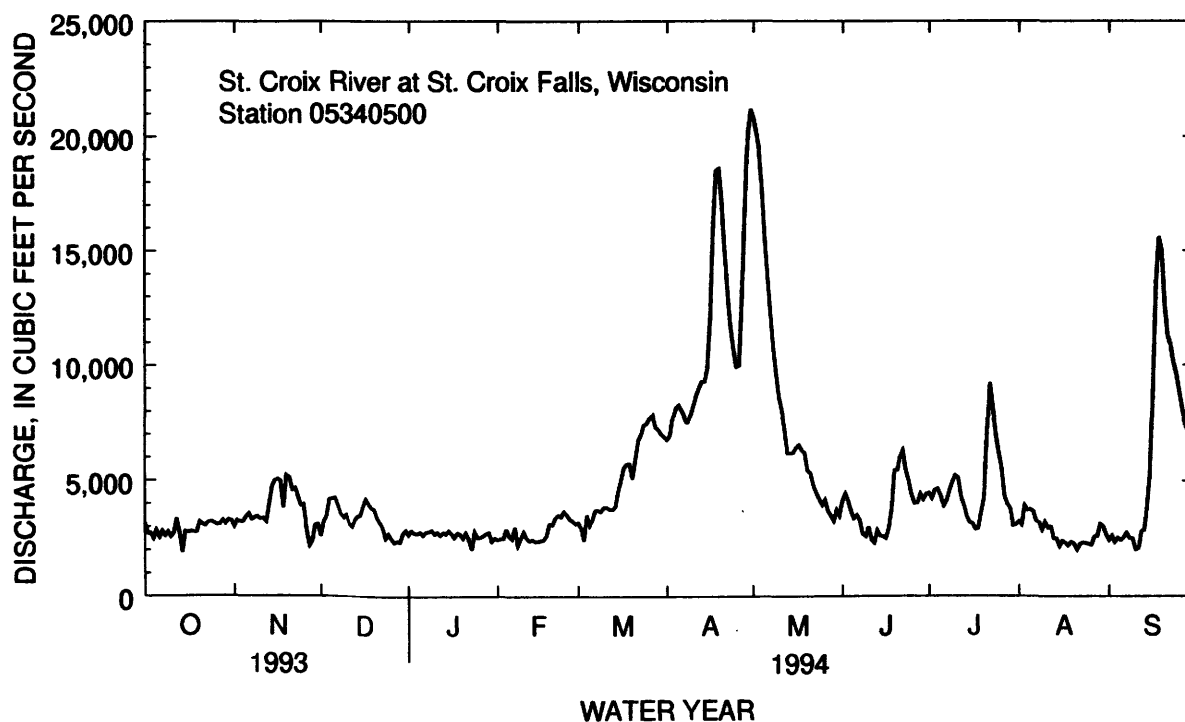
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	3643	3406	2505	2121	2087	4171	10120	7454	5720	4114	2799	3378
MAX	14270	11910	5821	4279	6021	14420	22320	21840	19510	17260	9777	14590
(WY)	1969	1972	1984	1984	1984	1945	1952	1950	1944	1952	1955	1941
MIN	1380	1342	1287	1157	1257	1538	2212	2430	1481	1014	839	1152
(WY)	1933	1911	1911	1911	1913	1912	1902	1934	1934	1934	1934	1933

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1902 - 1994

ANNUAL TOTAL	1824150	1770130	4301	
ANNUAL MEAN	4998	4850	8569	1986
HIGHEST ANNUAL MEAN			1754	1934
LOWEST ANNUAL MEAN			53900	May 8 1950
HIGHEST DAILY MEAN	19700	Jun 26	21200	Apr 30
LOWEST DAILY MEAN	1890	Oct 14	1890	Oct 14
ANNUAL SEVEN-DAY MINIMUM	2160	Feb 19	2250	Aug 20
INSTANTANEOUS PEAK FLOW			21300	Apr 30
INSTANTANEOUS PEAK STAGE			10.33	Apr 30
ANNUAL RUNOFF (CFSM)	.80		.78	
ANNUAL RUNOFF (INCHES)	10.87		10.55	
10 PERCENT EXCEEDS	10400		9190	
50 PERCENT EXCEEDS	3270		3420	
90 PERCENT EXCEEDS	2450		2480	



MISSISSIPPI RIVER MAIN STEM

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 mi², 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 good except those for estimated daily discharge, which are fair. Some regulation by reservoirs, navigation dams, and powerplants at low and medium stages.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	25100	17700	14600	14800	11600	17000	39700	69200	26600	29900	20400	16200
2	24400	16700	14500	15300	11700	16300	39400	71000	26000	29500	19900	15800
3	23200	16900	16400	16600	11700	15600	39000	71900	24900	28900	19000	16200
4	22700	16800	17500	15900	11500	14600	39100	72700	24000	28200	19300	15100
5	21400	17100	19000	15300	12000	15600	39400	72500	23700	28300	18300	15200
6	21400	17200	19500	14700	11300	15400	39200	71400	24000	29000	18700	15500
7	20300	17700	19800	14800	11400	16500	38500	69700	23500	27700	18600	15200
8	20500	17700	19400	14100	11700	18300	37600	67400	24100	27600	16200	16000
9	19800	17500	17900	14700	10600	21600	37500	65100	24400	29000	16900	15500
10	20000	16800	18200	14000	10800	24300	36800	61900	25000	30000	16600	14900
11	19300	16600	18300	13600	11100	27200	35800	59700	25500	31000	17300	14300
12	18900	17100	17700	14100	11200	29100	35300	56400	25300	31200	17600	13700
13	19400	17300	16900	14400	11100	31100	35700	52900	25400	30600	22900	14000
14	19200	17900	16300	13200	11200	32900	35800	50700	24500	29700	25400	13700
15	17800	19600	17100	13300	11300	34900	36400	48200	25000	27800	26800	16600
16	18800	21500	17800	13300	11000	e36000	37900	45700	24500	26600	27200	20000
17	18400	21700	18400	12700	11100	e36500	41100	44100	23800	25900	26900	21500
18	18800	23200	19100	13000	10900	e37000	46200	42600	24200	25200	26100	23600
19	18300	22200	19600	14300	11700	e37500	50800	41100	23800	24700	25000	25400
20	18200	23700	19800	12800	12300	e38000	54300	39400	23300	25600	23800	25700
21	18500	24000	20000	11200	13200	e38000	55700	37300	24300	27400	21200	25300
22	18500	22900	19900	11600	15100	e38500	54700	36100	26200	29800	20200	25300
23	18200	22600	18300	12300	14100	e39000	52600	34400	28000	31000	19000	24600
24	18500	21700	17300	12300	14500	40200	51700	32900	29600	31100	17700	24200
25	18600	21200	15400	12900	17200	40400	51100	31300	29500	30300	16600	23200
26	18100	18900	14000	12600	17300	41200	51300	30600	29900	28700	16000	23100
27	18100	18100	14200	12400	16800	41400	52800	29900	29700	27700	14700	23500
28	18100	16100	12800	12100	17500	41400	55000	29300	29900	26100	16000	24600
29	18200	14600	13800	12000	---	41400	61500	28900	30100	24200	16600	23600
30	17500	15300	13900	12000	---	41100	66000	28400	29700	22500	16900	22100
31	18000	---	14300	11700	---	40200	---	27600	---	21200	17600	---
TOTAL	606200	568300	531700	418000	352900	958200	1347900	1520300	778400	866400	615400	583600
MEAN	19550	18940	17150	13480	12600	30910	44930	49040	25950	27950	19850	19450
MAX	25100	24000	20000	16600	17500	41400	66000	72700	30100	31200	27200	25700
MIN	17500	14600	12800	11200	10600	14600	35300	27600	23300	21200	14700	13700
AC-FT	1202000	1127000	1055000	829100	700000	1901000	2674000	3016000	1544000	1719000	1221000	1158000
CFSM	.44	.42	.38	.30	.28	.69	1.00	1.09	.58	.62	.44	.43
IN.	.50	.47	.44	.35	.29	.80	1.12	1.26	.65	.72	.51	.48

e Estimated.

MISSISSIPPI RIVER MAIN STEM

05344500 MISSISSIPPI RIVER AT PRESCOTT, WI--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1928 - 1994, BY WATER YEAR (WY)

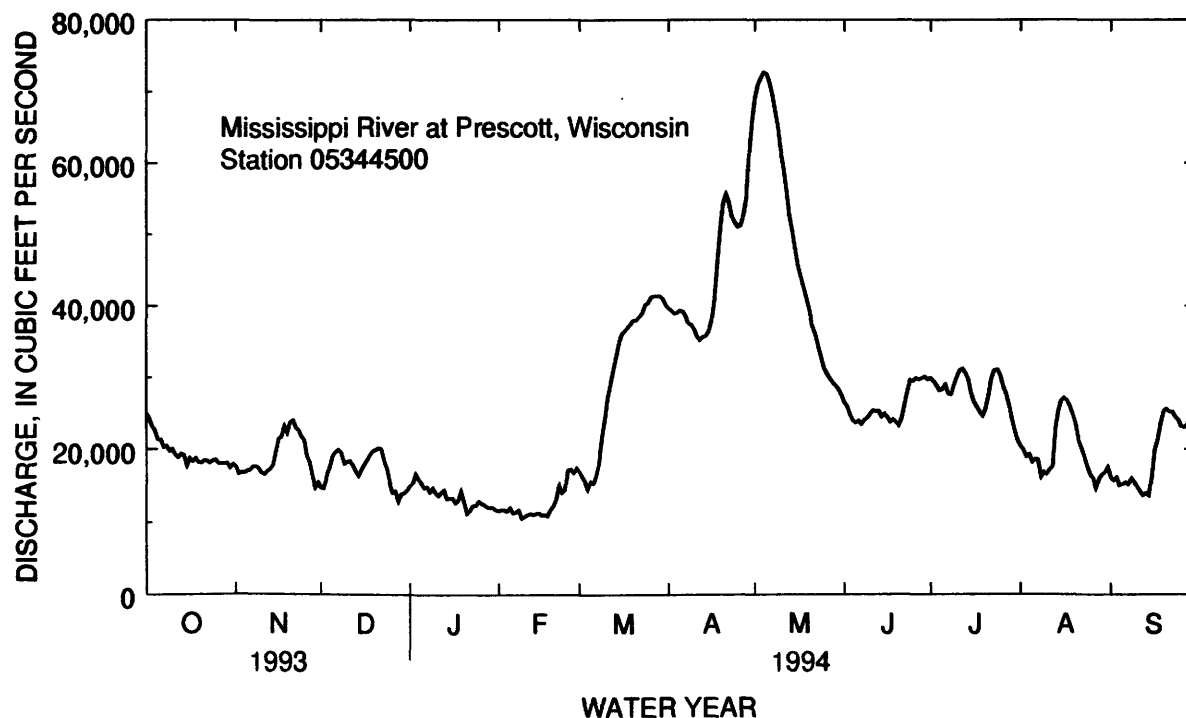
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	13150	12790	9642	8068	7961	16900	39930	31590	25620	20060	13020	12830
MAX	49740	40360	21460	16060	21390	55010	117600	90100	69890	87420	48350	45950
(WY)	1987	1972	1983	1983	1966	1983	1965	1986	1993	1993	1993	1986
MIN	3526	3874	3379	3153	3519	4369	7215	6304	4185	3197	2366	3002
(WY)	1933	1977	1934	1935	1934	1934	1931	1931	1934	1934	1934	1976

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1928 - 1994

ANNUAL TOTAL	13358030	9147300	
ANNUAL MEAN	36600	25060	17670 ^a
HIGHEST ANNUAL MEAN			38540
LOWEST ANNUAL MEAN			4367
HIGHEST DAILY MEAN	130000	Jun 27	72700
LOWEST DAILY MEAN	7420	Feb 26	10600
ANNUAL SEVEN-DAY MINIMUM	7850	Feb 25	11000
INSTANTANEOUS PEAK FLOW			72900
INSTANTANEOUS PEAK STAGE			33.62
ANNUAL RUNOFF (AC-FT)	26500000	18140000	12800000
ANNUAL RUNOFF (CFSM)	.82	.56	.39
ANNUAL RUNOFF (INCHES)	11.09	7.60	5.36
10 PERCENT EXCEEDS	73100	41100	38700
50 PERCENT EXCEEDS	25700	21200	11400
90 PERCENT EXCEEDS	9060	13200	5000

^a Median of annual mean discharge is 17430 ft³/s.

VERMILLION RIVER BASIN

05345000 VERMILLION RIVER NEAR EMPIRE, MN

LOCATION.--Lat 44°40'00", long 93°03'17", in SW 1/4 NW 1/4 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.--110 mi².

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 mean 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. Some regulation at low-flow by sewage 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 ft³/s, from rating extended above 2,100 ft³/s.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 200 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Mar. 06	--	e272	--	Jun 06	0730	*e941	*7.38
Apr. 27	1300	e352	5.96	Sept. 15	2300	e318	5.83

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	106	83	67	e46	e37	e48	e64	e208	58	58	45	53
2	97	83	67	e46	e37	e48	e65	e178	57	56	43	49
3	97	83	68	e46	e37	e49	e62	e150	54	54	45	56
4	93	85	68	e46	e37	e83	e63	e132	52	54	47	62
5	90	90	70	e46	e37	e220	e61	e121	e351	54	45	58
6	88	84	70	e46	e37	e272	e54	e113	e740	63	44	55
7	88	82	66	e46	e37	e222	e50	e107	e331	61	44	51
8	94	82	66	e45	e37	e125	e47	e102	e247	e129	44	49
9	95	80	66	e45	e37	e106	e62	96	e198	e133	44	47
10	92	79	66	e45	e37	e98	e61	91	e159	73	98	46
11	94	80	61	e44	e36	e82	e59	91	e144	66	e131	45
12	94	79	63	e44	e37	e82	e49	86	e128	63	88	52
13	91	106	64	e44	e37	e86	e55	82	e124	62	72	85
14	90	117	73	e44	e38	e98	e65	83	e118	74	63	e182
15	95	108	85	e44	e37	e105	e76	90	e106	73	59	e268
16	99	98	88	e43	e37	e93	e92	81	e101	64	55	e262
17	100	91	88	e42	e37	e87	e105	80	e100	60	53	e139
18	99	88	88	e41	e39	e81	e97	74	e104	58	52	e107
19	96	86	86	e40	e68	e78	e92	71	94	57	54	94
20	96	82	82	e39	e114	e77	e82	68	88	59	51	84
21	106	81	71	e38	e101	e88	76	65	83	63	48	83
22	102	78	70	e38	e78	e91	73	79	76	73	47	e126
23	97	76	65	e37	e78	e89	69	88	74	65	47	e146
24	95	75	62	e36	e68	e81	67	96	73	59	48	e175
25	94	75	60	e36	e60	e73	87	92	70	55	47	e168
26	92	73	57	e36	e55	e72	e189	e99	74	53	62	e132
27	90	69	53	e36	e51	e72	e326	e87	70	53	60	99
28	89	71	e51	e36	e50	e70	e264	79	67	50	51	87
29	87	69	e50	e36	---	e67	e217	72	63	48	48	92
30	85	66	e48	e36	---	e64	e220	67	61	45	52	85
31	84	---	e46	e36	---	e64	---	63	---	45	62	---
TOTAL	2915	2499	2085	1283	1391	2971	2949	2991	4065	1980	1749	3037
MEAN	94.0	83.3	67.3	41.4	49.7	95.8	98.3	96.5	135	63.9	56.4	101
MAX	106	117	88	46	114	272	326	208	740	133	131	268
MIN	84	66	46	36	36	48	47	63	52	45	43	45
AC-FT	5780	4960	4140	2540	2760	5890	5850	5930	8060	3930	3470	6020

e Estimated.

VERMILLION RIVER BASIN

05345000 VERMILLION RIVER NEAR EMPIRE, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1943 - 1994, BY WATER YEAR (WY)

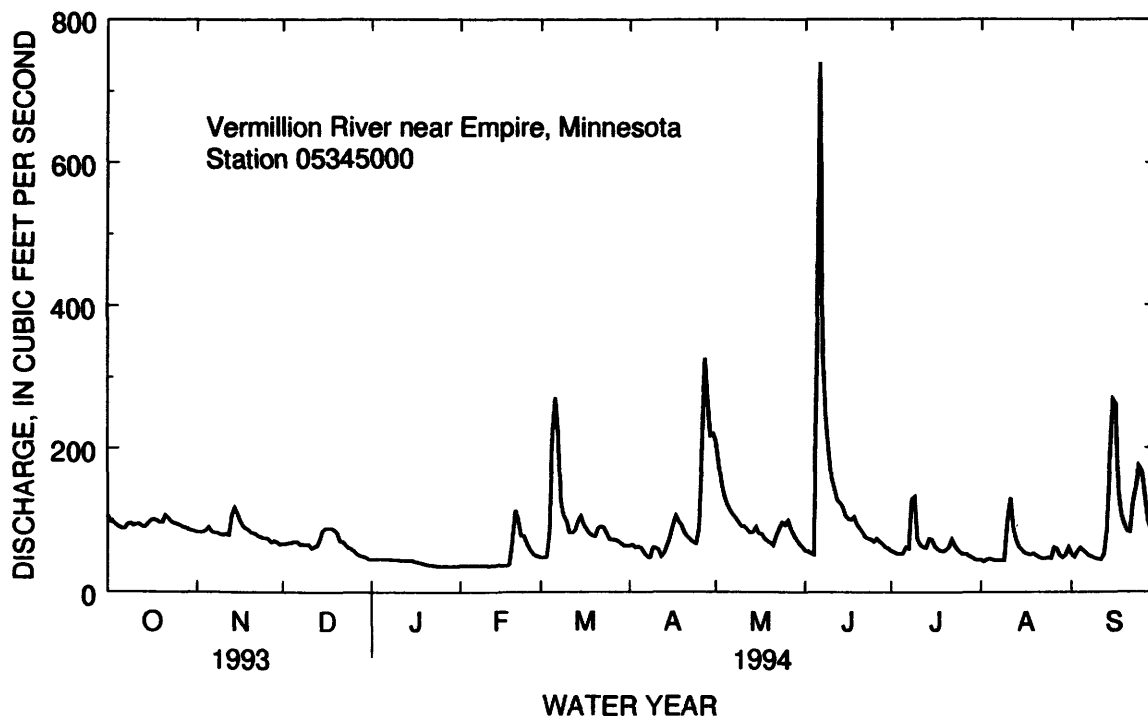
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	47.5	44.7	36.0	28.4	32.9	96.7	97.3	87.1	84.2	58.6	49.0	65.4
MAX	135	133	79.5	52.6	85.2	199	244	223	290	203	180	310
(WY)	1987	1993	1993	1993	1984	1983	1983	1986	1993	1993	1993	1992
MIN	14.9	15.6	12.4	11.0	13.1	25.4	35.2	29.3	23.0	16.0	14.3	14.6
(WY)	1977	1977	1977	1977	1977	1975	1977	1977	1988	1988	1976	1976

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1943 - 1994

ANNUAL TOTAL	49109		29915									
ANNUAL MEAN	135		82.0							60.4		
HIGHEST ANNUAL MEAN										142		1993
LOWEST ANNUAL MEAN										23.6		1977
HIGHEST DAILY MEAN	1480	Jun 18		740	Jun 6					2910		Sep 16 1992
LOWEST DAILY MEAN	43	Feb 25		36	Jan 24					8.4		Jan 15 1975
ANNUAL SEVEN-DAY MINIMUM	44	Feb 24		36	Jan 24					9.0		Jan 13 1975
INSTANTANEOUS PEAK FLOW				941	Jun 6					6570		Sep 16 1992
INSTANTANEOUS PEAK STAGE				7.38	Jun 6					10.00		Sep 16 1992
INSTANTANEOUS LOW FLOW				33	Feb 3,13					6.8		Aug 15 1992
ANNUAL RUNOFF (AC-FT)	97410			59340						43730		
10 PERCENT EXCEEDS	228			117						120		
50 PERCENT EXCEEDS	102			71						39		
90 PERCENT EXCEEDS	51			44						19		



CANNON RIVER BASIN

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.--442 mi².

PERIOD OF RECORD.--October 1965 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,034.58 ft above mean sea level.

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

EXTREMES FOR CURRENT YEAR.--Peak discharge greater than base discharge of 1,500 ft³/s and maximum (*):

Date	Time	Discharge (ft³/s)	Gage height (ft)	Date	Time	Discharge (ft³/s)	Gage height (ft)					
Apr. 26	2000	*1670	*7.12	Aug. 10	2000	1640	*7.12					
DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994												
DAILY MEAN VALUES												
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e459	156	171	e85	e56	e205	202	1170	155	156	e91	143
2	e423	156	169	e83	e58	e200	199	970	149	138	e85	128
3	e385	157	164	e82	e58	e200	190	828	134	126	e80	133
4	e354	159	159	e81	e59	e205	189	735	130	130	e92	127
5	e317	163	151	e80	e60	e300	198	682	185	148	e81	133
6	e290	148	133	e79	e60	e700	194	629	453	364	e74	126
7	e261	135	131	e78	e61	e850	196	582	504	682	e70	117
8	e238	152	149	e78	e61	e750	213	539	628	651	e70	108
9	242	142	135	e74	e61	e650	221	497	677	608	e70	101
10	236	142	131	e70	e62	e580	217	450	536	463	844	e94
11	233	144	113	e68	e62	e500	208	433	425	356	1410	e87
12	229	147	134	e70	e62	e525	242	391	351	297	1180	109
13	222	191	147	e72	e62	e570	496	360	346	258	859	125
14	214	193	189	e70	e62	553	618	342	400	270	572	113
15	212	195	262	e67	e65	528	610	329	355	290	420	175
16	211	186	319	e64	e66	436	690	303	312	269	344	668
17	205	182	320	e62	e72	361	645	285	306	244	287	470
18	201	183	333	e60	e90	316	561	270	1100	220	271	334
19	195	185	349	e60	e130	284	511	254	1030	203	259	262
20	197	175	329	e60	e240	279	460	240	794	191	238	221
21	215	169	291	e60	e300	296	431	230	539	244	207	262
22	208	168	281	e61	e290	307	402	221	409	238	184	1350
23	204	162	234	e62	e275	295	376	218	344	194	165	1430
24	200	162	e190	e63	e260	285	358	232	307	170	150	1200
25	199	163	e165	e64	e240	255	903	234	277	149	142	922
26	193	158	e140	e66	e230	244	1530	239	249	135	175	735
27	187	180	e130	e69	e220	237	1560	219	222	124	161	641
28	184	190	e115	e68	e210	232	1270	206	203	114	142	557
29	174	172	e105	e68	---	217	1290	188	190	108	125	474
30	165	168	e98	e64	---	203	1310	177	167	100	185	414
31	158	---	e90	e58	---	204	---	168	---	e93	188	---
TOTAL	7411	4983	5827	2146	3532	11767	16490	12621	11877	7733	9221	11759
MEAN	239	166	188	69.2	126	380	550	407	396	249	297	392
MAX	459	195	349	85	300	850	1560	1170	1100	682	1410	1430
MIN	158	135	90	58	56	200	189	168	130	93	70	87
AC-FT	14700	9880	11560	4260	7010	23340	32710	25030	23560	15340	18290	23320
CFSM	.54	.38	.43	.16	.29	.86	1.24	.92	.90	.56	.67	.89
IN.	.62	.42	.49	.18	.30	.99	1.39	1.06	1.00	.65	.78	.99

e Estimated.

CANNON RIVER BASIN

05353800 STRAIGHT RIVER NEAR FARIBAULT, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1966 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	217	194	119	68.1	114	528	620	430	369	299	220	181
MAX	831	595	336	167	837	1270	1912	1224	1399	1027	1136	645
(WY)	1969	1971	1983	1992	1984	1973	1993	1973	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

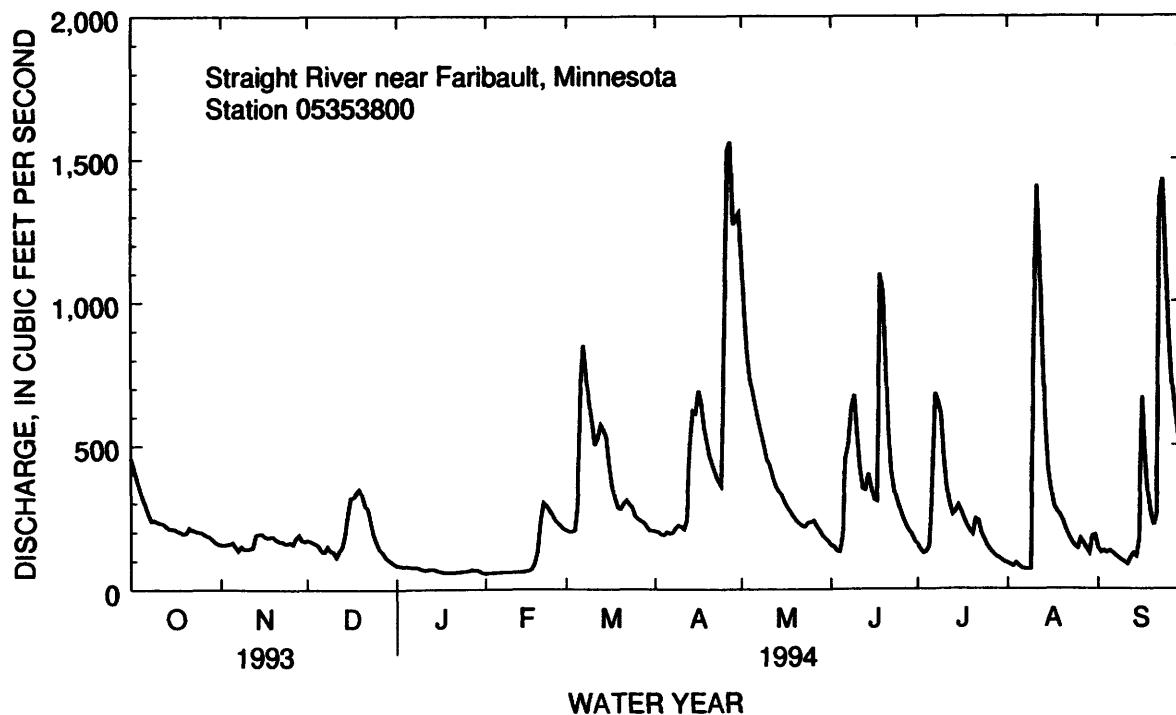
SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1966 - 1994

ANNUAL TOTAL	254104			105367								
ANNUAL MEAN	696			289						280		
HIGHEST ANNUAL MEAN										754		1993
LOWEST ANNUAL MEAN										43.9		1977
HIGHEST DAILY MEAN	4700			Apr 1	1560		Apr 27			5410		May 2 1973
LOWEST DAILY MEAN	90			Dec 31	56		Feb 1			11		Feb 18 1968
ANNUAL SEVEN-DAY MINIMUM	95			Jan 9	58		Jan 31			11		Feb 18 1968
INSTANTANEOUS PEAK FLOW					1670		Apr 26			6030		Jul 7 1990
INSTANTANEOUS PEAK STAGE					7.12		Apr 26, Aug 10			12.74 ^a		Mar 5 1974
INSTANTANEOUS LOW FLOW										10		Oct 27 1976
ANNUAL RUNOFF (AC-FT)	504000				209000					203200		
ANNUAL RUNOFF (CFSM)	1.58				.65					.63		
ANNUAL RUNOFF (INCHES)	21.39				8.87					8.62		
10 PERCENT EXCEEDS	1730				622					706		
50 PERCENT EXCEEDS	360				203					116		
90 PERCENT EXCEEDS	95				70					29		

a Backwater from ice.



CANNON RIVER BASIN

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.--1,320 mi², approximately.

PERIOD OF RECORD.--June 1909 to January 1914 (no winter records 1909-11), November 1930 to September 1971, annual maximum, water years 1973-87, October 1991 to current year.

REVISED RECORDS.--WSP 1308: 1912(M). WSP 1508: 1933. WSP 1914: 1960.

GAGE.--Water-stage recorder. Datum of gage is 699.16 ft above mean 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.

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

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1090	618	566	e540	e475	e375	844	2870	676	694	345	613
2	1330	551	588	e538	e475	e425	868	2800	631	658	327	588
3	1230	509	589	e535	e475	e550	876	2590	578	623	316	568
4	1160	433	591	e532	e475	765	876	2370	548	563	315	558
5	1150	615	583	e530	e475	1160	866	2220	606	514	310	554
6	1200	584	574	e525	e475	1420	807	2080	881	568	308	549
7	1110	570	550	e520	e475	1780	789	1970	1170	610	304	540
8	1030	539	544	e518	e475	1870	748	1870	1330	784	297	530
9	1020	557	554	e516	e475	1720	806	1770	1460	949	289	520
10	968	570	553	e515	e475	1620	792	1670	1520	1010	374	499
11	966	569	527	e508	e475	1390	719	1600	1530	1000	1480	461
12	963	565	471	e500	e476	1250	807	1510	1450	935	2500	435
13	889	582	483	e500	e479	1230	868	1430	1380	861	2700	450
14	869	590	531	e500	e482	1290	953	1370	1320	780	2510	987
15	845	609	625	e499	e485	1380	1150	1340	1270	711	2050	1240
16	849	778	680	e497	e490	1360	1270	1260	1220	658	1700	1310
17	827	828	742	e490	e495	1280	1370	1190	1150	632	1490	1480
18	838	684	790	e485	e750	1210	1420	1100	1180	618	1380	1360
19	755	702	813	e478	e1100	1140	1380	1040	1630	605	1270	1180
20	731	660	824	e475	e1150	1100	1290	996	1740	592	1220	1010
21	764	670	824	e475	e950	1110	1260	960	1640	592	1140	863
22	834	643	824	e475	e850	1140	1240	934	1460	611	1050	888
23	869	623	813	e475	e720	1150	1200	916	1290	645	950	1340
24	828	608	705	e475	e600	1130	1170	905	1160	648	855	1830
25	796	605	622	e475	e510	1100	1190	895	1070	644	723	1870
26	806	636	584	e475	e450	1060	1530	891	985	621	662	1640
27	802	541	e580	e475	e410	1050	2270	886	913	593	701	1460
28	810	519	e570	e475	e385	1030	2730	874	845	512	717	1320
29	862	554	e560	e475	---	1010	2850	829	794	447	678	1200
30	855	547	e555	e475	---	939	2860	773	741	399	645	1090
31	646	---	e550	e475	---	885	---	727	---	369	622	---
TOTAL	28692	18059	19365	15426	16007	35919	37799	44636	34168	20446	30228	28933
MEAN	926	602	625	498	572	1159	1260	1440	1139	660	975	964
MAX	1330	828	824	540	1150	1870	2860	2870	1740	1010	2700	1870
MIN	646	433	471	475	385	375	719	727	548	369	289	435
AC-FT	56910	35820	38410	30600	31750	71250	74970	88540	67770	40550	59960	57390
CFSM	.70	.46	.47	.38	.43	.88	.95	1.09	.86	.50	.74	.73
IN.	.81	.51	.55	.43	.45	1.01	1.07	1.26	.96	.58	.85	.82

e Estimated.

CANNON RIVER BASIN

05355200 CANNON RIVER AT WELCH, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1994, BY WATER YEAR (WY)

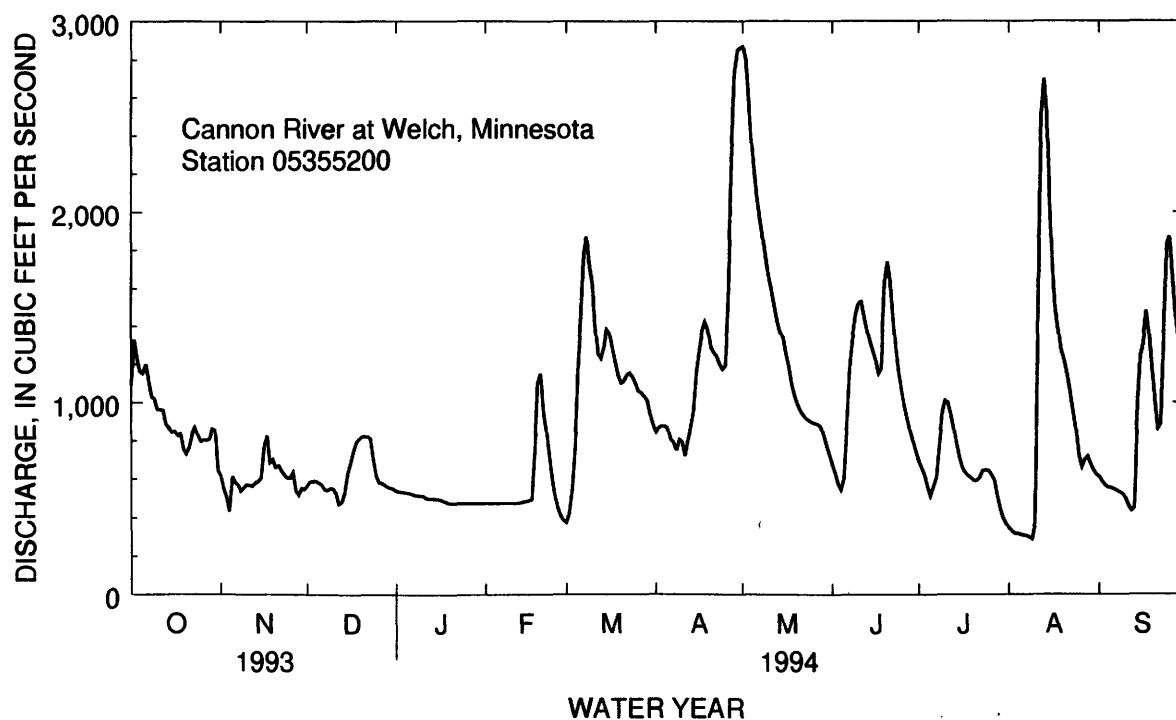
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	343	336	265	224	282	961	1300	714	739	528	393	365
MAX	1806	1708	1105	662	1141	2627	8240	2966	4144	3343	2951	1823
(WY)	1969	1971	1992	1992	1966	1992	1965	1944	1993	1993	1993	1993
MIN	65.5	78.8	75.0	76.9	110	149	145	84.9	80.0	71.2	78.1	72.8
(WY)	1934	1934	1938	1938	1913	1911	1911	1934	1934	1934	1936	1933

SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1909 - 1994

ANNUAL TOTAL	735255	329678	
ANNUAL MEAN	2014	903	560
HIGHEST ANNUAL MEAN			2132
LOWEST ANNUAL MEAN			137
HIGHEST DAILY MEAN	11700	Jun 18	2870
LOWEST DAILY MEAN	362	Feb 14	289
ANNUAL SEVEN-DAY MINIMUM	368	Feb 11	306
INSTANTANEOUS PEAK FLOW			2870
INSTANTANEOUS PEAK STAGE			6.01
INSTANTANEOUS LOW FLOW			286
ANNUAL RUNOFF (AC-FT)	1458000	653900	405500
ANNUAL RUNOFF (CFSM)	1.53	.68	.42
ANNUAL RUNOFF (INCHES)	20.72	9.29	5.76
10 PERCENT EXCEEDS	4780	1480	1200
50 PERCENT EXCEEDS	1350	784	244
90 PERCENT EXCEEDS	385	475	96



ZUMBRO RIVER BASIN

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 mi².

PERIOD OF RECORD.--March 1981 to current year.

GAGE.--Water-stage recorder. Datum of gage is 950.00 ft above mean sea level.

REMARKS.--Records good except those for estimated daily discharges, which are fair. 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 ft³/s. This is the highest known stage since at least 1908.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,300 ft³/s and maximum (*):

Date	Time	Discharge (ft³/s)	Gage height (ft)	Date	Time	Discharge (ft³/s)	Gage height (ft)
Feb. 19	2230	1570	6.73	Apr. 26	0430	1340	6.25
Mar. 06	0600	1620	6.81	Aug. 10	0800	1540	6.67
Apr. 25	0900	*1690	*6.94				

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	191	127	116	100	e70	151	156	545	90	69	81	97
2	180	123	116	103	e70	148	155	465	109	64	77	94
3	172	125	116	106	e70	157	150	408	108	62	92	101
4	153	125	116	107	e70	236	153	380	104	62	105	103
5	149	128	116	98	e70	912	159	318	159	145	90	102
6	147	128	120	101	e70	1450	151	306	133	73	80	97
7	144	123	110	100	e70	770	148	304	180	78	74	93
8	149	127	120	100	e70	393	159	285	155	88	78	91
9	150	126	120	96	e70	327	159	255	145	82	79	99
10	151	125	121	95	e70	282	159	246	137	75	638	87
11	139	125	101	95	e70	225	153	250	126	71	748	83
12	129	131	112	95	e70	237	208	226	125	65	465	85
13	128	144	124	95	e71	283	237	209	150	72	306	99
14	128	142	131	100	e90	289	254	203	120	71	237	102
15	140	137	131	114	e87	331	293	199	111	70	196	101
16	141	131	133	88	e90	283	287	177	105	67	170	102
17	142	130	134	84	93	245	263	173	98	64	149	111
18	142	130	137	e81	130	226	246	162	94	63	139	111
19	140	130	137	e78	804	211	228	154	109	67	189	105
20	144	128	136	e75	1200	207	209	154	105	84	137	98
21	148	127	122	e72	616	226	200	140	96	127	122	237
22	140	128	126	70	333	234	193	138	85	93	116	236
23	139	126	113	82	232	236	183	159	103	83	112	264
24	137	125	115	80	200	223	192	168	92	80	106	250
25	137	122	119	76	192	200	1010	175	86	77	149	229
26	135	122	109	72	166	188	1040	159	81	78	137	206
27	131	111	103	76	155	183	674	135	78	77	118	193
28	131	121	103	78	160	177	704	129	77	72	112	173
29	130	120	100	73	---	170	703	118	74	72	104	160
30	130	109	95	e70	---	166	634	136	71	68	113	150
31	128	---	95	e70	---	159	---	245	---	72	103	---
TOTAL	4445	3796	3647	2730	5459	9525	9460	7121	3306	2391	5422	4059
MEAN	143	127	118	88.1	195	307	315	230	110	77.1	175	135
MAX	191	144	137	114	1200	1450	1040	545	180	145	748	264
MIN	128	109	95	70	70	148	148	118	71	62	74	83
AC-FT	8820	7530	7230	5410	10830	18890	18760	14120	6560	4740	10750	8050
CFSM	.47	.42	.39	.29	.64	1.01	1.04	.76	.36	.25	.58	.45

e Estimated.

ZUMBRO RIVER BASIN

05372995 SOUTH FORK ZUMBRO RIVER AT ROCHESTER, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1981 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	175	160	135	82.5	131	394	421	327	230	233	170	204
MAX	824	338	358	167	454	760	1211	617	1014	663	501	1075
(WY)	1987	1992	1992	1983	1984	1983	1993	1991	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	1987	1981	1989	1989	1988	1988	1988

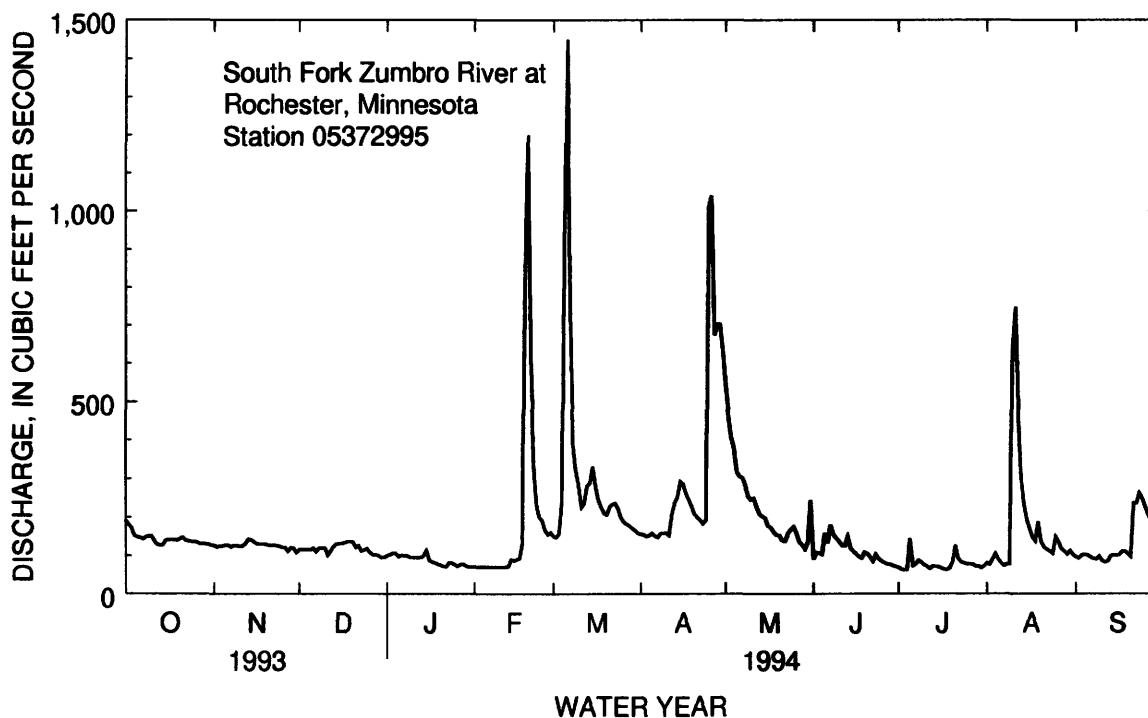
SUMMARY STATISTICS FOR 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

WATER YEARS 1981 - 1994

ANNUAL TOTAL	155606	61361	
ANNUAL MEAN	426	168	224
HIGHEST ANNUAL MEAN			431
LOWEST ANNUAL MEAN			87.3
HIGHEST DAILY MEAN	4180	Apr 1	1450
LOWEST DAILY MEAN	60	Feb 26	62
ANNUAL SEVEN-DAY MINIMUM	62	Feb 22	67
INSTANTANEOUS PEAK FLOW			1690
INSTANTANEOUS PEAK STAGE			6.94
INSTANTANEOUS LOW FLOW			53
ANNUAL RUNOFF (AC-FT)	308600	121700	162100
ANNUAL RUNOFF (CFSM)	1.41	.55	.74
10 PERCENT EXCEEDS	984	258	510
50 PERCENT EXCEEDS	208	128	123
90 PERCENT EXCEEDS	74	73	37

a Result of regulation.



WHITEWATER RIVER BASIN

05376800 WHITEWATER RIVER NEAR BEAVER, MN

LOCATION.--Lat 44° 00'19", long 92° 00'19", in SW¹/₄ SE¹/₄ 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.

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 mean 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 ft³/s, June 21, 1974, gage height, 13.00 ft, present datum, determined by contracted opening measurement.

EXTREMES FOR CURRENT RECORD.--Oct. 1, 1993 to Sept. 30, 1994: Peak discharge greater than base discharge of 2,000 ft³/s and maximum (*).

Date	Time	Discharge (ft³/s)	Gage height (ft)	Date	Time	Discharge (ft³/s)	Gage height (ft)					
Apr. 25		535 _{a,e}				No peak greater than base discharge.						
DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994												
DAILY MEAN VALUES												
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e240	e210	e205	e173	e175	e220	e250	e350	e196	178	e140	e155
2	e235	e210	e200	e172	e172	e215	e250	e335	e180	181	e142	e145
3	e230	e210	e198	e171	e170	e212	e250	e331	170	174	e141	e140
4	e228	e207	e197	e170	e170	e211	e251	e325	168	183	e145	e145
5	e225	e206	e196	e169	e170	e212	e250	e305	161	184	e148	e154
6	e220	e202	e195	e168	e171	e220	e240	e290	166	173	e139	e165
7	e222	e200	e194	e167	e173	e280	e235	e280	156	175	e138	e164
8	e228	e197	e193	e167	e172	e400	e225	e270	e228	169	e137	e161
9	e231	e197	e192	e166	e170	e300	e218	e268	171	173	e143	e160
10	e230	e197	e191	e166	e171	e250	e211	e260	164	191	e165	e160
11	e230	e197	e190	e165	e172	e235	e210	e255	172	188	e190	e160
12	e225	e204	e189	e164	e171	e225	e212	e249	167	180	e175	e161
13	e216	e209	e188	e163	e170	e221	e230	e241	175	180	e165	e163
14	e220	e212	e187	e163	e165	e219	e252	e238	177	205	e160	e165
15	e220	e215	e186	e162	e162	e217	e265	e235	170	206	e155	e170
16	e221	e215	e186	e162	e163	e213	e290	e230	170	200	e152	e172
17	e227	e212	e185	e161	e160	e213	e280	e222	168	205	e149	e169
18	e222	e211	e184	e160	e159	e215	e270	e224	166	205	e200	e162
19	e220	e209	e183	e160	e159	e219	e260	e224	174	201	e190	e161
20	e219	e209	e182	e159	e159	e221	e250	e220	177	e280	e170	e161
21	e220	e208	e181	e158	e200	e230	e242	e218	180	e210	e160	e165
22	e223	e207	e180	e157	e325	e240	e239	e218	169	e195	e153	e170
23	e225	e205	e180	e156	e280	e240	e235	e220	164	e180	e150	e177
24	e220	e202	e180	e155	e240	e235	e232	e240	176	e165	e143	e178
25	e220	e201	e180	e154	e235	e240	e535	e203	172	e159	e140	e175
26	e220	e205	e179	e171	e230	e240	e480	e207	175	e157	e147	e179
27	e215	e210	e178	e175	e229	e237	e435	e207	176	e155	e148	e190
28	e214	e209	e177	e174	e225	e235	e390	e207	171	e152	e143	e185
29	e218	e209	e176	e171	---	e235	e380	e207	171	e150	e140	e180
30	e215	e208	e175	e175	---	e241	e370	e202	178	e148	e148	e172
31	e211	---	e175	e177	---	e249	---	e202	---	e145	e154	---
TOTAL	6910	6193	5782	5131	5318	7340	8437	7683	5208	5647	4770	4964
MEAN	223	206	187	166	190	237	281	248	174	182	154	165
MAX	240	215	205	177	325	400	535	350	228	280	200	190
MIN	211	197	175	154	159	211	210	202	156	145	137	140
AC-FT	13710	12280	11470	10180	10550	14560	16730	15240	10330	11200	9460	9850
CFSM	.82	.76	.69	.61	.70	.87	1.04	.91	.64	.67	.57	.61
IN	.95	.85	.79	.70	.73	1.01	1.16	1.05	.71	.78	.65	.68

a Daily.

e Estimated.

WHITEWATER RIVER BASIN

05376800 WHITEWATER RIVER NEAR BEAVER, MN

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1975 - 1994, BY WATER YEAR (WY)

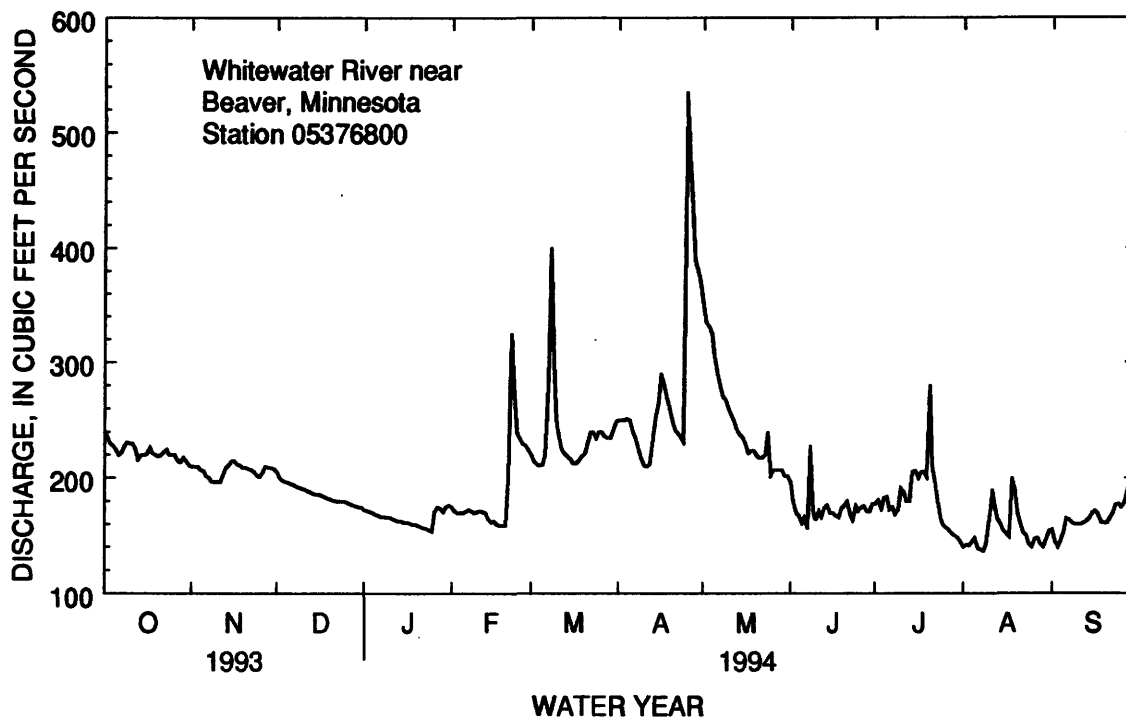
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	139	156	142	127	147	262	197	184	173	232	148	145
MAX	223	288	235	188	236	512	282	255	240	973	205	230
(WY)	1994	1992	1992	1980	1985	1985	1992	1984	1980	1978	1979	1978
MIN	88.0	84.8	77.0	80.6	59.7	84.2	92.9	89.6	112	92.1	87.1	85.5
(WY)	1978	1978	1977	1978	1978	1978	1977	1977	1976	1977	1977	1977

SUMMARY STATISTICS

FOR 1994 WATER YEAR

WATER YEARS 1975 - 1994

ANNUAL TOTAL	73383		
ANNUAL MEAN		201	168
HIGHEST ANNUAL MEAN		203	1984
LOWEST ANNUAL MEAN		103	1977
HIGHEST DAILY MEAN	535 ^e	Apr 25	8760 Jul 6 1978
LOWEST DAILY MEAN	137 ^e	Aug 8	53 Feb 20 1978
ANNUAL SEVEN-DAY MINIMUM	141	Aug 2	53 Feb 20 1978
INSTANTANEOUS PEAK FLOW			15400 Jul 6 1978
INSTANTANEOUS PEAK STAGE			12.88 Jul 6 1978
ANNUAL RUNOFF (AC-FT)	145600		121500
ANNUAL RUNOFF (CFSM)	.74		.62
ANNUAL RUNOFF (INCHES)	10.07		8.41
10 PERCENT EXCEEDS	249		238
50 PERCENT EXCEEDS	191		143
90 PERCENT EXCEEDS	157		92

^e Estimated.


MISSISSIPPI RIVER MAIN STEM

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 mi², 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 mean 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.--No estimated daily discharges. Records good. Some regulation by reservoirs, navigation dams, and powerplants at low and medium stages. Flood flow not materially affected by artificial storage.

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.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of June 18, 1880, reached an elevation of 657.14 ft, discharge, 172,000 ft³/s, from information by U.S. Army Corps of Engineers.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	38300	27300	18300	23500	22300	31100	52300	102000	39200	38900	30200	23700
2	37900	23200	19500	25500	22100	31200	52200	105000	39000	39300	28100	24200
3	36800	22100	21200	29000	20700	31400	52500	106000	37500	38900	27200	23500
4	36600	25100	22900	28600	20800	29800	52000	105000	35400	37800	26500	22100
5	36000	25100	25300	28300	20900	29200	52100	104000	34800	37800	25800	19700
6	34000	25400	28700	28000	21000	31100	51900	102000	35100	38100	25200	19100
7	30300	24900	30900	26000	21000	35100	51600	100000	35900	41100	24100	19100
8	31700	24600	30500	25500	20700	37700	50800	98300	35900	44700	22800	18400
9	32400	24700	30400	25000	20500	37400	50400	95300	35800	43700	22900	17400
10	32100	25300	29800	24500	20300	34700	50700	90300	35700	41900	23800	16800
11	31600	25700	28700	22700	20200	35000	50600	87600	35600	41600	29800	16900
12	30500	26400	26200	22800	20300	37800	50000	85200	35500	42000	30900	15800
13	29800	26400	24200	23000	20300	39300	50000	80500	35000	42700	31500	17200
14	29600	27200	25300	23200	20300	38300	50800	76300	33500	42500	31800	21400
15	29800	28300	27400	23000	20300	38800	52600	72700	32500	41300	30900	26700
16	30100	29000	28700	22500	20300	40500	54300	71500	33800	39400	29900	34100
17	30100	30300	29100	22000	20300	41700	60000	69000	37500	38800	29800	43500
18	30100	33000	29400	21100	20500	44400	60500	65800	35500	36600	30700	45400
19	28900	33900	30900	21000	22000	47000	62600	63900	34900	33800	31300	50700
20	27600	34400	31900	21000	25500	47500	66000	62900	32600	33500	31100	63800
21	27600	34500	31400	20900	30500	48100	68500	61600	32600	34700	30200	70500
22	27500	34500	30800	20100	36400	48700	70300	56300	33800	34800	28400	73800
23	27300	34100	29700	19200	45800	48700	70900	52300	34400	35800	26000	70400
24	27900	33100	23500	18500	44800	49100	70900	50300	36300	38100	24900	62700
25	27900	32600	19300	20300	44500	50300	72600	48400	37800	40600	24200	55700
26	27700	32000	16300	20100	40000	52100	73300	47100	37300	41000	23400	52800
27	28000	30400	15100	22700	37500	53700	74700	44700	36700	40400	22600	50200
28	27100	28300	16200	22300	32900	59000	78400	41600	36500	40000	21500	48300
29	27100	26800	18000	22300	---	54800	85600	39100	37600	37900	20500	45000
30	27600	24200	19700	22400	---	54300	95700	39000	38900	35700	20100	41500
31	28400	---	20100	22600	---	53400	---	39200	---	33900	21800	---
TOTAL	948300	852800	779400	717600	732700	1311200	1834800	2262900	1072600	1207300	827900	1110400
MEAN	30590	28430	25140	23150	26170	42300	61160	73000	35750	38950	26710	37010
MAX	38300	34500	31900	29000	45800	59000	95700	106000	39200	44700	31800	73800
MIN	27100	22100	15100	18500	20200	29200	50000	39000	32500	33500	20100	15800
AC-FT	1881000	1692000	1546000	1423000	1453000	2601000	3639000	4488000	2128000	2395000	1642000	2202000
CFSM	.52	.48	.42	.39	.44	.71	1.03	1.23	.60	.66	.45	.63

MISSISSIPPI RIVER MAIN STEM

05378500 MISSISSIPPI RIVER AT WINONA, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1928 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	22020	22160	17220	14880	15070	29930	59590	47840	38970	31040	20740	22320
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 1993 CALENDAR YEAR

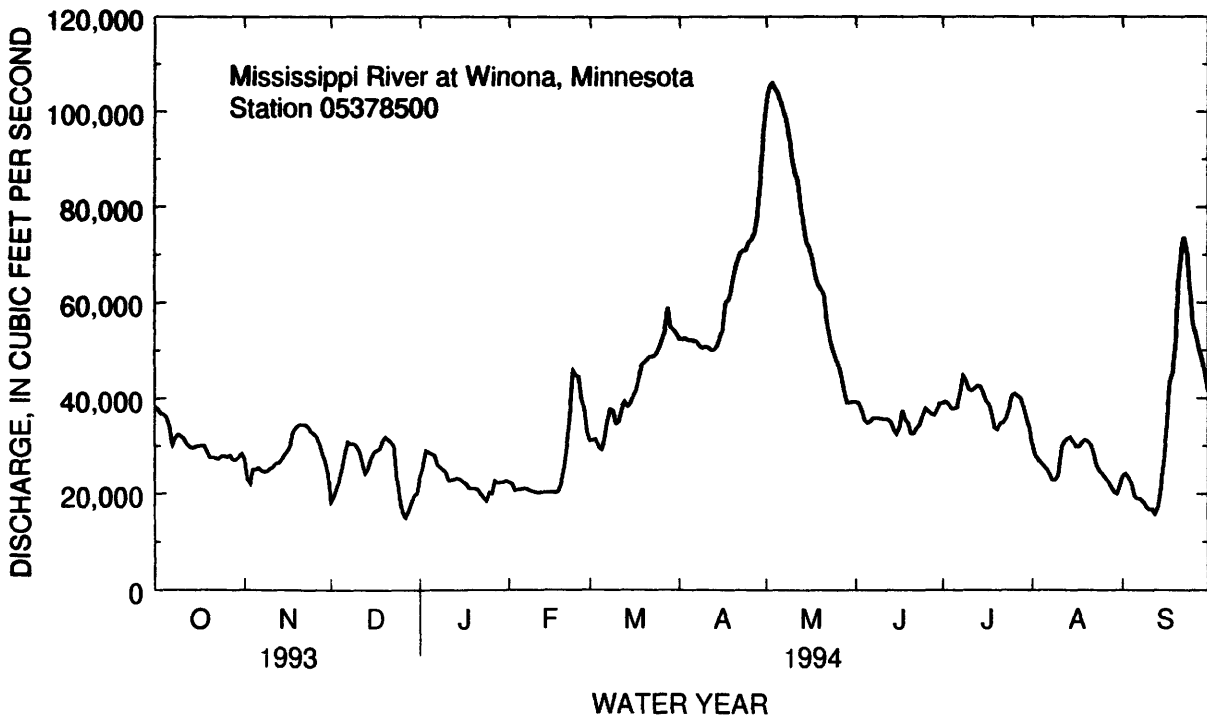
FOR 1994 WATER YEAR

WATER YEARS 1928 - 1994

ANNUAL TOTAL	19705700	13657900	28510
ANNUAL MEAN	53990	37420	56850
HIGHEST ANNUAL MEAN			9742
LOWEST ANNUAL MEAN			1934
HIGHEST DAILY MEAN	168000	Jun 26	106000
LOWEST DAILY MEAN	15100	Dec 27	15100
ANNUAL SEVEN-DAY MINIMUM	16600	Feb 25	17400
INSTANTANEOUS PEAK FLOW			107000
INSTANTANEOUS PEAK STAGE			12.14
INSTANTANEOUS LOW FLOW			May 3
ANNUAL RUNOFF (AC-FT)	39090000	27090000	264000
ANNUAL RUNOFF (CFSM)	.91	.63	2250
10 PERCENT EXCEEDS	104000	62600	3210
50 PERCENT EXCEEDS	41000	32500	268000
90 PERCENT EXCEEDS	17800	20700	20.77 ^a
			1940 ^b
			20650000
			.48
			59200
			20200
			9800

a From floodmark.

b Result of ice jam.



MISSISSIPPI RIVER MAIN STEM

05378500 MISSISSIPPI RIVER AT WINONA, MN--Continued

SUSPENDED SEDIMENT CONCENTRATIONS, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	TEMPER- ATURE WATER (DEG C) (00010)	SEDI- MENT, SUS- PENDED (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
AUG 23...	0910	26300	23.0	21	99

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DATE	TIME	NUMBER OF SAM- PLING POINTS (COUNT) (00063)	BED MAT. SIEVE DIAM. % FINER THAN .062 MM (80164)	BED MAT. SIEVE DIAM. % FINER THAN .125 MM (80165)	BED MAT. SIEVE DIAM. % FINER THAN .250 MM (80166)	BED MAT. SIEVE DIAM. % FINER THAN .500 MM (80167)	BED MAT. SIEVE DIAM. % FINER THAN 1.00 MM (80168)	BED MAT. SIEVE DIAM. % FINER THAN 2.00 MM (80169)	BED MAT. SIEVE DIAM. % FINER THAN 4.00 MM (80170)	BED MAT. SIEVE DIAM. % FINER THAN 8.00 MM (80171)
SEP 18..	1632	3	0	0.9	6	38	78	86	90	91

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ROOT RIVER BASIN

05385000 ROOT RIVER NEAR HOUSTON, MN

LOCATION.--43°46'07", long 91°34'11", in SW $\frac{1}{4}$ NW $\frac{1}{4}$ 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.--1,270 mi², approximately.

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 895: Drainage area. WSP 1508: 1911-12, WSP 1628: 1948(P).

GAGE.--Water-stage recorder. Datum of gage is 667.00 ft above mean 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 to poor. Slight diurnal fluctuation at low flows caused by powerplants above station.

EXTREME FOR CURRENT YEAR.--Peak discharges above base of 5,000 ft³/s and maximum (*).

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
*Mar. 06	1400	*4780	9.87	(No peaks above base.)			

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1030	814	741	e660	e540	e930	e814	e1760	926	688	e686	e745
2	1010	814	774	e660	e540	e880	e810	e1640	894	686	e731	e730
3	987	814	775	e660	e530	e833	e804	e1530	875	676	e842	e721
4	985	814	772	e650	e530	e877	e804	e1440	850	669	e922	e721
5	968	814	770	e640	e520	e1370	e832	e1370	851	666	e1730	e721
6	956	814	770	e630	e510	e4120	e847	e1310	880	672	e1210	e707
7	960	811	757	e620	e510	e4010	e859	e1270	908	702	e1030	e705
8	960	808	734	e600	e510	e2360	e872	e1240	957	819	e920	e695
9	960	813	731	e590	e510	e1630	e876	e1200	1020	767	e857	e683
10	960	822	750	e580	e500	e1380	e880	e1160	1050	709	e939	e669
11	958	818	746	e570	e500	e1220	e870	e1120	1000	689	e1640	e664
12	954	808	710	e560	e490	e1080	e897	e1090	985	677	e3000	e648
13	939	822	738	e560	e500	e1110	e959	e1060	977	659	e2050	e639
14	929	830	775	e550	e500	e1230	e977	e1040	951	670	e1620	e669
15	928	830	775	e550	e510	e1350	e1150	e1040	901	690	e1380	e669
16	928	817	775	e550	e540	e1370	e1230	e1030	861	703	e1220	e695
17	928	803	775	e550	e580	e1240	e1300	985	829	718	e1120	e709
18	928	793	775	e560	e640	e1140	e1260	959	801	721	e1050	e680
19	918	789	774	e600	e1500	e1070	1150	934	799	721	e981	e660
20	907	786	767	e620	e2000	e1060	1080	913	798	740	e924	e660
21	902	784	749	e640	e1400	e1050	1060	900	788	878	e878	e674
22	902	784	732	e650	e1050	e1080	1030	885	767	e1340	e845	e737
23	894	781	709	e650	e800	e1080	1000	870	763	e1140	e817	e782
24	891	777	677	e640	e820	e1060	982	888	789	e1010	e788	e790
25	878	775	663	e630	e840	e1010	e2190	939	785	e930	e769	e817
26	865	775	e690	e620	e900	e982	e3560	955	765	e860	e771	e876
27	844	771	e700	e600	e970	e947	e2810	943	758	e814	e818	e850
28	836	747	e700	e580	e970	e916	e2330	926	740	e776	e776	e835
29	835	759	e690	e580	---	e881	e2020	908	728	e745	e742	e826
30	821	747	e680	e560	---	e852	e1890	902	705	e712	e729	e804
31	814	---	e670	e550	---	e833	---	902	---	e706	e765	---
TOTAL	28575	23934	22844	18660	20710	40951	38143	34109	25701	23953	33550	21781
MEAN	922	798	737	602	740	1321	1271	1100	857	773	1082	726
MAX	1030	830	775	660	2000	4120	3560	1760	1050	1340	3000	876
MIN	814	747	663	550	490	833	804	870	705	659	686	639
AC-FT	56680	47470	45310	37010	41080	81230	75660	67660	50980	47510	66550	43200
CFSM	.73	.63	.58	.47	.58	1.04	1.00	.87	.67	.61	.85	.57

ROOT RIVER BASIN

05385000 ROOT RIVER NEAR HOUSTON, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1910 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	508	509	428	409	479	1396	1182	817	882	777	638	565
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 1993 CALENDAR YEAR

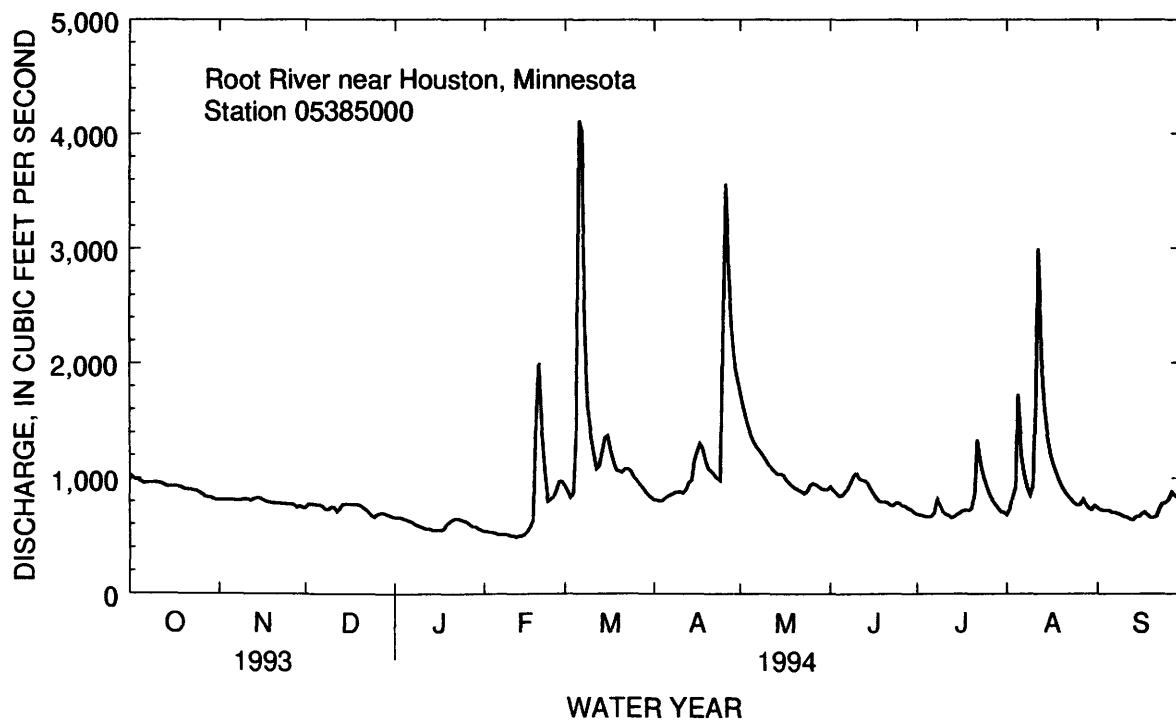
FOR 1994 WATER YEAR

WATER YEARS 1910 - 1994

ANNUAL TOTAL	579095	332911	
ANNUAL MEAN	1587	912	722
HIGHEST ANNUAL MEAN			1590
LOWEST ANNUAL MEAN			294
HIGHEST DAILY MEAN	14400	4120	31100
LOWEST DAILY MEAN	350	490	82
ANNUAL SEVEN-DAY MINIMUM	373	501	113
INSTANTANEOUS PEAK FLOW		4780	37000
INSTANTANEOUS PEAK STAGE		12.74	18.32 ^a
INSTANTANEOUS LOW FLOW			65 ^b
ANNUAL RUNOFF (AC-FT)	1149000	660300	523300
ANNUAL RUNOFF (CFSM)	1.25	.72	.57
10 PERCENT EXCEEDS	3040	1230	1280
50 PERCENT EXCEEDS	1150	817	451
90 PERCENT EXCEEDS	520	620	260

a Backwater from ice.

b Also occurred Feb. 25, 1935.



IOWA RIVER BASIN

05457000 CEDAR RIVER NEAR AUSTIN, MN

LOCATION.--Lat 43°38'11", long 92°58'26", in NE¼,SE¼, 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.--425 mi².

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 mean sea level. May 1909 to April 1912, nonrecording gage in tailwater of powerplant 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 2,000 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Mar. 06	0430	2200	7.44	July 20	1500	*2510	*8.01

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	359	173	141	e160	e99	139	165	505	125	173	158	110
2	331	173	148	e155	e99	128	165	442	119	135	145	112
3	310	173	149	e151	e98	131	166	393	113	118	183	134
4	299	174	149	e147	e98	204	157	361	107	123	589	127
5	280	176	148	e145	e97	1190	157	338	168	128	433	126
6	271	164	144	e142	e96	2030	157	318	219	190	289	124
7	267	154	125	e140	e95	1250	151	298	945	210	215	114
8	269	173	154	e138	e93	605	159	275	1290	285	185	124
9	282	160	146	e135	e93	466	176	261	758	246	159	107
10	274	159	139	e132	e92	378	169	240	531	201	527	104
11	266	160	108	e128	e91	293	164	231	426	175	1750	98
12	259	166	134	e125	e91	327	222	217	362	161	1560	95
13	259	190	145	e122	e90	438	408	203	454	215	965	99
14	249	187	199	e121	e90	456	418	206	445	384	644	115
15	235	180	256	e119	e90	506	432	209	367	335	477	122
16	233	174	273	e118	87	410	482	189	308	275	385	165
17	228	173	277	e116	87	351	430	180	269	248	322	202
18	220	171	299	e114	110	309	386	173	336	215	284	178
19	215	177	306	e112	322	269	349	167	329	307	261	158
20	217	170	286	e111	643	260	323	164	274	2110	230	155
21	220	164	221	e110	528	261	320	159	246	1710	203	157
22	213	162	243	e109	418	289	308	155	214	967	182	226
23	210	169	238	e108	271	291	281	160	254	633	165	354
24	207	168	229	e107	212	274	287	193	299	459	153	403
25	201	170	199	e107	185	257	455	201	276	369	148	425
26	198	149	e191	e103	e170	214	516	213	214	301	142	404
27	190	150	e185	e102	e160	203	514	194	186	260	130	419
28	190	153	e180	e101	e150	198	459	169	170	230	126	369
29	190	151	e175	e100	---	192	514	152	151	204	118	309
30	183	142	e170	e100	---	181	542	144	172	182	126	253
31	176	---	e165	e100	---	171	---	138	---	167	118	---
TOTAL	7501	5005	5922	3778	4755	12671	9432	7248	10127	11716	11372	5888
MEAN	242	167	191	122	170	409	314	234	338	378	367	196
MAX	359	190	306	160	643	2030	542	505	1290	2110	1750	425
MIN	176	142	108	100	87	128	151	138	107	118	118	95
AC-FT	14880	9930	11750	7490	9430	25130	18710	14380	20090	23240	22560	11680
CFSM	.57	.39	.45	.29	.40	.96	.74	.55	.79	.89	.86	.46
IN.	.66	.44	.52	.33	.42	1.11	.83	.63	.89	1.03	1.00	.52

e Estimated.

IOWA RIVER BASIN

05457000 CEDAR RIVER NEAR AUSTIN, MN

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	160	158	106	73.7	102	474	507	297	278	246	184	152
MAX	884	997	431	261	701	1428	2011	1222	1624	1456	1720	734
(WY)	1974	1910	1992	1973	1984	1973	1993	1991	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 1993 CALENDAR YEAR

FOR 1994 WATER YEAR

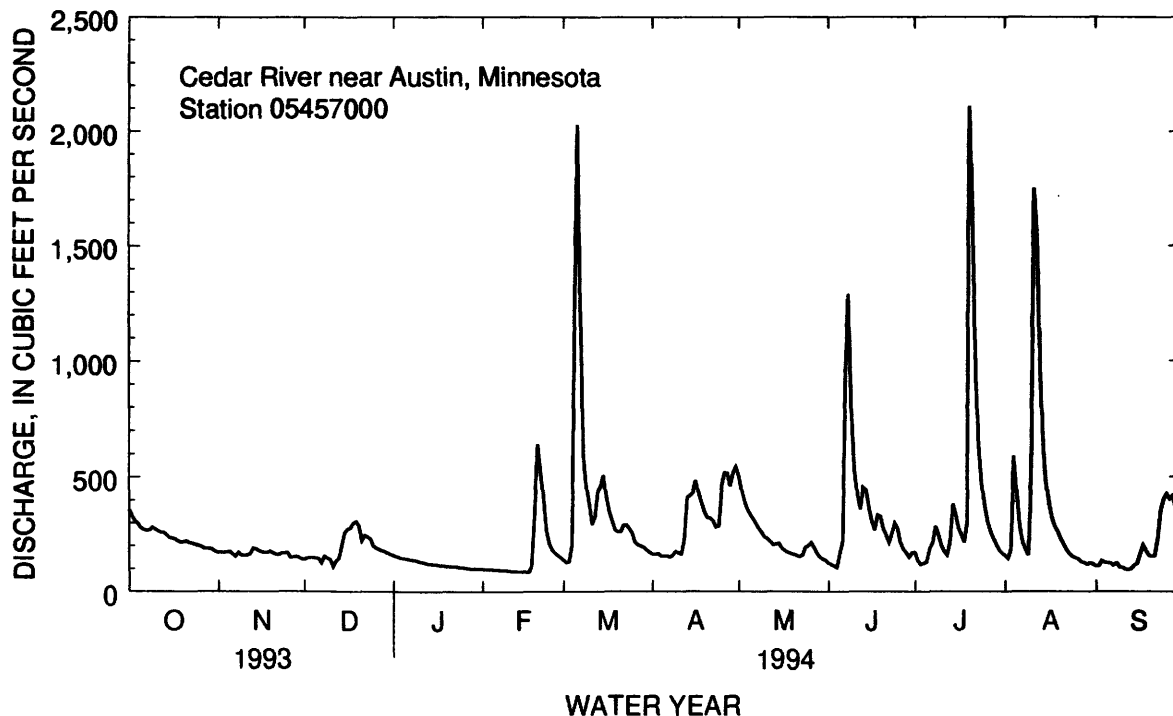
WATER YEARS 1909 - 1994

ANNUAL TOTAL	289257		95415			229 ^a	
ANNUAL MEAN	792		261			824	1993
HIGHEST ANNUAL MEAN						58.1	1977
LOWEST ANNUAL MEAN						8720	Mar 29 1962
HIGHEST DAILY MEAN	7100	Apr 1	2110	Jul 20		.00 ^b	Jan 15 1911
LOWEST DAILY MEAN	97	Mar 1	87	Feb 16		13	Sep 1 1912
ANNUAL SEVEN-DAY MINIMUM	99	Feb 26	89	Feb 11		20.35 ^c	Jul 17 1978
INSTANTANEOUS PEAK FLOW			2510	Jul 20			Jul 17 1978
INSTANTANEOUS PEAK STAGE			8.01	Jul 20			
INSTANTANEOUS LOW FLOW			80	Feb 17			
ANNUAL RUNOFF (AC-FT)	573700		189300			165700	
ANNUAL RUNOFF (CFSM)	1.86		.62			.54	
ANNUAL RUNOFF (INCHES)	25.32		8.35			7.31	
10 PERCENT EXCEEDS	1860		440			471	
50 PERCENT EXCEEDS	343		189			90	
90 PERCENT EXCEEDS	119		110			43	

a Median of annual mean discharges is 207 ft³/s.

b Occurred on several days in 1911.

c From floodmark in well.



DES MOINES RIVER BASIN

05476000 DES MOINES RIVER AT JACKSON, MN

LOCATION.--Lat 43°37'10", long 94°59'10", in SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec.24, T.102 N., R.35 W., Jackson County, Hydrologic Unit 07100001, on right bank in storage room of city powerplant in Jackson.

DRAINAGE AREA.--1,220 mi², approximately.

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 mean 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 fair. Regulation at times by Yankton, Long, Shetek, and Heron Lakes.

EXTREMES FOR CURRENT YEAR.--Peak discharge greater than base discharge of 900 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Mar. 6		2100a		Jun 28	0800	3070	*11.97
Mar. 17		2400a		Jul 20	0700	1500	8.80
May 1	0400	2320	10.19	Aug. 11	2400	2900	11.53
Jun 18	1400	*3090	11.95				

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	940	471	e410	e270	e98	e480	792	2280	457	2430	394	537
2	e840	484	e420	e260	e100	e520	752	2200	449	2260	357	518
3	e810	449	e450	e250	e105	e580	708	2120	434	2060	311	546
4	e760	440	e520	e240	e100	e700	684	2090	404	1920	280	601
5	e740	430	e500	e230	e100	e1500	648	2090	524	1820	250	649
6	e720	367	e470	e220	e100	e2100	599	2070	852	1900	226	655
7	e700	283	e460	e210	e105	e1900	637	2000	1050	1720	216	646
8	e690	424	e470	e200	109	e1800	622	1870	1270	1570	210	638
9	693	409	e450	e190	104	e1900	618	1760	1570	1490	221	608
10	718	411	e430	e180	e100	e2000	588	1620	1650	1360	1030	571
11	771	405	e380	e175	e98	e1900	559	1490	1620	1270	2400	529
12	793	400	e400	e170	e95	e1800	626	1370	1640	1280	2640	499
13	774	443	e410	e160	e92	e1800	821	1240	1790	1220	2230	468
14	757	501	e420	e150	e90	e1900	949	1190	1620	1160	2210	448
15	745	568	433	e145	e88	e2000	1050	1120	1480	1110	2190	421
16	722	682	e470	e140	e90	e2200	1290	1050	1390	1100	2100	394
17	702	760	e510	e135	e96	e2400	1390	992	1590	961	1970	371
18	690	747	e500	e130	e99	2230	1500	937	2910	906	1810	345
19	678	747	e510	e125	e130	2020	1590	871	2830	1170	1650	322
20	665	705	e500	e120	e330	1870	1610	813	2510	1450	1510	308
21	653	683	405	e115	817	1740	1520	766	2310	1280	1350	288
22	630	678	308	e115	659	1620	1410	725	2280	1090	1230	256
23	619	647	e260	e110	576	1490	1320	683	2520	952	1130	203
24	620	637	e270	e110	567	1360	1270	676	2500	828	1040	197
25	605	535	e280	e105	e420	1250	1360	681	2610	737	938	191
26	588	304	e240	e100	e440	1150	1750	670	2770	662	876	176
27	567	256	e210	e100	e470	1090	2080	646	2900	594	807	166
28	565	e350	e190	e98	e440	1020	2120	623	2920	538	748	162
29	549	e460	e200	e97	---	941	2110	596	2840	505	678	154
30	496	e420	e220	e95	---	877	2230	546	2600	473	638	145
31	428	---	e240	e96	---	826	---	510	---	439	591	---
TOTAL	21228	15096	11936	4841	6618	46964	35203	38295	54290	38255	34231	12012
MEAN	685	503	385	156	236	1515	1173	1235	1810	1234	1104	400
MAX	940	760	520	270	817	2400	2230	2280	2920	2430	2640	655
MIN	428	256	190	95	88	480	559	510	404	439	210	145
AC-FT	42110	29940	23680	9600	13130	93150	69830	75960	107700	75880	67900	23830
CFSM	.56	.41	.32	.13	.19	1.24	.96	1.01	1.48	1.01	.91	.33
IN.	.65	.46	.36	.15	.20	1.43	1.07	1.17	1.66	1.17	1.04	.37

a Daily discharge.

e Estimated.

DES MOINES RIVER BASIN

05476000 DES MOINES RIVER AT JACKSON, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1930 - 1994, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	158	162	95.1	45.0	65.8	454	1013	609	595	521	224	183
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 1993 CALENDAR YEAR

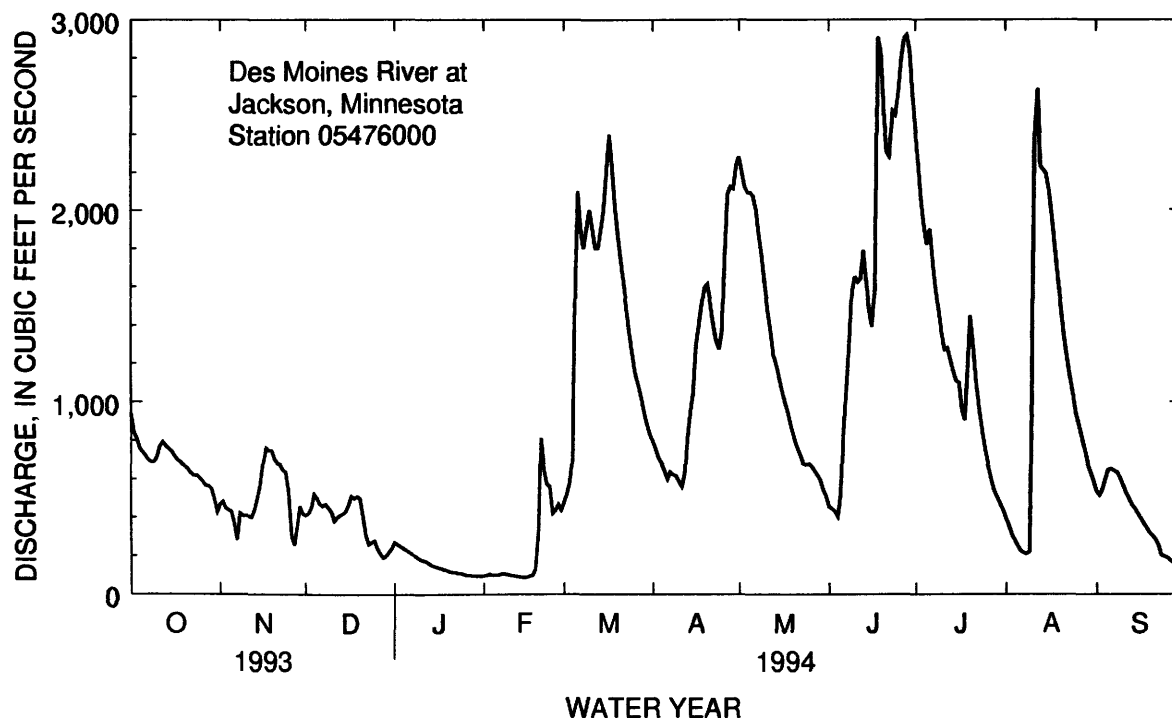
FOR 1994 WATER YEAR

WATER YEARS 1930 - 1994

ANNUAL TOTAL	748127	318969	
ANNUAL MEAN	2050	874	366 ^a
HIGHEST ANNUAL MEAN			2098
LOWEST ANNUAL MEAN			15.1
HIGHEST DAILY MEAN	8180	Jul 8	2920
LOWEST DAILY MEAN	115	Mar 2	88
ANNUAL SEVEN-DAY MINIMUM	121	Feb 28	93
INSTANTANEOUS PEAK FLOW			3090
INSTANTANEOUS PEAK STAGE			11.97
INSTANTANEOUS LOW FLOW			.00
ANNUAL RUNOFF (AC-FT)	1484000	632700	264800
ANNUAL RUNOFF (CFSM)	1.68	.72	.30
ANNUAL RUNOFF (INCHES)	22.81	9.73	4.07
10 PERCENT EXCEEDS	5840	2040	972
50 PERCENT EXCEEDS	1000	646	77
90 PERCENT EXCEEDS	145	145	2.7

a Median of annual mean discharges is 247 ft³/s.

b Many days in several years.



DES MOINES RIVER BASIN

05476000 DES MOINES RIVER AT JACKSON, MN--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1968-69, 1973-76, 1978, 1983, 1989-90, 1994.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

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, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS ORTHOPHOS- PHATE DIS- SOLVED (MG/L AS P) (00671)
APR 05...	0845	870	643	8.2	3.0	12.2	0.020	2.30	0.020	<0.010
JUN 06...	1245	1120	712	8.0	23.0	7.4	0.040	3.50	0.020	<0.010

**Partial-Record Stations
and
Miscellaneous Sites**



**Mississippi River at Elk River, MN
(12/18/33)**

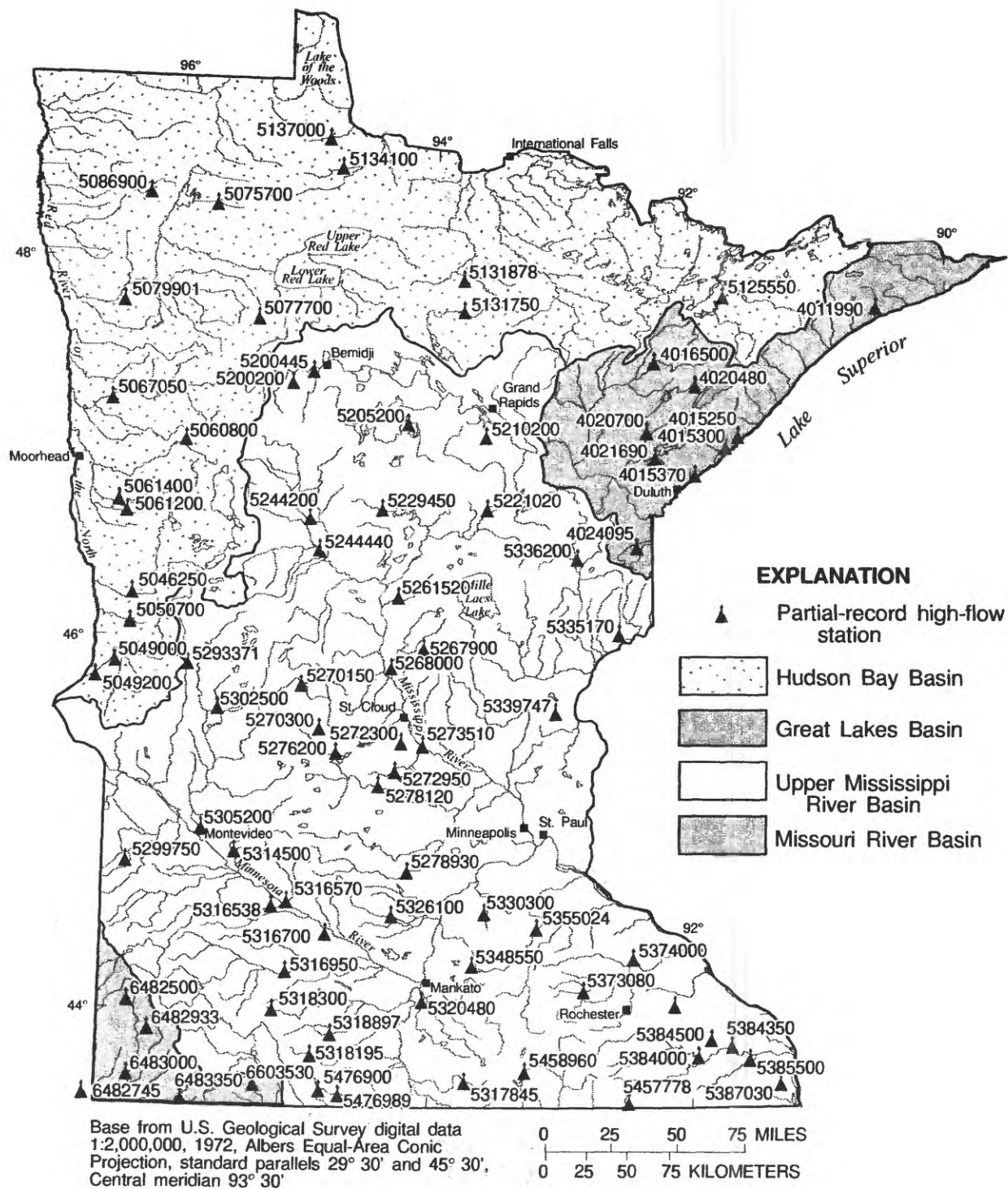


Figure 9.—Location of high-flow partial-record stations.

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

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 partial-record stations or miscellaneous sites are presented in two tables. The first is a table of discharge at high-flow partial-record stations and the second is a table of discharge measurements made at miscellaneous sites.

High-flow partial-record stations

The following table contains annual maximum discharge for high-flow stations. A high-flow partial-record station is equipped with a crest-stage gage, a device which will register the peak stage occurring between inspections of the gage. A stage-discharge relation for each gage is developed from discharge measurements made by indirect measurements of peak flow or by current meter. The date of the maximum discharge is not always certain but is usually determined by comparison with nearby continuous-record stations, weather records, or local inquiry. Only the maximum discharge for each water year is given. Information on some lower floods may have been obtained, and discharge measurements may have been made for purposes of establishing the stage-discharge relation, but these are not published herein. 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 partial-record stations during water year 1994

Station name and number	Location and drainage area	Period of record	Water year 1994 maximum			Period of record maximum		
			date	gage height (ft)	discharge (ft ³ /s)	date	gage height (ft)	discharge (ft ³ /s)
Streams tributary to Lake Superior								
Cascade River near Grand Marais, MN 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 is ____ mi ² .	1985-94	6-17-94	a10.96	535	4-29-90	11.95	1210
Silver Creek tributary near Two Harbors, MN 04015250	Lat 47° 04' 40", long 91° 36' 49", in SW 1/4 NE 1/4 sec. 16, T. 53 N., R. 10 W., Lake County, Hydro- logic Unit 04010102, at cul- vert on County Highway 3, 1.0 mile upstream from mouth, 4.5 miles northeast of Two Harbors. Drainage area is 3.72 mi ² .	1965-94	4-26-94	bc5.37	275	9-20-72	17.08	1880
Little Stewart River near Two Harbors, MN 04015300	Lat 47° 03' 52", long 91° 40' 03", in SE 1/4 NE 1/4 sec. 24, T. 53 N., R. 11 W., Lake County, Hydro- logic Unit 04010102, at cul- vert on County Highway 2, 2.0 miles upstream from mouth, 2.7 miles north of Two Harbors. Drainage area is 5.54 mi ² .	1960-94	4-26-94	10.55	187	9-20-72	15.18	598

"See footnotes at end of the table."

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES
Annual maximum discharge at high-flow partial-record stations during water year 1994--Continued

Station name and number	Location and drainage area	Period of record	Water year 1994 maximum			Period of record maximum		
			date	gage height (ft)	discharge (ft ³ /s)	date	gage height (ft)	discharge (ft ³ /s)
Streams tributary to Lake Superior--Continued								
Talmadge River at Duluth, MN 04015370	Lat 46°53'20", long 91°55'21", in SE 1/4 NE 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 is 5.79 mi ² .	1964-94	4-26-94	14.26	196	5-9-79	21.76	1180
St. Louis River near Aurora, MN 04016500	Lat 47°29'30", long 92°14'20", in NW 1/4 SW 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 is 290 mi ² .	1942-87# 1988-94	6-20-94	4.55	1680	5-14-50	8.37	5380
North Branch Whiteface River near Fairbanks, MN 04020480	Lat 47°22'20", long 91°56'28", in NW 1/4 NW 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 is 17.1 mi ²	1979-94	4-16-94	12.75	295	4-23-79	13.67	660
Bug Creek at Shaw, MN 04020700	Lat 47°06'40", long 92°21'03", in SW 1/4 SE 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 is 24.0 mi ² .	1979-94	4-16-94	14.19	315	4-23-79	15.12	590
Cloquet River near Toimi, MN 04021690	Lat 47°21'00", long 91°39'30", in NE 1/4 SW 1/4 sec. 7, T.56 N., R.10 W., Lake County, Hydro- logic Unit 04010202, at bridge on County Highway 2, 5.8 miles southeast of Toimi, 23 miles north of Two Harbors. Drainage area is ____ mi ² .	1986-94	6-17-94	6.68	550	7-4-93	9.06	1540

"See footnotes at end of the table."

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES
Annual maximum discharge at high-flow partial-record stations during water year 1994--Continued

Station name and number	Location and drainage area	Period of record	Water year 1994 maximum			Period of record maximum		
			date	gage height (ft)	discharge (ft ³ /s)	date	gage height (ft)	discharge (ft ³ /s)
Streams tributary to Lake Superior—Continued								
Nemadji River near Holyoke, MN 04024095	Lat 46°31'04", long 92°23'22", in NE¼NE¼ sec.32, T.47 N., R.16 W., Carlton County, Hydro- logic Unit 04010301, at bridge on State Highway 23, 3.5 miles north of Holyoke, 7 miles south of Wrenshall. Drainage area is 118 mi².	1972-94	4-26-94	11.62	1620	9-3-85	17.38	4420
Red River of the North basin								
Ottertail River near Foxhome, MN 05046250	Lat 46°12'48", long 96°18'24", in SW¼SW¼ sec.26, T.132 N., R.45 W., Wilkin County, Hydro- logic Unit 09020103, at bridge on County Road 19, 4 miles south of Foxhome, 10.8 miles below Orwell Dam. Drainage area is ____ mi².	1990-94	5-7-94	c15.85	1230	7-25-93	16.38	1400
Mustinka River above Wheaton, MN 05049000	Lat 45°49'15", long 96°29'25", in SW¼ 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 is 834 mi².	1915-24#, 1930-58#, 1985-94	3-25-94	16.95	4310	4-10-52	16.56	7320
Eighteenmile Creek near Wheaton, MN 05049200	Lat 45°47'18", long 96°31'52", in NW¼NW¼ sec.25, T.127 N., R.47 W., Traverse County, Hydro- logic Unit 09020102, at culvert on County Highway 7, 1.4 miles upstream from mouth, 2.0 miles southwest of Wheaton. Drainage area 68.5 mi².	1965-94	7-19-94	c11.35	995	4-9-69	---	d2400
Rabbit River near Nashua, MN 05050700	Lat 46°04'30", long 96°18'24", in SE¼NE¼ sec. 15, T.130 N., R.45 W., Wilkin County, Hydro- logic 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 is 56.1 mi².	1979-94	3-23-94	a15.37	1020	9-21-86	14.27	1280

"See footnotes at end of the table."

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES
 Annual maximum discharge at high-flow partial-record stations during water year 1994--Continued

Station name and number	Location and drainage area	Period of record	Water year 1994 maximum			Period of record maximum		
			date	gage height (ft)	discharge (ft ³ /s)	date	gage height (ft)	discharge (ft ³ /s)
Red River of the North basin--Continued								
Buffalo River near Callaway, MN 05060800	Lat 47°01'17", long 95°54'43", in SW ¹ / ₄ SW ¹ / ₄ sec. 17, T.141 N., R.41 W., Becker County, Hydro- logic Unit 09020106, at culvert on U.S. Highway 59, 2.7 miles north of Callaway. Drainage area is 94.5 mi ² .	1960-94	3-21-94	13.78	270	7-16-93	24.90	1630
Whiskey Creek at Barnesville, MN 05061200	Lat 46°39'35", long 96°23'54", in SE ¹ / ₄ SW ¹ / ₄ sec.20, T.137 N., R.45 W., Clay County, Hydro- logic Unit 09020106, at cul- vert on State Highway 34, 0.7 mile upstream from Blue Eagle Lake, 1.0 mile northeast of Barnesville. Drainage area is 25.3 mi ² .	1961-64, 1965-66#, 1967-94	3-22-94	b5.50	120	5-31-85	7.12	660
Spring Creek above Downer, MN 05061400	Lat 46°44'37", long 96°25'12", in NW ¹ / ₄ NW ¹ / ₄ sec.30, T.138 N., R.45 W., Clay County, Hydro- logic Unit 09020106, at cul- vert on county road, 3.1 miles east of Downer. Drainage area is 5.81 mi ² .	1961-94	3-20-94	b6.97	31	6-29-75	13.52	1460
Marsh River Ditch near Ada, MN 05067050	Lat 47°17'46", long 96°26'09", in NE ¹ / ₄ NE ¹ / ₄ sec.13, T.144 N., R.46 W., Norman County, Hydro- logic Unit 09020108, at bridge on County Highway 24, 3.5 miles southeast of Ada. Drainage area is ____ mi ² .	1985-94			0	4-6-89	16.74	1070
Mud River near Grygla, MN 05075700	Lat 48°19'31", long 95°44'35", in NE ¹ / ₄ NE 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. Drain- age area is 170 mi ² .	1979-94	7-8-94	e17.02	1150	4-26-79	18.49	1480
Ruffy Brook near Gonvick, MN 05077700	Lat 47°44'50", long 95°24'45", in SE ¹ / ₄ SE 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 is 45.2 mi ² .	1960-78#, 1979-85, 1986,# 1987-94	7-19-94	ac2.85	112	3-30-67	6.35	453

"See footnotes at end of the table."

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES
Annual maximum discharge at high-flow partial-record stations during water year 1994--Continued

Station name and number	Location and drainage area	Period of record	Water year 1994 maximum			Period of record maximum		
			date	gage height (ft)	discharge (ft ³ /s)	date	gage height (ft)	discharge (ft ³ /s)
Red River of the North basin—Continued								
Burnham Creek near Crookston, MN 05079901	Lat 47°43'59", long 96°39'52", in SE ¹ / ₄ SW ¹ / ₄ sec.10, T.149 N., R.47 W., Polk County, Hydro- logic 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 is 1111 mi ² .	1986-94	7-8-94	e19.25	1340	4-4-89	20.44	1900
Middle River near Newfolden, MN 05086900	Lat 48°22'04", long 96°16'47", in NE ¹ / ₄ NE ¹ / ₄ sec.3, T.156 N., R.44 W., Marshall County, Hydro- logic Unit 09020309, at bridge on township road, 2.0 miles northeast of Newfolden. Drain- age area is 91.1 mi ² .	1979-94	3-22-94	bc14.40	50	4-25-79	17.10	1000
Lake of the Woods basin								
Stony River near Babbitt, MN 05125550	Lat 47°41'36", long 91°45'38", in SW ¹ / ₄ SW ¹ / ₄ sec.8, T.60 N., R.11 W., Lake County, Hydro- logic Unit 09030001, in Super- ior National Forest, at bridge on Forest Road 424, 4.7 miles upstream from mouth, 8.5 miles southeast of Babbitt. Drain- age area is 219 mi ² .	1975-80#, 1986-94	6-19-94	6.76	1150	4-19-76	8.71	2490
Gold Portage Outlet from Kabetogama Lake near Ray, MN 05129290	Lat 48°31'28", long 93°04'29", in SW ¹ / ₄ NE ¹ / ₄ 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.	1983-93# 1994	7-5-94	18.70	765	9-21-88	19.23	897
Big Fork River near Bigfork, MN 05131750	Lat 47°44'56", long 93°46'31", in SW ¹ / ₄ NE ¹ / ₄ sec.27, T.61 N., R.27 W., Itasca County, Hydro- logic Unit 09030006, at bridge on State Highway 6, 5.5 miles west of Bigfork. Drainage area is 602 mi ² .	1973-94	4-30-94	ce11.35	985	4-22-79	15.48	2830
Bowerman Brook near Craigville, MN 05131878	Lat 47°55'29", long 93°45'34", in NE ¹ / ₄ NW 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 is 25.0 mi ² .	1979-94	4-18-94	e12.88	120	4-21-79	14.73	650

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Annual maximum discharge at high-flow partial-record stations during water year 1994--Continued

Station name and number	Location and drainage area	Period of record	Water year 1994 maximum			Period of record maximum		
			date	gage height (ft)	discharge (ft ³ /s)	date	gage height (ft)	discharge (ft ³ /s)
Lake of the Woods basin--Continued								
Big Fork River at Big Falls, MN 05132000	Lat 48°11'45", long 93°48'25", in SW ¹ / ₄ SE ¹ / ₄ sec. 35, T. 155 N., R. 25 W., Koochiching County, Hydrologic Unit 09030006, at village 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 is 11,460 mi ² .	1929-1979#, 5-2-94 1980-1982 1983-1993#, 1994		7.02	3190	5-8-50	17.08	14800
North Branch Rapid River near Baudette, MN 05134100	Lat 48°31'56", long 94°38'50", in NW ¹ / ₄ SW 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 south- west of Baudette. Drainage area is 1180 mi ² .	1986-94	6-20-94	7.14	340	3-31-86	11.16	1000
Winter Road River near Baudette, MN 05137000	Lat 48°42'39", long 94°41'52", in NW ¹ / ₄ NE 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 is 1145 mi ² .	1986-94	9-18-94	e11.85	700	3-31-86	14.30	1400
Mississippi River main stem								
Hennepin Creek near Becida, MN 05200200	Lat 47°23'52", long 95°05'12", in NW ¹ / ₄ NE ¹ / ₄ sec. 11, T. 145 N., R. 35 W., Hubbard County, Hydro- logic Unit 07010101, at culvert on Stumphges Rapids Trail approxi- mately 0.5 mile west of Hubbard County Road 3, 3 miles north of Becida, 1.5 miles upstream from mouth. Drainage area 41.4 mi ² .	1979-94	6-20-94	ce12.90	44	5-11-85	15.25	375
Mississippi River at Bemidji, MN 05200445	Lat 46°27'04", long 94°54'23", in NW ¹ / ₄ NW ¹ / ₄ sec. 20, T. 146 N., R. 33 W., Beltrami County, Hydro- logic Unit 07010101, at bridge on County Highway 11, 1.4 miles south- west of intersection of U.S. Highway 2 and County Highway 7 in Bemidji. Drainage area 400 mi ² .	1973-87, 1988-89#, 1990-94	4-7-94	a11.17	372	4-23-79	13.04	1690

"See footnotes at end of the table."

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES
Annual maximum discharge at high-flow partial-record stations during water year 1994--Continued

Station name and number	Location and drainage area	Period of record	Water year 1994 maximum			Period of record maximum		
			date	gage height (ft)	discharge (ft ³ /s)	date	gage height (ft)	discharge (ft ³ /s)
		Leech Lake River basin						
Boy River near Remer, MN 05205200	Lat 47°04'51", long 94°05'54", in SE¼SE¼ sec.28 T.142 N., R.27 W., Cass County, Hydro- logic Unit 07010102, at bridge on County Highway 53, 1.9 miles up- stream from Boy Lake and 9 miles northwest of Remer. Drainage area 310 mi².	1986-94	6-20-94	ce10.25	240	7-23-87	11.64	660
		Smith Creek basin						
Smith Creek near Hill City, MN 05210200	Lat 47°04'58", long 93°34'59", in SE¼NW¼ sec.13, T.53 N., R.26 W., Itasca County, Hydro- logic Unit 07010101, at culvert on U.S. Highway 169, 6.2 miles north of Hill City. Drainage area 8.00 mi².	1961-94	4-26-94	c5.04	68	8-5-81	7.95	445
		Willow River basin						
Willow River below Palisade, MN 05221020	Lat 46°42'36", long 93°33'21", in NW¼NE¼ sec.30, T.49 N., R.25 W., Aitkin County, Hydro- logic Unit 07010103, at bridge on County Highway 3, 3.2 miles west of Palisade. Drainage area 44 mi².	1972-94	4-16-94	12.42	1520	4-25-79	17.25	3730
		Pine River basin						
Pine River near Pine River, MN 05229450	Lat 48°41'39", long 94°22'11", in NE¼SE¼ sec.8, T.137 N., R.29 W., Cass County, Hydro- logic Unit 07010105, at bridge 2.3 miles southeast of Pine River, on U.S. Highway 371, 4.9 miles up- stream of upper Whitefish Lake. Drainage area 2277 mi².	1986-94	6-17-94	a3.48	305	3-28-86	4.35	1150

"See footnotes at end of the table."

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES
Annual maximum discharge at high-flow partial-record stations during water year 1994--Continued

Station name and number	Location and drainage area	Period of record	Water year 1994 maximum		Period of record maximum		gage height (ft)	discharge (ft ³ /s)
			date	gage height (ft)	discharge (ft ³ /s)	date		
Crow Wing River basin								
Cat River near Nimrod, MN 05244200	Lat 46°37'49", long 94°55'51", in SW ¹ / ₄ SW ¹ / ₄ sec.36, T.137 N., R.34 W., Wadena County, Hydro- logic Unit 07010106, at bridge on State Highway 227, 2.5 miles west of Nimrod, 3.0 miles upstream from mouth. Drainage area 49.2 mi ² .	1961-94	3-22-94	67.93	140	10-12-73	9.43	560
Leaf River near Aldrich, MN 05244440	Lat 46°27'25", long 94°50'29", in SW ¹ / ₄ SW ¹ / ₄ sec.34, T.135 N., R.33 W., Wadena County, Hydro- logic Unit 07010107, at bridge on County Highway 29, 3.3 miles upstream from mouth, 7.0 miles northeast of Aldrich. Drainage area 860 mi ² .	1972-94	4-26-94	14.05	2300	4-22-79	16.15	5170
Nokasippi River basin								
Nokasippi River near Fort Ripley, MN 05261520	Lat 46°12'02", long 94°19'03" on line between secs. 13 and 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 178 mi ² .	1967-70+, 1974+, 1976+, 1986-94	5-2-94	12.63	640	4-4-86	13.90	828
Platte River basin								
Hillman Creek near Pierz, 05267900	Lat 45°58'27", long 94°04'21", in NE ¹ / ₄ SE 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 46.7 mi ² .	1964-94	5-2-94	13.66	460	4-9-69	15.48	2960
Platte River above Royalton, MN 05268000	Lat 45°50'43", long 94°17'40", in SE ¹ / ₄ NW ¹ / ₄ sec.26, T.39 N., R.32 W., Morrison County, Hydro- logic Unit 07010201, at bridge on County Highway 27, 0.6 mile north of Royalton, 6.6 miles up- stream from mouth. Drainage area 335 mi ² .	1929-36, 1972-94	5-1-94	11.36	1320	7-26-72	7.84	6850

"See footnotes at end of the table."

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES
Annual maximum discharge at high-flow partial-record stations during water year 1994--Continued

Station name and number	Location and drainage area	Period of record	Water year 1994 maximum			Period of record maximum		
			date	gage height (ft)	discharge (ft ³ /s)	date	gage height (ft)	discharge (ft ³ /s)
Sauk River basin								
Ashley Creek near Sauk Centre, MN 05270150	Lat 45°46'46", long 94°58'52", in NW¼SE¼ 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 113 mi².	1963-70+ 1974+ 1976+ 1986-88, 1989# 1990-94	4-29-94	a14.87	330	9-25-86	16.52	600
Sauk River tributary at Spring Hill, MN 05270300	Lat 45°31'22", long 94°48'31", in SW¼NE¼ 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 7.06 mi².	1960-94	4-26-94	10.20	110	7-8-78	22.76	1440
Johnson Creek basin								
Johnson Creek near St. Augusta, MN 05272300	Lat 45°27'49", long 94°09'19", in NW¼SW¼ 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 46.7 mi².	1964-94	4-29-94	12.56	212	9-9-85	16.37	2350
Clearwater River basin								
Clearwater River near South Haven, MN 05272950	Lat 45°16'45", long 94°15'04", in NE¼NW¼ 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 -.	1985-94	5-1-94	15.58	440	9-9-85	17.11	1040
Mississippi River main stem								
Mississippi River at Clearwater, MN 05273510	Lat 45°25'15", long 94°02'37", in NW¼SW¼ sec.23, T.34 N., R.30 W., Sherburne County, Hydrologic Unit 07010203, on left bank 700 ft upstream from bridge, on State Highway 24 at Clearwater. Drainage area -.	1972-94	5-2-94	a14.56	23300	4-24-79	18.75	33900

"See footnotes at end of the table."

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES
Annual maximum discharge at high-flow partial-record stations during water year 1994—Continued

Station name and number	Location and drainage area	Period of record	date	Water year 1994 maximum		Period of record maximum		
				gage height (ft)	discharge (ft ³ /s)	date	gage height (ft)	discharge (ft ³ /s)
Crow River basin								
North Fork Crow River at Paynesville, MN 05276200	Lat 45°23'09", long 94°42'41", in SW¼SE¼ 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 236 mi².	1973-94	5-1-94	4.72	780	6-21-83	9.29	2300
North Fork Crow River near Kingston, MN 05278120	Lat 45°12'13", long 94°23'16", in SW¼SE¼ 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 -.	1986-94	5-2-94	14.69	2060	5-1-86	17.82	4850
Buffalo Creek near Glencoe, MN 05278930	Lat 44°45'50", long 94°05'27", in SW¼SW¼ sec. 16, T. 115 N., R. 27 W., McLeod County, Hydrologic Unit 07010205, on right bank, 20 ft downstream from bridge on County Highway 1, 2.6 mi east of Glencoe. Drainage area 374 mi².	1972 1973-80# 1991-94	3-15-94	a7.58	1370	9-12-91	11.78	4300
Minnesota River basin								
Pomme de terre River near Elbow Lake, MN 05293371	Lat 46°57'47", long 95°53'07", in SE¼SW¼ 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 mi².	1986-94	3-26-94	a4.76	200	7-26-93	7.08	420
Florida Creek near Burr, MN 05299750	Lat 44°49'00", long 96°25'10", in SE¼SE¼ 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 mi².	1982 1983-84# 1991-94	6-23-94	17.94	455	6-17-92	20.85	996
Little Chippewa River near Starbuck, MN 05302500	Lat 45°36'52", long 95°37'12", in NW¼NE¼ 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 69.6 mi².	1979-94	4-25-94	c12.65	172	6-30-91	12.54	178

"See footnotes at end of the table."

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES
Annual maximum discharge at high-flow partial-record stations during water year 1994--Continued

Station name and number	Location and drainage area	Period of record	Water year 1994 maximum			Period of record maximum		
			date	gage height (ft)	discharge (ft ³ /s)	date	gage height (ft)	discharge (ft ³ /s)
Minnesota River basin—Continued								
Spring Creek near Montevideo, MN 05305200	Lat 44°58'41", long 95°42'57", in NW¼NW¼ sec. 5, T. 117 N., R. 40 W., Chippewa County, Hydro- logic Unit 07020005, at culvert on State Highway 29, 1.2 miles upstream from mouth, 2.0 miles north of Montevideo. Drainage area 15.8 mi².	1959-94	4-25-94	14.00	82	6-17-92	19.73	660
Hawk Creek near Maynard, MN 05314500	Lat 44°52'10", long 95°28'58", in SW¼NW¼ sec. 7, T. 116 N., R.38 W., at Renville and Chippewa County line, Hydrologic Unit 07020004, at bridge on State High- way 23, 3.0 miles southwest of Maynard. Drainage area 474 mi².	1949-54#, 1981-94	3-22-94	b16.53	1450	6-18-57	16.10	6970
Beaver Creek at Beaver Falls, MN 05316570	Lat 44°35'03", long 95°02'49", in NE¼NW¼ sec. 22, T. 113 N., R.35 W., Renville County, Hydro- logic 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 194 mi².	1972-94	3-21-94	a9.78	615	6-17-93	13.86	2750
Spring Creek near Sleepy Eye, MN 05316700	Lat 44°24'12", long 94°44'41", in NE¼SE¼ sec. 24, T. 111 N., R. 33 W., Brown County, Hydro- logic Unit 07020007, at cul- vert on county highway, 4.3 miles upstream from mouth, 7.5 miles north of Sleepy Eye. Drainage area 31.3 mi².	1959-94	4-26-94	15.34	610	6-17-93	17.91	960
Cottonwood River tributary No. 2 near Sanborn, MN 05316920	Lat 44°10'34", long 95°07'15", in SW¼NW¼ sec. 12, T. 108 N., R. 36 W., Cottonwood County, Hydrologic Unit 07020008, at culvert on U.S. Highway 71, 2.4 miles south of Sanborn. Drainage area 0.42 mi².	1966-90 1993-94	h6-17-93 4-26-94	7.54 6.74	134 98	h6-17-93	7.54	134
Cottonwood River near Springfield, MN 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 up- stream from Coal Mine Creek, 3.5 miles southwest of Spring- field. Drainage area 773 mi².	1973-94	4-26-94	a23.95	3400	4-8-69	31.55	18300

"See footnotes at end of the table."

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES
Annual maximum discharge at high-flow partial-record stations during water year 1994--Continued

Station name and number	Location and drainage area	Period of record	Water year 1994 maximum			Period of record maximum		
			date	gage height (ft)	discharge (ft ³ /s)	date	gage height (ft)	discharge (ft ³ /s)
Minnesota River basin--Continued								
East Branch Blue Earth River near Walters, MN 05317845	Lat 43°37'58", long 93°42'28", in SE 1/4 SE 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 .	1979-94	8-10-94	17.47	465	8-15-93	18.73	595
Elm Creek near Trimont, MN 05318195	Lat 43°45'27", long 94°50'30", in NW 1/4 NW 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 Trimont. Drainage area -.	1991-94	6-18-94	22.99	1550	6-4-91	22.92	2000
Watonwan River near Delft, MN 05318300	Lat 43°59'55", long 95°07'11", in NE 1/4 SE 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 .	1960-94	8-10-94	15.33	72	6-18-93	17.70	1000
South Fork Watonwan River near Ormsby, MN 05318897	Lat 43°53'08", long 94°41'27", in SE 1/4 NW 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 .	1979-94	8-10-94	12.89	405	5-31-80	18.40	1920
Maple River near Rapidan, MN 05320480	Lat 44°03'54", long 94°01'32", in SW 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 .	1972-94	3-5-94	10.77	2330	3-1-83	12.73	4550
Middle Branch Rush River near Gaylord, MN 05326100	Lat 44°30'27", long 94°15'00", in SW 1/4 NW 1/4 sec. 18, T. 112 N., on line between R. 28 W. and R. 29 W., Sibley County, Hydrologic Unit 07020012, at bridge on township road, 3.0 miles southwest of Gaylord, 10.5 miles upstream from the main branch of Rush River. Drainage area 68.5 mi ² .	1979-94	8-25-94	15.97	765	6-17-93	19.93	1380

"See footnotes at end of the table."

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES
Annual maximum discharge at high-flow partial-record stations during water year 1994—Continued

Station name and number	Location and drainage area	Period of record	date	Water year 1994 maximum		Period of record maximum		
				gage height (ft)	discharge (ft ³ /s)	date	gage height (ft)	discharge (ft ³ /s)
Minnesota River basin—Continued								
Sand Creek near New Prague, MN 05330300	Lat 44°32'37", long 93°32'16", in NE¼NW¼ sec.1, T.112 N., R.23 W., Le Sueur County, Hydro- logic Unit 07020012, at culvert on State Highway 13 and 19, 1.9 miles east of New Prague. Drainage area 62.4 mi².	1960-94	3-5-94	10.05	178	5-21-60	14.84	1100
St. Croix River basin								
Crooked Creek near Hinckley, MN 05335170	Lat 46°00'42", long 92°31'45", in NE¼NE¼ sec.30, T.41 N., R.17 W., Pine County, Hydro- logic Unit 07030001, at culvert on State Highway 48, 2.7 miles up- stream from mouth, 8 miles south of Duxbury, 19 miles east of Hinckley. Drainage area 93 mi².	1966-70+, 1974-76+, 1979-80+, 1986-94	9-16-94	13.93	1020	5-28-89	15.52	1630
Glaisby Brook near Kettle River, MN 05336200	Lat 46°27'19", long 92°51'34", in SE¼NW¼ sec.22, T.46 N., R.20 W., Carlton County, Hydro- logic 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 27.5 mi².	1960-70#, 1971-94	9-15-94	7.13	660	7-22-72	10.18	1370
Goose Creek at Harris, MN 05339747	Lat 45°35'11", long 92°58'39", in SW¼SW¼ sec.21, T.36 N., R.21 W., Chisago County, Hydro- logic Unit 07030005, at culverts on County Highway 9, 0.15 mile east of County Highway 30 in Harris, 8 miles above mouth. Drainage area 660 mi².	1986-94	4-29-94	6.13	165	5-5-91	7.40	286
Cannon River basin								
Cannon River below Sabre Lake near Kilkenny, MN 05348550	Lat 44°17'50", long 93°37'44", in NE¼NE¼ sec.31, T. 110 N., R.23 W., LeSueur County, Hydro- logic Unit 07040002, at bridge on township road, 0.25 mile downstream of Sabre Lake, 3 miles southeast of Kilkenny. Drainage area -.	1985-94	8-10-94	12.16	180	6-17-93	14.36	535
Cannon River at Northfield, MN 05355024	Lat 44°27'19", long 93°09'46", in NE¼NE¼ sec.1, T.111 N., R.20 W., Rice County, Hydro- logic Unit 07040002, at Fifth Street bridge in North- field. Drainage area 934 mi².	1980-94	4-30-94	902.81	2550	6-18-93	905.10	8000

"See footnotes at end of the table."

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES
Annual maximum discharge at high-flow partial-record stations during water year 1994--Continued

Station name and number	Location and drainage area	Period of record	Water year 1994 maximum			Period of record maximum		
			date	gage height (ft)	discharge (ft ³ /s)	date	gage height (ft)	discharge (ft ³ /s)
Zumbro River basin								
Milliken Creek near Concord, MN 05373080	Lat 44°07'13", long 92°49'08", in NW¼NW¼ 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 22.2 mi ² .	1979-94	3-6-94	612.59	245	5-31-82	14.50	580
Zumbro River at Zumbro Falls, MN 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 61,130 mi ² .	1909-17#, 1929-80#, 1990-94	3-7-94	12.10	4790	7-21-51	30.80	35900
Whitewater River basin								
Middle Fork Whitewater River near State Park Group Camp near St. Charles, MN 05376110	Lat 44°03'21", long 92°03'13", in SW¼ sec.20, T.107 N., R.10 W., Olmsted County, Hydrologic Unit 07040003, at wooden bridge near Group Camp in Whitewater State Park. Drainage area -.	1986-94	3-6-94	64.86	†	4-24-90	67.39	†
Root River basin								
Root River near Lanesboro, MN 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 1987-90# 1991-94	3-6-94	4.83	2230	3-29-62	16.11	22100
Root River at Rushford, MN 05384350	Lat 43°48'11", long 91°45'10", in NE¼NE¼ 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 -.	1985-94	3-6-94	623.45	4200	4-1-93	26.10	15200

"See footnotes at end of the table."

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES
Annual maximum discharge at high-flow partial-record stations during water year 1994—Continued

Station name and number	Location and drainage area	Period of record	date	Water year 1994 maximum		Period of record maximum		
				gage height (ft)	discharge (ft ³ /s)	date	gage height (ft)	discharge (ft ³ /s)
Root River basin—Continued								
Rush Creek near Rushford, MN 05384500	Lat 43°50'00", long 91°46'40", on line between secs. 3 and 10, 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 129 mi ² .	1942-79#, 1980-94	3-5-94	b4.63	600	3-26-50	13.54	11600
South Fork Root River near Houston, MN 05385500	Lat 43°44'19", long 91°33'50", in NE¼SW¼ sec.9, T.103 N., R.6 W., Houston County, Hydrologic Unit 07040008, on left bank, 50 feet downstream from State Highway 76 bridge, 0.5 mile upstream from Badger Creek, 1.5 mile south of Houston. Drainage area 275 mi ² .	1953-83#, 1985-94	3-6-94	10.72	3100	6-21-74	13.81	11000
Crooked Creek basin								
Crooked Creek at Freeburg, MN 05387030	Lat 43°36'37", long 91°21'39", in SW¼NE¼ sec.30, T.102 N., R.4 W., Houston County, Hydro- logic Unit 07060001, at bridge on State Highway 249 at Freeburg. 6.5 miles upstream from mouth. Drainage area 44.2 mi ² .	1979-94	4-26-94	10.33	370	3-4-92	19.02	i2200
Iowa River basin								
Little Cedar River near Johnsburg, MN 05457778	Lat 43°30'52", long 92°45'19", in NW¼NE¼ sec.33, T.101 N., R.16 W., Mower County, Hydro- logic Unit 07080201, at bridge on County Road 6, 1 mile north- east of Johnsburg, 1 mile north of Minnesota-Iowa border. Drainage area 46 mi ² .	1986-94	6-7-94	c12.86	1350	8-16-93	17.58	9280
Bancroft Creek at Bancroft, MN 05458960	Lat 43°42'09", long 93°21'23", in SW¼SE¼ sec.21, T.103 N., R.21 W., Freeborn County, Hydro- logic Unit 07080202, at bridge on County Road 14, 1.6 miles north- east of Fountain Lake, 1 mile north of Interstate 90. Drainage area 29.1 mi ² .	1985+, 1986-94	6-7-94	6.26	360	8-16-93	8.26	700

"See footnotes at end of the table."

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES
Annual maximum discharge at high-flow partial-record stations during water year 1994--Continued

Station name and number	Location and drainage area	Period of record	Water year 1994 maximum			Period of record maximum		
			date	gage height (ft)	discharge (ft ³ /s)	date	gage height (ft)	discharge (ft ³ /s)
Iowa River basin--Continued								
Fourmile Creek near Dunnell, MN 05476900	Lat 43°34'57", long 94°46'26", in SW ¹ / ₄ NW 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 14.0 mi ² .	1960-94	6-23-94	ac12.12	145	7-4-62	16.15	2200
Des Moines River basin								
East Fork Des Moines River near Ceylon, MN 05476989	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. Drainage area 154 mi ² .	1986-94	6-23-94	18.00	565	7-5-93	21.65	1350
Big Sioux River basin								
Pipestone Creek near Pipestone, MN 06482500	Lat 44°04'54", long 96°18'27", in SE ¹ / ₄ SE ¹ / ₄ sec.12, T.107 N., R.46 W., Pipestone County, Hydrologic Unit 10170203, at bridge on Trunk Highway 75, 5.5 miles north of Pipestone. Drainage area -.	1991-94	8-10-94	17.85	500	5-8-93	20.28	2650
Beaver Creek at Valley Springs, S.D. 06482745	Lat 43°35'10", long 96°28'20", in NW ¹ / ₄ NW 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 .	1986-94	6-13-94	24.89	2280	6-13-94	24.89	2280
Chanarambi Creek near Edgerton, MN 06482933	Lat 43°53'59", long 96°03'39", in NW ¹ / ₄ SW ¹ / ₄ sec.18, T.105 N., R.43 W., near Murray and Pipestone County line, Hydrologic Unit 10170204, at bridge on township road, 3.8 miles north-east of Edgerton, 7.4 miles upstream from mouth. Drainage area 56.1 mi ² .	1979-94	8-10-94	16.39	662	5-8-93	18.14	850

"See footnotes at end of the table."

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES
Annual maximum discharge at high-flow partial-record stations during water year 1994—Continued

Station name and number	Location and drainage area	Period of record	Water year 1994 maximum			Period of record maximum		
			date	gage height (ft)	discharge (ft ³ /s)	date	gage height (ft)	discharge (ft ³ /s)
Big Sioux River basin--Continued								
Rock River at Luverne, MN 06483000	Lat 43°39'15", long 96°12'03", in SW 1/4 NE 1/4 sec.11, T.102 N., R.45 W., Rock County, Hydro- logic Unit 10170204, at bridge on Main Street (County Highway 4) in Luverne. Drainage area 425 mi ² .	1911-14#, 1972-94	6-13-94	9.35	4260	5-8-93	14.23	35400
Little Rock River near Rushmore, MN 06483350	Lat 43°32'36", long 95°48'58", in NE 1/4 NE 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. Drainage area .	1991-94	6-12-94	a26.09	1500	7-11-93	27.04	4290
Little Sioux River basin								
Little Sioux River near Spafford, MN 06603530	Lat 43°36'08", long 95°15'27", in NE 1/4 NE 1/4 sec.34, T.102 N., R.37 W., Jackson County, Hydro- logic 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 41.1 mi ² .	1962-94	8-10-94	e9.81	530	6-29-69	12.06	4500

< Less than peak stage unknown, discharge estimated.

+ Operated as low flow site.

Operated as a continuous-record gaging station.

† Discharge not determined.

a Affected by shifting control.

b Backwater from ice.

c Not annual maximum gage height.

d Discharge estimated.

e Backwater from aquatic growth or debris.

f Approximate.

g Revised.

h Not previously published.

i Peak stage at downstream side of road.

MISCELLANEOUS SITES



Current-meter measurement off of cableway

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Discharge measurements at miscellaneous sites

Measurements of streamflow at points other than gaging stations are given in the following table. The measurements of base flow are designated by an asterisk (*); measurements of peak flow by a dagger (†).

Discharge measurements made at miscellaneous sites during water year 1994

Stream	Tributary	Location	Drainage area (mi ²)	Period of record	Date	Discharge (ft ³ /s)
Red River of the North basin						
Otter Tail River	Red River of the North	Lat 46°40'20", long 95°39'56", in SW 1/4 SW 1/4 sec. 18, T. 137 N., R. 39 W., Otter Tail County, Hydrologic Unit 09020103, at trunk Highway 10 bridge, 1.2 miles northwest of Luce, MN (05030140).	331	1967-71, 1973-74, 1976-77, 1994	6-8-94 8-31-94	178 92
Otter Tail River	Red River of the North	Lat 46°39'48", long 95°38'20", in NE 1/4 SW 1/4 sec. 20, T. 137 N., R. 39 W., Otter Tail County, Hydrologic Unit 09020103, at bridge on County Road 60, 0.8 mile east of Luce, MN (463948095382001).	-	1968, 1994	8-31-94	100
Otter Tail River	Red River of the North	Lat 46°34'34", long 95°32'21", in NW 1/4 SE 1/4 sec. 24, T. 136 N., R. 39 W., Otter Tail County, Hydrologic Unit 09020103, at bridge on State Highway 80, 2 miles southeast of Perham, MN (463434095322101).	-	1945, 1967-68, 1994	8-30-95	149
Otter Tail River	Red River of the North	Lat 46°31'40", long 95°31'44", in SE 1/4 SE 1/4 sec. 6, T. 135 N., R. 38 W., Otter Tail County, Hydrologic Unit 09020103, at bridge on township road, 1.5 miles above Rush Lake, 4.5 miles southeast of Perham, MN (463140095314401).	-	1994	8-30-94	107
Otter Tail River	Red River of the North	Lat 46°30'48", long 95°31'04", in SW 1/4 SE 1/4 sec. 7, T. 135 N., R. 38 W., Otter Tail County, Hydrologic Unit 09020103, at triple box culvert, on County Road 14, 5 miles east of Richville, 0.8 mile above Rush Lake (05030300).	765	1967-74, 1976-77, 1988, 1994	8-31-94	135
aBuffalo River	Red River of the North	Lat 46°53'59", long 96°36'34", in SW 1/4 NW 1/4 sec. 34, T. 140 N., R. 47 W., Clay County, Hydrologic Unit 09020106, at bridge on County Road 68, 1.6 miles north of State Highway 10, about 2.1 miles northwest of Glyndon, MN (05061020).	-	1948, 1977-78, 1980, 1988, 1993-94	11-1-93 b12-6-93	*57 *59

"See footnotes at end of the table."

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Discharge measurements made at miscellaneous sites during water year 1994

Stream	Tributary	Location	Drainage area (mi ²)	Period of record	Date	Discharge (ft ³ /s)
Red River of the North basin--Continued						
aSouth Branch Buffalo	Buffalo River	Lat 46°46'20", long 96°37'40", in SW ¹ / ₄ SW ¹ / ₄ sec. 9, T. 138 N., R. 47 W., Clay County, Hydrologic Unit 09020106, near center of span on down- stream side of highway bridge, 0.3 mile downstream from Stony Creek, 1 mile east of Sabin (05061500).	522	1945-94#	11-1-93 b12-6-93	*8.09 *6.64
aBuffalo River	Red River of the North	Lat 46°54'19", long 96°37'09", in NW ¹ / ₄ NE ¹ / ₄ sec. 33, T. 140 N., R. 47 W., Clay County, Hydrologic Unit 09020106, at bridge on County Highway 18, 3.0 miles northwest of Glyndon, MN.	-	1978, 1993-94	11-1-93 b12-6-93	*74 *70
aBuffalo River	Red River of the North	Lat 46°54'43", long 96°37'50", in NW ¹ / ₄ SW ¹ / ₄ sec. 28, T. 140 N., R. 47 W., Clay County, Hydrologic Unit 09020106, canoe measurement site adjacent to road on township road south of County Road 89, 0.5 mile north of County Road 18, 4 miles northeast of Dilworth, 3 miles northwest of Glyndon, MN.	-	1994	11-2-93 b12-7-93	*74 *60
aBuffalo River	Red River of the North	Lat 46°55'13", long 96°38'02", in SE ¹ / ₄ SE ¹ / ₄ sec. 20, T. 140 N., R. 47 W., Clay County, Hydrologic Unit 09020106, at bridge on County Road 89, 0.9 mile east of State Highway 11, 3.5 miles northwest of Glyndon, MN.	-	1994	11-2-93 b12-7-93	*76 *63
aBuffalo River	Red River of the North	Lat 46°56'03", long 96°38'39", on section line between secs. 17 and 20, T. 140 N., R. 47 W., Clay County, Hydrologic Unit 09020106, at bridge on County Highway 91, 5 miles southwest of Averill, MN.	-	1931, 1947, 1978, 1993-94	11-1-93 b12-6-93	*77 *71
aBuffalo River	Red River of the North	Lat 46°57'40", long 96°39'40", in SW ¹ / ₄ SE ¹ / ₄ sec. 6, T. 140 N., R. 47 W., Clay County, Hydrologic Unit 09020106, on left bank 4.5 miles southeast of Kragnes, 6.5 miles northeast of Dilworth, and 9 miles downstream from South Branch (05062000).	1,040	1931-94#	11-1-93 b12-6-93	*71 *70
aBuffalo River	Red River of the North	Lat 46°58'20", long 96°41'22", in SW ¹ / ₄ NW ¹ / ₄ sec. 1, T. 140 N., R. 48 W., Clay County, Hydrologic Unit 09020106, at first County bridge below gaging station (05062000) near Dilworth, MN.	-	1978, 1993-94	11-1-93 b12-6-93	*77 *66

"See footnotes at end of the table."

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Discharge measurements made at miscellaneous sites during water year 1994

Stream	Tributary	Location	Drainage area (mi ²)	Period of record	Date	Discharge (ft ³ /s)
Red River of the North basin--Continued						
Buffalo River	Red River of the North	Lat 47°04'43", long 96°47'50", in NE ¹ / ₄ NE ¹ / ₄ sec. 31, T. 142 N., R. 48 W., Clay County, Hydrologic Unit 09020106, at bridge on township road, 0.7 mile below U.S. Trunk Highway 75, 1.5 miles above mouth, at Georgetown, MN (05062100).	-	1994	6-2-94 7-6-94	122 92
Wild Rice River	Red River of the North	Lat 47°19'31", long 95°56'46", in SE ¹ / ₄ SW ¹ / ₄ sec. 36, T. 145 N., R. 42 W., Mahnomon County, Hydrologic Unit 09020108, at bridge on Trunk Highway 200, 1 mile northwest of Mahnomon, MN (471931095564601).	-	1994	6-21-94	430
White Earth River	Wild Rice River	Lat 47°18'55", long 95°56'00", in NE ¹ / ₄ SE ¹ / ₄ sec. 1, T. 144 N., R. 42 W., Mahnomon County, Hydrologic Unit 09020108, at bridge on gravel road, 1.2 miles east of Mahnomon, MN (05062435).	c190	1964-67, 1970-73, 1976, 1980, 1994	6-21-94	181
Wild Rice River	Red River of the North	Lat 47°17'29", long 96°26'09", in in SE ¹ / ₄ NE ¹ / ₄ sec. 13, T. 144 N., R. 46 W., Norman County, Hydro- logic Unit 09020108, at bridge on County Highway 24, 3.2 miles south- east of Ada, MN (05063000).	1050	1945-51, 1965-67, 1969-72, 1975-76, 1978-79, 1988, 1994	6-21-94	1,740
Snake River	Red River of the North	Lat 48°12'45", long 96°36'32", in SE ¹ / ₄ SE ¹ / ₄ sec. 30, T. 155 N., R. 46 W., Marshall County, Hydro- logic Unit 09020309, at bridge on County Highway 36, 1 mile south of Radium, MN (481245096363201).	-	1972, 1994	6-20-94	12
Snake River	Red River of the North	Lat 48°21'27", long 97°03'56", in in SE ¹ / ₄ SE ¹ / ₄ sec. 3, T. 156 N., R. 50 W., Marshall County, Hydrologic Unit 09020309, at bridge on County Highway 17, 1 mile upstream from middle River, 11.8 miles west of Argyle, MN (05086500)	c481	1945#, 1946, 1949, 1951, 1980, 1983, 1994	6-21-94	62
Snake River	Red River of the North	Lat 48°24'42", long 97°06'26", in SW ¹ / ₄ SW ¹ / ₄ sec. 15, T. 157 N., R. 50 W., Marshall County, Hydro- logic Unit 09020309, at bridge on State Highway 220, 7 miles north of Big Woods, MN (05087600).	-	1994	6-21-94	70
Two Rivers	Red River of the North	Lat 48°46'50", long 97°02'25", in NE ¹ / ₄ SE ¹ / ₄ sec. 7, T. 161 N., R. 49 W., Kittson County, Hydrologic Unit 09020312, 4 miles west of Hallock, MN (05095500).	644	1946-55#, 1994	5-25-94	33

"See footnotes at end of the table."

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Discharge measurements made at miscellaneous sites during water year 1994

Stream	Tributary	Location	Drainage area (mi ²)	Period of record	Date	Discharge (ft ³ /s)
Red River of the North basin--Continued						
North Branch Two Rivers	Red River of the North	Lat 48°49'06", long 97°03'11", in SE 1/4 SW 1/4 sec. 30, T. 162 N., R. 49 W., Kittson County, Hydrologic Unit 09020312, 3 miles southwest of Northcote, MN (05097500).	-	1994	5-25-95	20
Mississippi River main stem						
Mississippi River	Gulf of Mexico	Lat 47°25'42", long 94°03'00", in SW 1/4 sec. 25, T. 146 N., R. 27 W., Itasca County, Hydrologic Unit 07010101, on Leech Lake Indian Reservation, at dam 1 mile northwest of Little Winnibigoshish Lake, 14 miles northwest of city of Deer River, at mile 1,248 upstream from Ohio River (05201500).	1,442	1884-94#	6-2-94 9-30-94	641 1,170
Mississippi River	Gulf of Mexico	Lat 47°24'20", long 94°01'50", in SW 1/4 NW 1/4 sec. 6, T. 145 N., R. 26 W., Itasca County, Hydrologic Unit 07010101, by boat 300 yards below Little Winnibigoshish Lake outlet, 7 miles northwest of Ball Club, MN	-	1994	8-24-94	358
Mississippi River	Gulf of Mexico	Lat 47°19'29", long 93°57'33", in NE 1/4 NW 1/4 sec. 3, T. 144 N., R. 26, Cass County, Hydrologic Unit 07010101, at bridge on State Trunk Highway 2, 1 mile west of Ball Club, MN	-	1990-91, 1994	8-25-94	411
Leech Lake River basin						
Leech Lake River	Mississippi River	Lat 47°14'45", long 94°13'12", in sec. 34, T. 144 N., R. 28 W., Cass County, Hydrologic Unit 07010102, on Leech Lake Indian Reservation on right bank at dam on Leech Lake River at city of Federal Dam, 2 miles downstream from natural outlet of Leech Lake (05206500).	1,163	1984-94#	6-3-94 8-26-94	521 260
Leech Lake River	Mississippi River	Lat 47°14'57", long 94°00'07", in SW 1/4 NW 1/4 sec. 32, T. 144 N., R. 26 W., Cass County, Hydrologic Unit 07010102, from boat upstream of Mud - Goose Lake, below Six Mile Brook, 8 miles northeast of Boy River, MN	-	1994	8-26-94	270
Mississippi River main stem						
Mississippi River	Gulf of Mexico	Lat 47°17'23", long 93°46'56", in SW 1/4 NW 1/4 sec. 13, T. 56 N., R. 25 W., Itasca County, Hydrologic Unit 07010101, from boat near White Oak Point, at outlet of White Oak Lake, 3 miles southeast of Deer River, MN	-	1994	8-24-94	1,250

"See footnotes at end of the table."

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Discharge measurements made at miscellaneous sites during water year 1994

Stream	Tributary	Location	Drainage area (mi ²)	Period of record	Date	Discharge (ft ³ /s)
Mississippi River main stem—Continued						
Mississippi River	Gulf of Mexico	Lat 47°13'46", long 93°45'26", in NE ¹ / ₄ SW ¹ / ₄ sec. 22, T. 55 N., R. 27 W., Itasca County, Hydrologic Unit 07010101, at bridge on State Highway 6, 9 miles west of Grand Rapids, MN, 6 miles south of Zemple, MN	-	1994	8-25-94	1,220
Mississippi River	Gulf of Mexico	Lat 47°15'00", long 93°35'12", in N1/2 sec. 13, T. 155 N., R. 26 W., Itasca County, Hydrologic Unit 07010103, at dam at outlet of Pokegama Lake, 3.5 miles northwest of Grand Rapids, MN (05210700).	c3,360	1929-30, 1944-45, 1948-55, 1957-75, 1982-94	6-2-94 9-30-94	945 1,610
Sandy River basin						
dSandy River	Mississippi River	Lat 46°47'20", long 93°19'10", in sec. 25, T. 50 N., R. 24 W., Aitkin County, Hydrologic Unit 07010103, dam at outlet of Sandy Lake, at Libby, 1.2 miles above mouth, 14 miles north of McGregor (05219000).	421	1893-94, 1894-95, 1895-1994	6-3-94 9-29-94	212 221
Pine River Basin						
dPine River	Mississippi River	Lat 46°40'09", long 94°06'44", in SW ¹ / ₄ NW ¹ / ₄ sec. 21, T. 137 N., R. 27 W., Crow Wing County, Hydrologic Unit 07010105, at dam at outlet of Cross Lake at city of Cross Lake (05231000).	562	1886-1994	6-1-94 9-29-94	292 234
Crow Wing River basin						
dGull River	Crow Wing River	Lat 46°24'40", long 94°21'12", in sec. 20, T. 134 N., R. 29 W., Cass County, Hydrologic Unit 07010106, at tailwater of dam at outlet of Gull Lake, 8 miles northwest of Brainerd (05247000).	287	1911-94	6-1-94 9-29-94	62 20
Mississippi River main stem						
Mississippi River	Gulf of Mexico	Lat 44°58'46", long 93°14'50", in SE ¹ / ₄ SE ¹ / ₄ sec. 23, T. 29 N., R. 24 W., Hennepin County, Hydrologic Unit 07010206, at lower St. Anthony Falls lock and dam in Minneapolis at River Mile 853.3 upstream from Ohio River. (Discharge measurements made between Hennepin Avenue bridges over the Mississippi River are included). (05288920).	c19,700	1912, 1938-39, 1941, 1943, 1953-54, 1957, 1963-85, 1990-94	11-10-93	7,880
Big Sioux River basin						
Kanaranzi Creek tributary	Kanaranzi Creek	Lat 43°36'10", long 95°56'00", in SW ¹ / ₄ SW ¹ / ₄ sec. 30, T. 102 N., R. 43 W., Nobles County, Hydrologic Unit 10170204, at twin box culverts under State Highway 91, 1.7 miles south of Adrian, 2.9 miles south of I-90 interchange.	1.52	1993	e7-10-93	†1,750

operated as a continuous record gaging station.

a also published as low flow investigations.

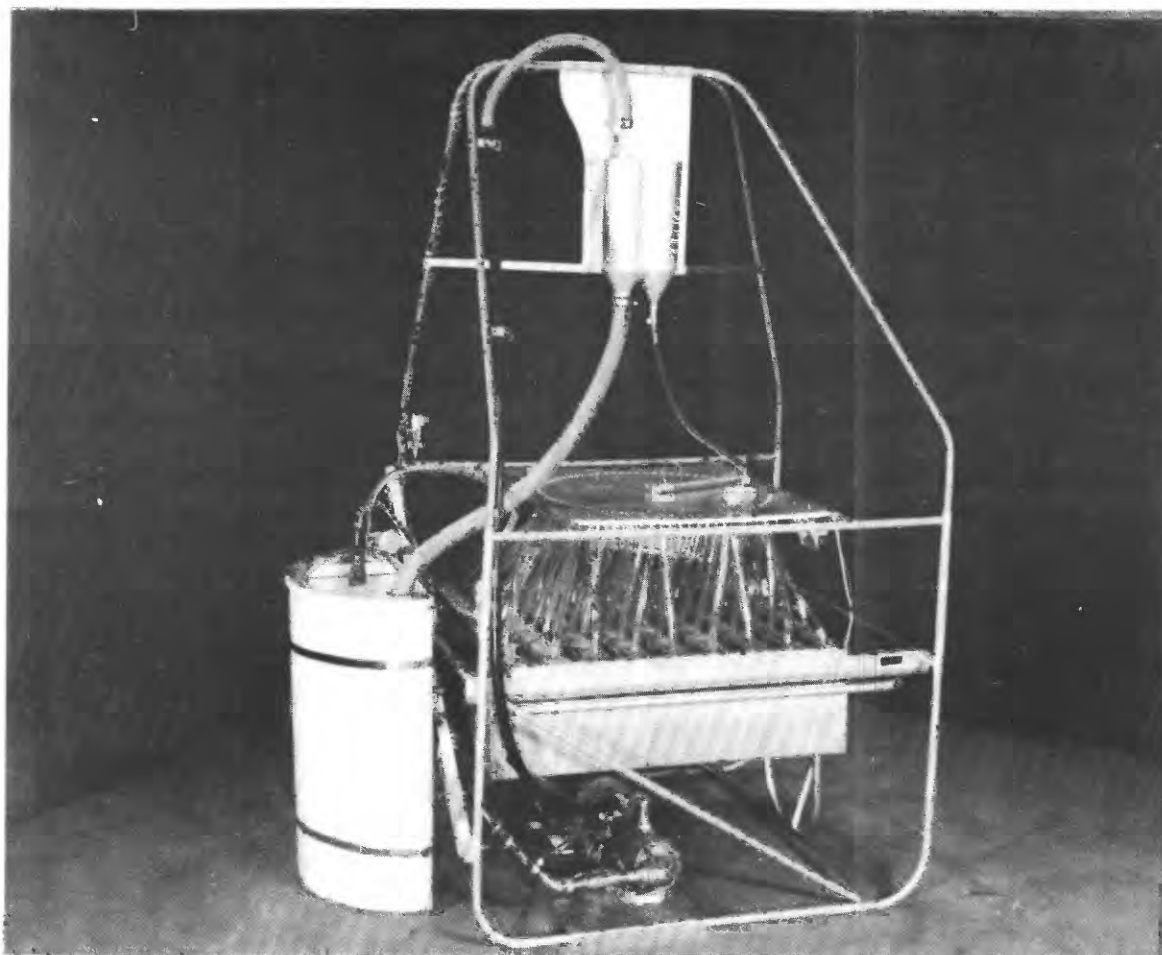
b total ice cover.

c approximately.

d also published as a continuous record station.

e not previously published.

WATER QUALITY
PARTIAL-RECORD STATIONS



Model P-69 Automatic Sediment Sampler

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

Water-quality partial-record stations are particular sites where chemical-quality, biological and (or) sediment data are collected systematically over a period of years for use in hydrologic analyses. Letter E indicates estimated value. Letter K indicates non-ideal colony count.

RED RIVER OF THE NORTH BASIN

05053800 RED RIVER OF THE NORTH ABOVE FARGO, ND

WATER-QUALITY RECORDS

LOCATION.--Lat 46°48'14". long 96 °47'47", in SW¹/₄SW¹/₄ sec.31, T.139 N., R.48 W., Cass County, Hydrologic Unit 09020104, 3.0 mi south of Fargo.

DRAINAGE AREA.--6,800 mi², approximately.

PERIOD OF RECORD.--April to September 1994.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DATE	TIME	DIS-CHARGE,	DIS-CHARGE,	SPE- CIFIC CON- DUCT- ANCE (UNITS)	PH	BARO-	TEMPER-	TEMPER-	OXYGEN,	DIS- SOLVED (PER- CENT SATUR- CACO3)	OXYGEN,	ALKA-
		INST. CUBIC FEET PER SECOND (00061)	IN CUBIC FEET PER US/CM) (00060)		WATER WHOLE FIELD (STAND- ARD HG) (00400)	METRIC PRES- SURE (MM OF (DEG C) (00025)					ATURE AIR (DEG C) (00020)	ATURE WATER (MG/L) (00010)
APR 04...	1150	10200	--	615	7.8	735	-0.5	2.5	--	--	250	128
JUN 07...	0820	--	2100	791	7.4	738	21.5	23.0	6.2	75	360	191
JUL 07...	0945	--	959	540	8.1	--	--	21.5	7.2	--	250	--
20...	1345	--	2530	646	7.8	740	19.0	21.5	7.4	87	280	162
26...	0920	--	2940	539	7.8	740	22.0	23.0	5.4	65	230	124
AUG 23...	0930	544	4090	610	8.1	732	21.0	21.5	6.6	78	260	207
SEP 21...	0945	386	--	556	8.2	737	14.5	20.0	6.6	75	250	196

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 PERCENT (00932)	POTAS- AD- SORP- TION RATIO (00931)	BICAR- BONATE SIUM, DIS- SOLVED (MG/L AS K) (00935)	CAR- BONATE WATER DIS IT FIELD (MG/L AS HCO3 (00453)	WATER DIS IT FIELD (MG/L AS CO3 (00452)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)	SILICA, DIS- SOLVED (MG/L AS SiO2) (00955)
APR 04...	56	27	19	14	0.5	8.1	156	0	150	11	0.2015	
JUN 07...	72	44	25	13	0.6	7.7	233	0	200	13	0.5012	
JUL 07...	48	32	14	11	0.4	4.7	--	--	65	10	0.2016	
20...	55	35	24	15	0.6	8.1	197	0	150	11	0.2019	
26...	48	26	18	14	0.5	8.1	151	0	120	7.4	0.2017	
AUG 23...	50	33	19	13	0.5	5.6	242	6	93	12	0.3017	
SEP 21...	48	32	16	12	0.4	5.0	239	0	56	13	0.2018	

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DATE	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	NITRO- SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	NITRO- SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NITRATE DIS- SOLVED (MG/L AS N) (00618)	NITRO- GEN, NO2+NO3 TOTAL SOLVED (MG/L AS N) (00630)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN, ORGANIC TOTAL SOLVED (MG/L AS N) (00605)	GEN, ORGANIC DIS- SOLVED (MG/L AS N) (00607)	GEN,AM- MONIA + ORGANIC TOTAL SOLVED (MG/L AS N) (00625)
APR 04...	381	414	0.56	11400	0.190	3.61	3.80	3.80	0.240	1.1	0.76	1.3
JUN 07...	491	540	0.73	3060	0.010	0.300	0.310	0.310	0.040	1.1	0.86	1.1
JUL 07...	319	339	0.46	878	<0.010	--	0.160	0.160	0.030	0.77	0.47	0.80
20...	401	435	0.59	2970	0.020	0.200	0.220	0.220	0.050	0.95	0.75	1.0
26...	320	359	0.49	2850	0.010	0.140	0.150	0.150	0.050	1.0	0.85	1.1
AUG 23...	355	387	0.53	568	<0.010	--	--	<0.050	0.050	0.85	0.55	0.90
SEP 21...	306	331	0.45	345	<0.010	--	--	<0.050	0.040	0.66	0.46	0.70
NITRO- GEN,AM- MONIA + ORGANIC DIS- SOLVED DATE THAN AS N) (00623)	PHOS- PHOS- NITRO- GEN, TOTAL (MG/L AS N) (00600)	CARBON, PHOS- PHOS- PHORUS TOTAL (MG/L AS P) (00665)	SEDI- MANGA- PHORUS DIS- SOLVED (MG/L AS P) (00666)	SED. CARBON, ORTHO, DIS- SOLVED (MG/L AS P) (00671)	IRON, DIS- SOLVED (MG/L AS FE) (01046)	MENT, NESE, DIS- SOLVED (UG/L AS MN) (01056)	SUSP. ORGANIC DIS- SOLVED (UG/L AS C) (00681)	SUS- PENDE TOTAL (MG/L AS C) (00689)	SEDI- MENT, SUS- SOLVED (MG/L (80154)	DIS- CHARGE, SUS- PENDE (T/DAY) (80155)	SIEVE DIAM. % FINER PENDE (70331)	
APR 04...	1.0	5.1	0.380	0.270	0.260	21	36	10	1.8	115	3170	99
JUN 07...	0.90	1.4	0.320	0.140	0.130	3	2	10	1.0	198	1120	99
JUL 07...	0.50	0.96	0.150	0.050	0.070	<3	6	8.1	0.9	79	2059	6
20...	0.80	1.2	0.360	0.200	0.190	10	3	--	--	196	1340	100
26...	0.90	1.2	0.290	0.190	0.190	27	8	8.3	2.1	176	1400	99
AUG 23...	0.60	0.90	0.170	0.060	0.050	<3	4	8.7	1.9	19	2896	
SEP 21...	0.50	0.70	0.170	0.040	0.030	7	17	8.0	1.5	253	26499	

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

05337100

- SNAKE RIVER AT PLINY, MN

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)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)
FEB 24...	0945	5.3	154	6.6	0.0	7.1	K5

DATE	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)
FEB 24...	39	0.020	0.190	0.030	0.550	0.060

05337150

- SNAKE RIVER NEAR MCGRATH, MN

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)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)
FEB 24...	1230	23	156	6.6	0.0	6.5	K7

DATE	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)
FEB 24...	53	0.010	0.390	0.030	0.270	0.050

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

460746093110200

- CHELSEY BROOK NEAR WOODLAND MN

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)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)
FEB 24...	1530	5.5	154	6.9	0.0	8.6	63
DATE	TIME	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)
FEB 24...	46		0.020	0.250	0.040	0.210	0.070

05337220

- SNOWSHOE BROOK NEAR WARMAN, MN

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)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)
FEB 25...	1130	2.6	236	7.1	0.0	8.8	K14
DATE	TIME	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)
FEB 25...	27		<0.010	0.290	0.040	0.280	0.100

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

455945093151900 - SNAKE RIVER BLW SNOWSHOE BROOK NR WARMAN MN

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)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)
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FEB 25...	1245	70	199	7.2	0.0	10.1	K15
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DATE	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)
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FEB 25...	23	<0.010	0.380	0.020	0.230	0.040
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05337300

- KNIFE RIVER NEAR WARMAN, MN

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)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)
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FEB 22...	1300	5.3	218	6.8	0.0	9.7	K23
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DATE	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)
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FEB 22...	59	0.020	0.210	0.080	0.470	0.150
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ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

455834093194400

- KNIFE RIVER ABV KNIFE LAKE NR MORA MN

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)	COLI- FORM. FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)
FEB 22...	1700	11	269	7.2	0.0	9.7	22
DATE	TIME	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)
FEB 22...	100		0.020	0.380	0.060	0.230	0.100

05337400

- KNIFE RIVER NEAR MORA, MN

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)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)
FEB 28...	1300	21	227	7.5	0.0	12.8	K9
DATE	TIME	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)
FEB 28...	K3		<0.010	0.290	0.020	0.230	0.060

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

05337500

- SNAKE RIVER AT MORA, MN

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)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)
FEB 28...	1500	94	234	7.3	0.0	10.2	K940
MAR 03...	0945	--	237	7.3	0.0	10.6	130

DATE	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)
FEB 28...	K190	<0.010	0.520	0.020	0.300	0.080
MAR 03...	52	--	--	--	--	--

05337530

- LITTLE ANN RIVER NEAR MORA, MN

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)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)
FEB 23...	0900	3.0	228	7.0	0.0	8.8	K6

DATE	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)
FEB 23...	40	0.010	0.120	0.040	0.390	0.100

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

05337550

- ANN RIVER NEAR MORA, MN

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)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)
MAR 01...	0830	13	256	7.2	0.0	10.6	K9
DATE	TIME	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)
MAR 01...	K14		<0.010	0.120	0.020	0.240	0.050

455020093165700

- SNAKE RIVER SOUTH OF MORA MN

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)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)
MAR 01...	1400	111	245	7.2	0.0	9.0	K140
DATE	TIME	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)
MAR 01...	100		<0.010	0.430	0.010	0.220	0.040

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

455223093282400

- GROUNDHOUSE RIVER ABV OGILVIE MN

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)	COLI- FORM, FECAL, 0.7 UM-MF (COLS/ 100 ML) (31625)
FEB 23...	1100	2.1	260	6.8	0.0	3.3	K3
DATE	TIME	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)
FEB 23...	K9		0.020	0.097	0.030	0.300	0.120

05337600

- GROUNDHOUSE RIVER NEAR OGILVIE, MN

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)	COLI- FORM, FECAL, 0.7 UM-MF (COLS/ 100 ML) (31625)
FEB 23...	1300	5.8	272	7.1	0.0	7.3	K230
DATE	TIME	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)
FEB 23...	65		0.010	0.870	0.030	0.270	0.080

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

454718093122500

- RICE CREEK NEAR GRASSTON MN

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)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML) (31625)
MAR 02...	0900	0.0	584	6.9	0.0	2.7	28
DATE	TIME	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)
MAR 02...	K5		<0.010	<0.050	0.720	1.10	0.890

05337790

- MUD CREEK AT QUAMBA, MN

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)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML) (31625)
MAR 01...	1200	3.6	342	6.8	0.0	6.3	K2
DATE	TIME	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)
MAR 01...	39		<0.010	<0.050	0.020	0.600	0.100

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

454954093091500

- MUD CREEK NEAR GRASSTON MN

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)	COLI- FORM, FECAL, 0.7 UM-MF (COLS/ 100 ML) (31625)
MAR 01...	1600	10	360	7.1	0.0	6.5	K9

DATE	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)
MAR 01...	K5	<0.010	0.160	<0.010	0.420	0.050

05337900

- SNAKE RIVER AT GRASSTON, MN

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)	COLI- FORM, FECAL, 0.7 UM-MF (COLS/ 100 ML) (31625)
MAR 02...	1100	147	277	7.1	0.0	6.3	230

DATE	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)
MAR 02...	41	<0.010	0.560	0.040	0.270	0.090

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

454722093083000

- SNAKE RIVER NEAR GRASSTON MN

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)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)
MAR 02...	1300	129	279	7.1	0.0	6.0	K220
DATE	TIME	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)
MAR 02...	63		<0.010	0.450	0.020	0.260	0.070

454737093043800

- SNAKE RIVER WEST OF POKEGAMA LAKE NR PINE CITY

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)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)
MAR 01...	1430	176	269	7.0	0.0	5.2	160
DATE	TIME	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)
MAR 01...	44		<0.010	0.440	0.030	0.270	0.060

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

455729093045800

- POKEGAMA CREEK ABOVE BROOK PARK MN

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)
FEB 15...	1430	0.35	415	6.8	0.0	—	1.7
APR 15...	1730	33	105	7.2	8.0	733	7.9
DATE	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)
FEB 15...	28	K11	0.020	<0.050	0.130	1.90	0.270
APR 15...	110	300	<0.010	<0.050	0.020	0.020	0.040

455652092593100

- POKEGAMA CREEK TRIB EAST NR BROOK PARK MN

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)
FEB 15...	1115	0.37	404	6.9	0.0	—	2.4
APR 15...	1415	24	153	7.2	5.5	733	8.5
DATE	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)
FEB 15...	120	K13	<0.010	0.082	0.030	0.420	0.110
APR 15...	290	K470	<0.010	0.071	0.040	0.070	0.110

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

455652092595000

- POKEGAMA CREEK TRIB WEST NR BROOK PARK MN

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)
FEB 15...	1300	0.65	357	7.3	0.0	--	11.0
APR 15...	1600	165	110	7.4	5.0	733	10.1
17...	0915	106	98	7.4	5.0	742	9.8
DATE	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)
FEB 15...	K12	K15	0.020	0.150	<0.010	0.700	0.060
APR 15...	K730	490	<0.010	<0.050	0.020	0.020	0.060
17...	K97	320	<0.010	0.380	0.050	0.120	0.190

455508093010600

- POKEGAMA CREEK AT CNTY RD 130 NR BEROUN MN

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)
FEB 17...	0945	3.0	418	7.2	0.0	--	9.9
APR 16...	0815	344	121	8.1	3.0	737	8.6
DATE	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)
FEB 17...	K20	K3	0.030	0.150	<0.010	0.610	0.050
APR 16...	270	K840	<0.010	0.150	0.040	0.030	0.090

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

455416093015400

- POKEGAMA CREEK AT HWY 14 NR BEROUN MN

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)
FEB 17...	1230	1.8	419	7.2	0.0	--	11.0
APR 16...	1130	449	120	9.6	4.0	737	8.7
DATE	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)
FEB 17...	K12	K8	0.020	0.140	<0.010	0.490	0.080
APR 16...	K420	K630	<0.010	0.150	0.030	0.050	0.130

455324093051200

- POKEGAMA CREEK TRIBUTARY NEAR HENRIETTE MN

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)
MAR 03...	1115	0.47	407	6.9	0.0	--	6.9
APR 16...	1300	49	131	8.9	8.0	737	9.8
DATE	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)
MAR 03...	K4	K6	<0.010	<0.050	<0.010	1.30	0.050
APR 16...	K25	85	<0.010	0.130	0.020	0.020	0.050

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

455238093034500

- POKEGAMA CREEK TRIB ON HWY 13 NR HENRIETTE MN

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)
MAR 03...	1300	2.7	379	7.2	0.0	--	8.7
APR 16...	1500	94	126	4.6	9.0	737	8.9
DATE	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)
MAR 03...	K3	K14	<0.010	0.160	<0.010	1.10	0.060
APR 16...	10	130	<0.010	0.170	0.020	0.050	0.060

455218093023800

- POKEGAMA CR ABV POKEGAMA LAKE NR PINE CITY MN

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)
FEB 18...	0900	0.0	415	7.0	0.0	—	2.8
APR 17...	1615	410	115	7.2	10.0	742	7.7
DATE	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)
FEB 18...	K5	20	<0.010	0.120	<0.010	0.570	0.050
APR 17...	73	150	<0.010	<0.050	0.020	0.020	0.070

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

454928093032100

- POKEGAMA LAKE SW IN/OUTFLOW NR PINE CITY MN

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)
MAR 02...	1015	8.3	286	7.1	0.0	--	3.3
APR 18...	1645	222	84	6.9	12.0	733	7.9
DATE	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)
MAR 02...	180	39	0.010	0.410	0.030	0.260	0.070
APR 18...	46	10	<0.010	<0.050	0.020	0.040	0.060

454917093022800

- POKEGAMA LAKE SE OUTFLOW NR PINE CITY MN

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)
MAR 02...	1515	26	246	7.3	1.0	--	9.0
APR 18...	1330	381	182	7.5	7.0	733	9.8
DATE	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)
MAR 02...	K1	K0	0.010	0.340	0.020	0.190	0.040
APR 18...	K5	K4	<0.010	0.180	0.020	0.070	0.050

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

455948092554700

- MISSION CREEK BELOW HINCKLEY MN

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)
FEB 15...	0900	0.13	383	7.2	0.0	—	9.2
APR 15...	1300	28	159	6.0	4.5	733	9.4
17...	1050	20	128	7.4	5.0	742	9.4
DATE	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)
FEB 15...	K380	K740	0.020	0.650	0.010	0.550	0.090
APR 15...	K2000	570	0.040	0.260	0.140	0.280	0.460
17...	K48	250	<0.010	<0.050	0.020	0.020	0.080

455507092584700

- MISSION CREEK NEAR MISSION CREEK MN

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)	
FEB 16...	0930	2.2	385	6.6	0.0	—	0.4	
APR 17...	1230	80	142	7.2	6.5	742	7.4	
DATE		COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)
FEB 16...	44	220	0.010	<0.050	0.090	0.830	0.210	
APR 17...	190	420	<0.010	<0.050	0.020	0.020	0.060	

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

455415092583700

- MISSION CREEK NEAR BEROUN MN

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)
FEB 16...	1150	1.7	390	6.6	0.5	--	1.6
APR 17...	1430	81	149	7.3	8.5	742	8.5
DATE	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)
FEB 16...	K9	K5	--	--	--	--	--
APR 17...	190	180	<0.010	<0.050	0.030	0.040	0.060

455231092592300

- MISSION CREEK NR PINE CITY MN

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)
FEB 16...	1525	2.7	393	6.8	0.0	--	2.9
APR 16...	1600	107	196	4.4	9.0	737	8.8
DATE	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)
FEB 16...	K14	K3	0.010	<0.050	0.010	0.680	0.080
APR 16...	K480	K860	<0.010	0.081	0.030	0.120	0.090

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

454900093011900

- SNAKE RIVER EAST OF POKEGAMA LAKE NR PINE CITY

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)
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MAR 02...	1600	188	272	7.1	0.0	741	5.3
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DATE	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)
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MAR 02...	120	58	<0.010	0.520	0.020	0.200	0.060
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05338500

- SNAKE RIVER NEAR PINE CITY, MN

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)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)
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MAR 04...	1305	191	284	7.4	2.0	9.6	34
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DATE	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)
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MAR 04...	40	<0.010	0.460	0.020	0.170	0.050
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ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DATE	TIME	DEPTH AT SAMPLE LOC- ATION, TOTAL (FEET) (81903)	TRANS- PAR- ENCY (SECCHI DISK) (M) (00078)	SAM- PLING DEPTH (FEET) (00003)	TEMPER- ATURE WATER (DEG C) (00010)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND- ARD UNITS) (00400)
455036093020400 POKEGAMA LAKE NR PINE CITY MN (SITE 4a) (LAT 45 50 36N LONG 093 02 04W)							
FEB 1994							
18...	1428	6.30	--	1.00	0.0	246	7.5
18...	1430	6.30	--	1.50	--	--	--
18...	1431	--	--	2.00	0.5	243	7.5
18...	1432	--	--	3.00	1.0	238	7.4
18...	1433	--	--	4.00	1.5	239	7.4
18...	1435	--	--	4.80	--	--	--
18...	1436	--	--	5.00	1.5	241	7.4
18...	1438	--	--	5.50	1.5	245	7.4
455036093022100 POKEGAMA LAKE NR PINE CITY MN (SITE 3a) (LAT 45 50 36N LONG 093 02 21W)							
FEB 1994							
18...	1538	17.8	--	1.00	0.5	243	7.5
18...	1540	17.8	--	1.50	--	--	--
18...	1542	--	--	2.00	0.5	240	7.5
18...	1544	--	--	3.00	1.0	235	7.5
18...	1546	--	--	4.00	1.5	233	7.4
18...	1548	--	--	5.00	2.0	232	7.4
18...	1550	--	--	6.00	2.0	232	7.3
18...	1552	--	--	7.00	2.0	233	7.3
18...	1554	--	--	8.00	2.5	234	7.2
18...	1556	--	--	9.00	2.5	237	7.2
18...	1558	--	--	10.0	2.5	242	7.2
18...	1600	--	--	11.0	3.0	244	7.1
18...	1602	--	--	12.0	3.0	246	7.1
18...	1604	--	--	13.0	3.0	252	7.1
18...	1606	--	--	14.0	3.0	259	7.1
18...	1608	--	--	15.0	3.0	273	7.1
18...	1610	--	--	16.0	3.0	281	7.1
18...	1612	--	--	16.3	--	--	--
18...	1616	--	--	17.0	3.0	290	7.1
455036093024100 POKEGAMA LAKE NR PINE CITY MN (SITE 2a) (LAT 45 50 36N LONG 093 02 41W)							
FEB 1994							
18...	1629	5.20	--	1.00	0.0	249	7.6
18...	1630	5.20	--	1.50	--	--	--
18...	1632	--	--	2.00	0.5	244	7.5
18...	1634	--	--	3.00	1.0	239	7.4
18...	1635	--	--	3.70	--	--	--
18...	1636	--	--	4.00	1.0	241	7.4
455202093022400 POKEGAMA LAKE NEAR PINE CITY (SITE 1) (LAT 45 52 02N LONG 093 02 24W)							
FEB 1994							
18...	1300	2.40	--	1.20	0.5	411	7.1
APR							
18...	0941	--	--	1.50	10.0	117	7.0
18...	0946	--	--	4.70	9.5	117	7.0

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

444416093280200 - Mystic Lake near Prior Lake Mn

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE	SPE- CIFIC CON- DUCT- ANCE	PH WATER WHOLE FIELD	PH WATER WHOLE LAB	TEMPER- ATURE WATER	OXYGEN, DIS- SOLVED	CALCIUM DIS- SOLVED	MAGNE- SIUM, DIS- SOLVED	SODIUM, DIS- SOLVED	
		(US/CM) (00095)	(US/CM) (90095)	(STAND- ARD UNITS) (00400)	(STAND- ARD UNITS) (00403)						(DEG C) (00010)
AUG 12...	1030	242	250	9.1	8.6	18.5	8.3	17	13	9.3	
DATE		POTAS- SIUM, DIS- SOLVED	ALKA- LITY WAT DIS TOT IT	ALKA- LITY LAB	CAR- BONATE WATER DIS IT	BICAR- BONATE WATER DIS IT	SULFATE DIS- SOLVED	CHLO- RIDE, DIS- SOLVED	FLUO- RIDE, DIS- SOLVED	SILICA, DIS- SOLVED	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED
		(MG/L AS K) (00935)	MG/L AS CACO3 (39086)	(MG/L AS CACO3) (90410)	MG/L AS CO3 (00452)	MG/L AS HCO3 (00453)					
AUG 12...	6.0	85	89	12	80	1.5	24	0.10	4.3	152	
DATE		NITRO- GEN, NITRITE DIS- SOLVED	NITRO- GEN, NO2+NO3 DIS- SOLVED	NITRO- GEN, AMMONIA DIS- SOLVED	NITRO- GEN,AM- MONIA + ORGANIC DIS.	NITRO- GEN,AM- MONIA + ORGANIC TOTAL	PHOS- PHORUS TOTAL	PHOS- PHORUS DIS- SOLVED	PHOS- PHORUS ORTHO, DIS- SOLVED	IRON, DIS- SOLVED	MANGA- NESE, DIS- SOLVED
		(MG/L AS N) (00613)	(MG/L AS N) (00631)	(MG/L AS N) (00608)	(MG/L AS N) (00623)	(MG/L AS N) (00625)					
AUG 12...	<0.010	<0.050	0.020	0.80	2.6	0.180	0.020	<0.010	18	<1	

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DATE	OXYGEN, DIS- SOLVED (MG/L) (00300)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)
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455036093020400 POKEGAMA LAKE NR PINE CITY MN (SITE 4a) (LAT 45 50 36N LONG 093 02 04W)

FEB 1994

18...	10.6	--	--	--	--	--
18...	--	<0.010	0.200	0.030	0.270	0.050
18...	10.8	--	--	--	--	--
18...	10.7	--	--	--	--	--
18...	10.7	--	--	--	--	--
18...	--	0.020	0.210	0.030	0.270	0.060
18...	10.5	--	--	--	--	--
18...	9.5	--	--	--	--	--

455036093022100 POKEGAMA LAKE NR PINE CITY MN (SITE 3a) (LAT 45 50 36N LONG 093 02 21W)

FEB 1994

18...	8.6	--	--	--	--	--
18...	--	0.020	0.220	0.020	0.250	0.060
18...	8.8	--	--	--	--	--
18...	8.2	--	--	--	--	--
18...	7.7	--	--	--	--	--
18...	7.1	--	--	--	--	--
18...	6.6	--	--	--	--	--
18...	5.8	--	--	--	--	--
18...	5.5	--	--	--	--	--
18...	5.0	--	--	--	--	--
18...	4.1	--	--	--	--	--
18...	3.8	--	--	--	--	--
18...	3.0	--	--	--	--	--
18...	2.4	--	--	--	--	--
18...	2.2	--	--	--	--	--
18...	3.0	--	--	--	--	--
18...	2.4	--	--	--	--	--
18...	--	0.020	0.230	0.010	0.360	0.050
18...	2.0	--	--	--	--	--

455036093024100 POKEGAMA LAKE NR PINE CITY MN (SITE 2a) (LAT 45 50 36N LONG 093 02 41W)

FEB 1994

18...	9.6	--	--	--	--	--
18...	--	0.010	0.220	0.020	0.230	0.050
18...	9.0	--	--	--	--	--
18...	8.8	--	--	--	--	--
18...	--	0.020	0.250	0.020	0.230	0.050
18...	8.2	--	--	--	--	--

455202093022400 POKEGAMA LAKE NEAR PINE CITY (SITE 1) (LAT 45 52 02N LONG 093 02 24W)

FEB 1994

18...	13.1	0.010	0.110	<0.010	0.560	0.070
APR						
18...	6.9	<0.010	<0.050	0.020	0.040	0.050
18...	6.4	<0.010	<0.050	0.020	0.030	0.050

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DATE	TIME	DEPTH AT SAMPLE LOC- ATION, TOTAL (FEET) (81903)	TRANS- PAR- ENCY (SECCHI DISK) (M) (00078)	SAM- PLING DEPTH (FEET) (00003)	TEMPER- ATURE WATER (DEG C) (00010)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND- ARD UNITS) (00400)	OXYGEN, DIS- SOLVED (MG/L) (00300)
454931093195400 FISH LAKE NEAR MORA MN (LAT 45 49 31N LONG 093 19 54W)								
MAR 1994								
03...	1432	7.20	--	1.00	0.5	273	7.1	4.9
03...	1436	--	--	2.00	1.5	273	7.0	3.8
03...	1441	--	--	3.00	2.5	283	7.0	2.1
03...	1448	--	--	4.00	3.0	300	6.9	0.8
03...	1453	--	--	5.00	4.0	365	6.8	0.2
03...	1458	--	--	5.60	4.0	385	6.7	0.2
454956092573400 CROSS LAKE AT PINE CITY MN (LAT 45 49 56N LONG 092 57 34W)								
MAR 1994								
04...	1002	20.8	--	1.00	0.0	283	7.2	4.3
04...	1009	--	--	3.00	0.0	284	7.1	4.4
04...	1014	--	--	5.00	0.0	284	7.1	4.4
04...	1023	--	--	7.00	1.0	292	7.1	2.4
04...	1027	--	--	9.00	2.0	283	7.1	1.0
04...	1031	--	--	11.0	3.0	287	7.1	0.4
04...	1035	--	--	13.0	3.0	292	7.1	0.2
04...	1038	--	--	15.0	3.0	293	7.2	0.1
04...	1041	--	--	17.0	3.0	296	7.2	0.1
04...	1052	--	--	19.0	3.5	299	7.2	0.1
455349093103600 MUD LAKE NEAR QUAMBA MN (QUAMBA LAKE) (LAT 45 53 49N LONG 093 10 36W)								
MAR 1994								
03...	1626	8.30	--	1.00	1.0	350	6.8	2.9
03...	1630	--	--	2.00	1.5	345	6.8	2.3
03...	1634	--	--	3.00	2.0	344	6.8	1.9
03...	1642	--	--	4.00	2.5	343	6.9	1.5
03...	1646	--	--	5.00	3.5	351	6.9	1.0
03...	1657	--	--	6.00	4.0	371	7.0	0.8
03...	1706	--	--	6.50	4.0	377	7.0	0.4
455429093253200 ANN LAKE NEAR MORA MN (LAT 45 54 29N LONG 093 25 32W)								
MAR 1994								
03...	1247	12.1	--	1.00	2.0	192	7.2	3.3
03...	1250	--	--	2.00	2.5	190	7.2	3.0
03...	1253	--	--	3.00	3.0	188	7.1	2.2
03...	1255	--	--	4.00	3.0	192	7.1	1.4
03...	1258	--	--	5.00	3.0	200	7.0	1.2
03...	1301	--	--	6.00	3.0	201	7.0	2.0
03...	1303	--	--	7.00	3.5	201	7.0	1.7
03...	1306	--	--	8.00	3.5	202	7.0	1.5
03...	1309	--	--	9.00	3.5	205	6.9	1.4
03...	1312	--	--	10.0	4.0	221	6.9	1.2
455926093172500 KNIFE LAKE NEAR MORA MN (LAT 45 59 26N LONG 093 17 25W)								
MAR 1994								
03...	1046	12.8	--	1.00	0.5	191	7.3	6.6
03...	1048	--	--	2.00	0.5	187	7.2	6.4
03...	1052	--	--	3.00	1.5	185	7.2	6.0
03...	1102	--	--	4.00	2.5	185	7.2	5.6
03...	1107	--	--	5.00	2.5	183	7.2	5.6
03...	1110	--	--	6.00	3.5	184	7.1	3.7
03...	1113	--	--	7.00	3.5	189	7.1	1.5
03...	1119	--	--	8.00	4.0	199	7.0	1.4
03...	1122	--	--	9.00	4.5	209	7.0	1.3
03...	1125	--	--	10.0	4.5	227	7.0	1.8
03...	1129	--	--	11.0	4.5	242	7.0	1.4

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

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, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)
06483000 ROCK RIVER AT LUVERNE, MN (LAT 43 39 15N LONG 096 12 03W)										
APR 1994										
04...	1400	168	759	8.1	6.5	11.2	0.020	5.30	0.030	0.030
JUN										
06...	1745	770	555	7.8	24.0	5.9	0.180	5.70	0.330	0.090

DATE	TIME	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)	BARO-METRIC PRES-SURE (MM HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN RESIDUE DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L) (00310)	TOTAL RESIDUE AT 105 DEG. C, PENDEDED (MG/L) (00530)	RESIDUE VOLA-TILE, SUS-PENDEDED (MG/L) (00535)
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05322000- BLUE EARTH RIVER AT MOUTH AT MANKATO

APR										
13...	1135	2290	637	8.1	7.5	730	14.8	4.7	320	30
20...	1330	3700	736	7.7	11.0	748	12.2	--	108	14
26...	1450	6450	609	8.3	15.5	723	9.9	--	936	144
MAY										
03...	1400	6270	834	8.2	11.5	746	12.2	--	180	26
09...	1330	4380	712	8.2	13.0	744	11.9	--	115	13
16...	1410	2650	701	8.2	18.5	748	9.0	--	73	20
25...	1400	2550	631	8.1	21.0	739	8.9	--	118	30
JUN										
01...	1425	1890	728	8.1	22.0	748	8.9	--	110	38
09...	1445	5340	583	8.3	19.0	749	9.3	--	400	30
16...	1355	4530	672	7.9	24.0	742	7.3	--	208	48
22...	1445	5610	652	8.2	23.0	748	7.1	--	250	--
29...	1410	5090	765	7.8	21.5	741	9.3	--	206	24
JUL										
06...	1110	3370	637	7.2	24.5	741	7.2	--	456	52
14...	1050	3170	678	7.7	19.0	744	7.6	--	94	21
20...	1420	5490	705	7.8	23.0	740	8.3	--	169	26
27...	1140	3900	654	7.8	21.0	742	8.2	--	129	27
AUG										
04...	1415	1620	625	8.0	24.5	749	9.5	--	145	17
11...	1530	6600	469	7.0	18.5	746	9.0	--	148	26
16...	1115	5360	674	8.0	20.0	741	7.7	--	--	--
24...	1110	2050	695	7.9	22.5	738	8.6	--	74	26
SEP										
01...	1415	1060	796	8.0	19.0	751	8.0	--	58	18

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

05322000- BLUE EARTH RIVER AT MOUTH AT MANKATO

DATE	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)	PHOS- PHORUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHORUS ORTHODIS- SOLVED (MG/L AS P) (00671)	CHLOR-ACHLOR-B PHYTO- PLANK- TON FLUOROMFLUOROM (UG/L) (70953)	CHLOR-ACHLOR-B PHYTO- PLANK- TON FLUOROMFLUOROM (UG/L) (70954)
APR										
13...	0.030	2.80	0.050	--	--	0.190	--	<0.010	35.0	0.600
20...	0.020	8.90	0.030	--	--	0.180	--	0.030	32.0	0.400
26...	0.050	8.80	0.100	--	--	0.260	--	0.090	35.0	5.90
MAY										
03...	0.020	9.20	0.030	--	--	0.200	--	0.040	12.0	3.40
09...	0.020	8.70	0.030	--	--	0.140	--	0.020	14.0	0.400
16...	0.020	7.70	0.030	--	--	0.130	--	0.030	27.0	1.30
25...	0.030	5.90	0.030	--	--	0.160	--	<0.010	31.0	1.10
JUN										
01...	0.030	7.30	0.040	--	--	0.200	--	0.030	24.0	1.40
09...	0.050	11.0	0.090	--	--	0.480	--	0.110	14.0	2.70
16...	0.030	11.0	0.120	--	--	0.170	--	0.080	9.70	1.00
22...	0.030	8.40	0.040	--	--	0.380	--	0.100	7.20	0.700
29...	0.020	9.30	0.040	--	--	0.310	--	0.080	13.0	1.20
JUL										
06...	0.010	6.70	<0.010	--	--	0.700	--	0.080	22.0	1.50
14...	0.010	8.10	0.010	0.60	1.1	0.190	0.110	0.090	12.0	0.800
20...	0.020	9.60	0.050	0.90	0.70	0.230	0.100	0.110	5.20	0.200
27...	0.010	7.50	<0.010	--	--	0.260	--	0.080	25.0	0.800
AUG										
04...	0.020	4.30	0.030	--	--	0.240	--	<0.010	55.0	4.90
11...	0.020	5.10	0.050	--	--	0.530	--	0.170	25.0	1.30
16...	--	--	--	--	--	--	--	--	11.0	0.700
24...	0.010	5.00	0.020	--	--	0.170	--	0.020	26.0	<0.100
SEP										
01...	0.010	2.00	0.020	--	--	0.140	--	0.020	75.0	12.0

WATER QUALITY
MISCELLANEOUS SITES



Water Quality Sampling

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

Samples are collected at sites other than gaging stations and partial-record stations to give better areal coverage in a river basin. Such sites are referred to as miscellaneous sites. Letter K indicates non-ideal colony count.

WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE- CIFIC CON- DUCT- ANCE LAB (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)	TEMPER- ATURE AIR (DEG C) (00020)	BARO- METRIC PRES- SURE (MM OF HG) (00025)	OXYGEN, DIS- SOLVED (MG/L) (00300)
	05030140	OTTER TAIL RIVER NORTHWEST OF LUCE, MN (LAT 46 40 20N LONG 095 39 56W)								
AUG 1994 31...	0710	92	357	351	8.0	7.6	16.0	8.5	732	5.8
	05049000	MUSTINKA RIVER ABOVE WHEATON, MN (LAT 45 49 15N LONG 096 29 25W)								
JUN 1994 01...	0630	76	1210	1210	8.2	7.9	19.0	16.0	740	6.8
	05062100	BUFFALO RIVER NEAR MOUTH AT GEORGETOWN, MN (LAT 47 04 43N LONG 096 47 50W)								
JUN 1994 02...	0800	122	784	797	8.2	7.8	19.5	18.0	746	7.0
JUL 07...	0945	92	703	679	8.0	7.9	23.0	25.0	740	6.9=
	05062435	WHITE EARTH RIVER NEAR MAHNOMEN, MN (LAT 47 18 53N LONG 095 55 58W)								
JUN 1994 21...	1820	181	501	495	7.5	7.6	26.0	--	732	4.8
	05063000	WILD RICE RIVER NEAR ADA, MN (LAT 47 15 50N LONG 096 30 00W)								
JUN 1994 22...	1020	E1740	424	418	7.7	7.9	23.0	--	--	6.7
	05086500	SNAKE RIVER ABOVE MIDDLE RIVER NR BIG WOODS, MN (LAT 48 21 30N LONG 097 04 00W)								
JUN 1994 21...	0830	61	625	632	8.1	7.9	22.5	23.0	743	6.0
	05087600	SNAKE RIVER NEAR MOUTH NR. BIG WOOD, MN (LAT 48 24 42N LONG 097 06 26W)								
JUN 1994 21...	1030	70	749	754	8.0	7.9	24.5	29.0	743	6.3
	05095500	TWO RIVERS BELOW HALLOCK, MN (LAT 48 46 50N LONG 097 02 25W)								
MAY 1994 24...	1400	E33	601	616	8.3	8.0	23.5	25.0	738	8.8
	05097500	NORTH BRANCH TWO RIVERS NEAR NORTHCOTE, MN (LAT 48 49 06N LONG 097 03 11W)								
MAY 1994 24...	1150	E20	794	816	8.3	7.9	24.0	23.0	740	8.4
	463140095314402	OTTER TAIL R. ABV. RUSH LAKE ON RD. BTW. SEC. 6(LAT 46 31 40N LONG 095 31 44W)								
AUG 1994 30...	1455	107	364	368	8.2	8.1	18.5	15.5	730	7.8
	463434095322101	OTTER TAIL R. BLW. BIG PINE LAKE, NR. PERHAM, MIN(LAT 46 34 34N LONG 095 32 21W)								
AUG 1994 30...	1625	148	352	349	8.4	7.8	17.0	16.5	726	9.4
	463948095382001	OTTER TAIL RIVER NORTH EAST OF LUCE, MN (LAT 46 39 48N LONG 095 38 20W)								
AUG 1994 31...	0900	98	367	359	7.6	7.6	16.5	11.5	732	7.8
	471931095564601	WILD RICE RIVER NEAR MAHNOMEN, MN. (LAT 47 19 31N LONG 095 56 46W)								
JUN 1994 21...	1530	430	437	434	7.6	7.6	24.0-	-	740	6.3

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES
WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

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)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CAR- BONATE WATER DIS IT FIELD MG/L AS CO3 (00452)	BICAR- BONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)
	05030140	OTTER TAIL RIVER NORTHWEST OF LUCE, MN (LAT 46 40 20N LONG 095 39 56W)							
AUG 1994 31...	39	21	4.6	1.7	171	185	0	208	1.5
	05049000	MUSTINKA RIVER ABOVE WHEATON, MN (LAT 45 49 15N LONG 096 29 25W)							
JUN 1994 01...	120	80	32	12	240	255	0	292	420
	05062100	BUFFALO RIVER NEAR MOUTH AT GEORGETOWN, MN (LAT 47 04 43N LONG 096 47 50W)							
JUN 1994 02...	84	47	16	5.8	313	324	0	382	110
JUL 07...	72	41	16	4.7	--	282	--	--	97
	05062435	WHITE EARTH RIVER NEAR MAHNOMEN, MN (LAT 47 18 53N LONG 095 55 58W)							
JUN 1994 21...	55	27	7.9	4.8	--	229	--	--	34
	05063000	WILD RICE RIVER NEAR ADA, MN (LAT 47 15 50N LONG 096 30 00W)							
JUN 1994 22...	50	18	5.8	4.7	--	151	--	--	55
	05086500	SNAKE RIVER ABOVE MIDDLE RIVER NR BIG WOODS, MN (LAT 48 21 30N LONG 097 04 00W)							
JUN 1994 21...	59	35	20	6.7	203	213	0	248	86
	05087600	SNAKE RIVER NEAR MOUTH NR. BIG WOOD, MN (LAT 48 24 42N LONG 097 06 26W)							
JUN 1994 21...	63	40	35	7.1	--	252	--	--	88
	05095500	TWO RIVERS BELOW HALLOCK, MN (LAT 48 46 50N LONG 097 02 25W)							
MAY 1994 24...	73	30	8.8	6.5	240	258	0	289	56
	05097500	NORTH BRANCH TWO RIVERS NEAR NORTHCOTE, MN (LAT 48 49 06N LONG 097 03 11W)							
MAY 1994 24...	94	40	20	6.8	320	338	0	391	49
	463140095314402	OTTER TAIL R. ABV. RUSH LAKE ON RD. BTW. SEC. 6/(LAT 46 31 40N LONG 095 31 44W)							
AUG 1994 30...	39	22	6.5	2.4	164	180	0	200	5.4
	463434095322101	OTTER TAIL R. BLW. BIG PINE LAKE, NR. PERHAM, MIN(LAT 46 34 34N LONG 095 32 21W)							
AUG 1994 30...	38	22	6.2	2.8	160	176	6	183	3.6
	463948095382001	OTTER TAIL RIVER NORTH EAST OF LUCE, MN (LAT 46 39 48N LONG 095 38 20W)							
AUG 1994 31...	41	22	4.6	2.0	166	189	0	202	2.1
	471931095564601	WILD RICE RIVER NEAR MAHNOMEN, MN. (LAT 47 19 31N LONG 095 56 46W)							
JUN 1994 21...	53	20	4.7	3.8	--	183	--	--	41

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES
WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DATE	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN,AM- MONIA + DIS- SOLVED (MG/L AS N) (00623)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N) (00625)
	05030140 OTTER TAIL RIVER NORTHWEST OF LUCE, MN (LAT 46 40 20N LONG 095 39 56W)								
AUG 1994 31...	2.9	0.10	15	207	<0.010	<0.050	0.020	0.50	0.60
	05049000 MUSTINKA RIVER ABOVE WHEATON, MN (LAT 45 49 15N LONG 096 29 25W)								
JUN 1994 01...	17	0.50	11	924	0.020	0.300	0.050	1.2	1.4
	05062100 BUFFALO RIVER NEAR MOUTH AT GEORGETOWN, MN (LAT 47 04 43N LONG 096 47 50W)								
JUN 1994 02...	9.5	0.50	11	526	0.010	0.140	0.060	0.90	1.1
JUL 07...	9.9	0.30	21	469	0.010	0.360	0.060	0.90	1.2
	05062435 WHITE EARTH RIVER NEAR MAHNOMEN, MN (LAT 47 18 53N LONG 095 55 58W)								
JUN 1994 21...	3.8	0.20	17	318	<0.010	0.051	0.030	1.2	2.2
	05063000 WILD RICE RIVER NEAR ADA, MN (LAT 47 15 50N LONG 096 30 00W)								
JUN 1994 22...	7.1	0.20	13	286	0.040	0.570	0.050	0.90	1.7
	05086500 SNAKE RIVER ABOVE MIDDLE RIVER NR BIG WOODS, MN (LAT 48 21 30N LONG 097 04 00W)								
JUN 1994 21...	23	0.20	12	399	0.070	0.460	0.040	1.0	1.1
	05087600 SNAKE RIVER NEAR MOUTH NR. BIG WOOD, MN (LAT 48 24 42N LONG 097 06 26W)								
JUN 1994 21...	45	0.20	12	474	0.030	0.170	0.030	1.0	1.2
	05095500 TWO RIVERS BELOW HALLOCK, MN (LAT 48 46 50N LONG 097 02 25W)								
MAY 1994 24...	18	0.20	2.6	379	<0.010	<0.050	0.030	0.80	1.1
	05097500 NORTH BRANCH TWO RIVERS NEAR NORTHCOTE, MN (LAT 48 49 06N LONG 097 03 11W)								
MAY 1994 24...	48	0.20	4.7	455	<0.010	<0.050	0.030	0.90	1.3
	463140095314402 OTTER TAIL R. ABV. RUSH LAKE ON RD. BTW. SEC. 6/(LAT 46 31 40N LONG 095 31 44W)								
AUG 1994 30...	7.4	0.10	14	220	<0.010	0.420	0.040	0.60	0.80
	463434095322101 OTTER TAIL R. BLW. BIG PINE LAKE, NR. PERHAM, MIN(LAT 46 34 34N LONG 095 32 21W)								
AUG 1994 30...	6.2	0.10	14	207	<0.010	0.120	0.020	0.70	0.50
	463948095382001 OTTER TAIL RIVER NORTH EAST OF LUCE, MN (LAT 46 39 48N LONG 095 38 20W)								
AUG 1994 31...	3.2	0.10	16	209	<0.010	<0.050	0.020	0.50	0.60
	471931095564601 WILD RICE RIVER NEAR MAHNOMEN, MN. (LAT 47 19 31N LONG 095 56 46W)								
JUN 1994 21...	3.7	0.20	14	296	0.020	0.200	0.060	1.1	1.4

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES
WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DATE	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)	SEDI- MENT, SUS- PENDE (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS- PENDE TOTAL (MG/L AS C) (00689)
	05030140	OTTER TAIL RIVER NORTHWEST OF LUCE, MN (LAT 46 40 20N LONG 095 39 56W)							
AUG 1994 31...	0.150	<0.010	<0.010	2	80	85	20	7.9	0.3
	05049000	MUSTINKA RIVER ABOVE WHEATON, MN (LAT 45 49 15N LONG 096 29 25W)							
JUN 1994 01...	0.250	0.160	0.170	80	99	3	91	15	1.7
	05062100	BUFFALO RIVER NEAR MOUTH AT GEORGETOWN, MN (LAT 47 04 43N LONG 096 47 50W)							
JUN 1994 02...	0.180	0.060	0.060	151	100	5	51	12	2.8
JUL 07...	0.210	0.150	0.120	82	99	5	14	19	1.4
	05062435	WHITE EARTH RIVER NEAR MAHNOMEN, MN (LAT 47 18 53N LONG 095 55 58W)							
JUN 1994 21...	0.240	0.090	0.080	24	89	69	19	--	--
	05063000	WILD RICE RIVER NEAR ADA, MN (LAT 47 15 50N LONG 096 30 00W)							
JUN 1994 22...	0.350	0.070	0.060	652	71	50	4	--	--
	05086500	SNAKE RIVER ABOVE MIDDLE RIVER NR BIG WOODS, MN (LAT 48 21 30N LONG 097 04 00W)							
JUN 1994 21...	0.360	0.310	0.330	1130	100	19	9	13	0.2
	05087600	SNAKE RIVER NEAR MOUTH NR. BIG WOOD, MN (LAT 48 24 42N LONG 097 06 26W)							
JUN 1994 21...	0.470	0.340	0.330	87	100	10	36	14	0.9
	05095500	TWO RIVERS BELOW HALLOCK, MN (LAT 48 46 50N LONG 097 02 25W)							
MAY 1994 24...	0.080	0.030	0.020	16	95	22	27	13	0.8
	05097500	NORTH BRANCH TWO RIVERS NEAR NORTHCOTE, MN (LAT 48 49 06N LONG 097 03 11W)							
MAY 1994 24...	0.080	0.010	<0.010	12	95	16	37	17	1.5
	463140095314402	OTTER TAIL R. ABV. RUSH LAKE ON RD. BTW. SEC. 6/(LAT 46 31 40N LONG 095 31 44W)							
AUG 1994 30...	0.020	<0.010	<0.010	--	--	25	13	8.1	1.0
	463434095322101	OTTER TAIL R. BLW. BIG PINE LAKE, NR. PERHAM, MIN(LAT 46 34 34N LONG 095 32 21W)							
AUG 1994 30...	<0.010	<0.010	<0.010	--	--	18	5	8.2	1.0
	463948095382001	OTTER TAIL RIVER NORTH EAST OF LUCE, MN (LAT 46 39 48N LONG 095 38 20W)							
AUG 1994 31...	0.020	<0.010	<0.010	3	85	110	46	7.5	0.4
	471931095564601	WILD RICE RIVER NEAR MAHNOMEN, MN. (LAT 47 19 31N LONG 095 56 46W)							
JUN 1994 21...	0.180	0.080	0.070	117	91	96	21	--	--

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

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)	TEMPER- ATURE AIR (DEG C) (00020)	BARO- METRIC PRES- SURE (MM OF HG) (00025)	OXYGEN, DIS- SOLVED (MG/L) (00300)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)
481311096345501 SNAKE RIVER NEAR RADIUM, MN (LAT 48 12 45N LONG 096 36 32W)												
JUN 1994 20...	0920	12	68	682	7.9	7.9	20.0	24.0	738	6.2	82	40
DATE		SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LITY LAB (MG/L AS CAO3) (90410)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)
481311096345501 SNAKE RIVER NEAR RADIUM, MN (LAT 48 12 45N LONG 096 36 32W)												
JUN 1994 20...		9.5	5.1	290	78	12	0.20	16	459	0.020	0.300	0.130
DATE		NITRO- GEN,AM- MONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	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)	SEDI- MENT, SUS- PENDE (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN (0.62 MM (70331)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	CARBON, MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C) (00681)	ORGANIC SUS- PENDE TOTAL (MG/L AS C) (00689)
481311096345501 SNAKE RIVER NEAR RADIUM, MN (LAT 48 12 45N LONG 096 36 32W)												
JUN 1994 20...		1.3	1.5	0.130	0.050	0.040	41	100	100	78	20	0.5

GROUND-WATER LEVELS



Automatic Recording Equipment

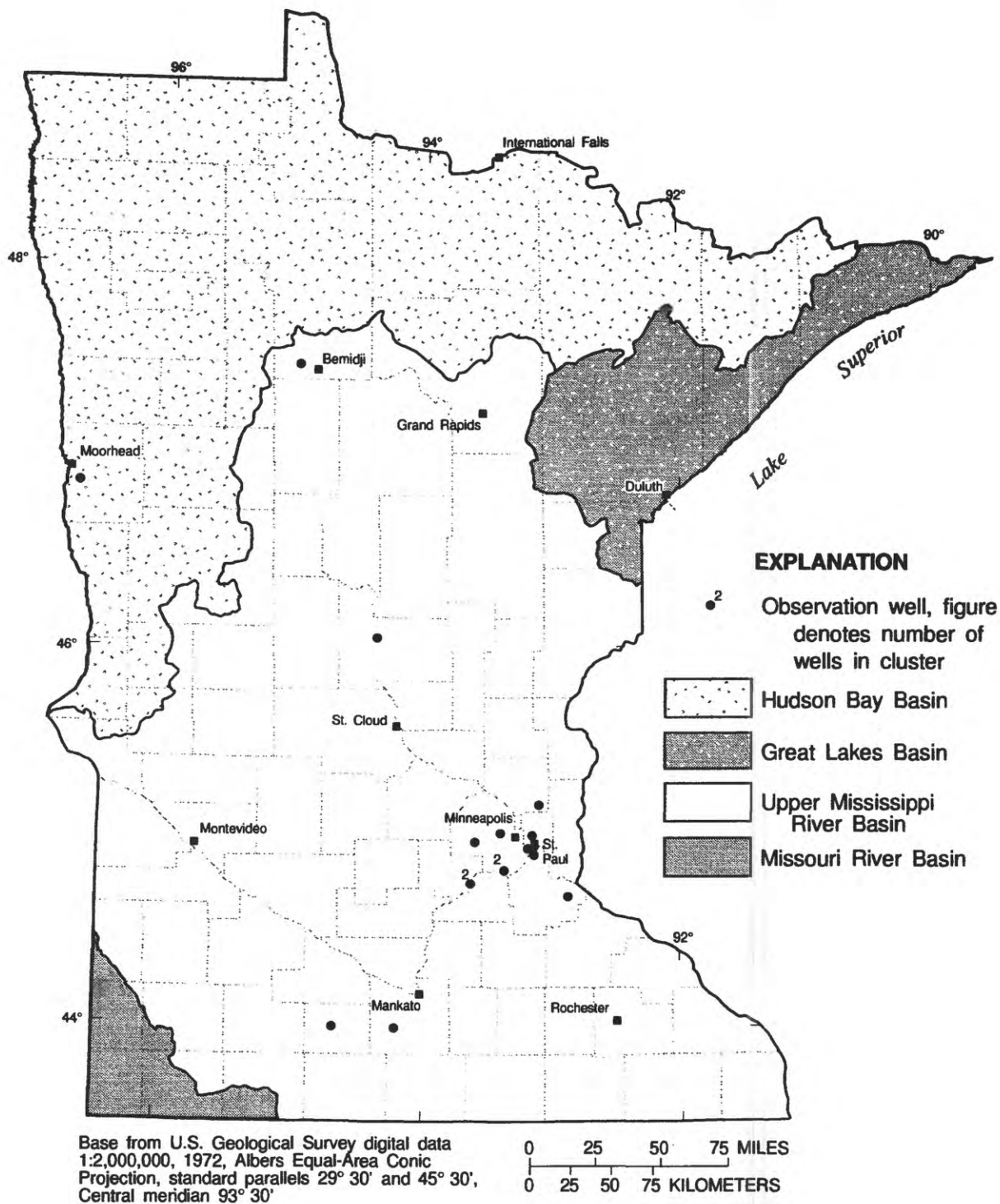


Figure 10.--Location of ground-water wells.

ANOKA COUNTY

450927093033802. Local number, 031N22W23CBC02.

LOCATION.--Lat 45°09'27", long 93°03'38", in SW $\frac{1}{4}$ NW $\frac{1}{4}$ SW $\frac{1}{4}$ 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.--Digital recorder with one-hour punch cycle.

DATUM.--Land-surface datum is 901.6 ft National Geodetic Vertical Datum of 1929. Measuring point: Top of recorder platform, 2.20 ft above land-surface datum.

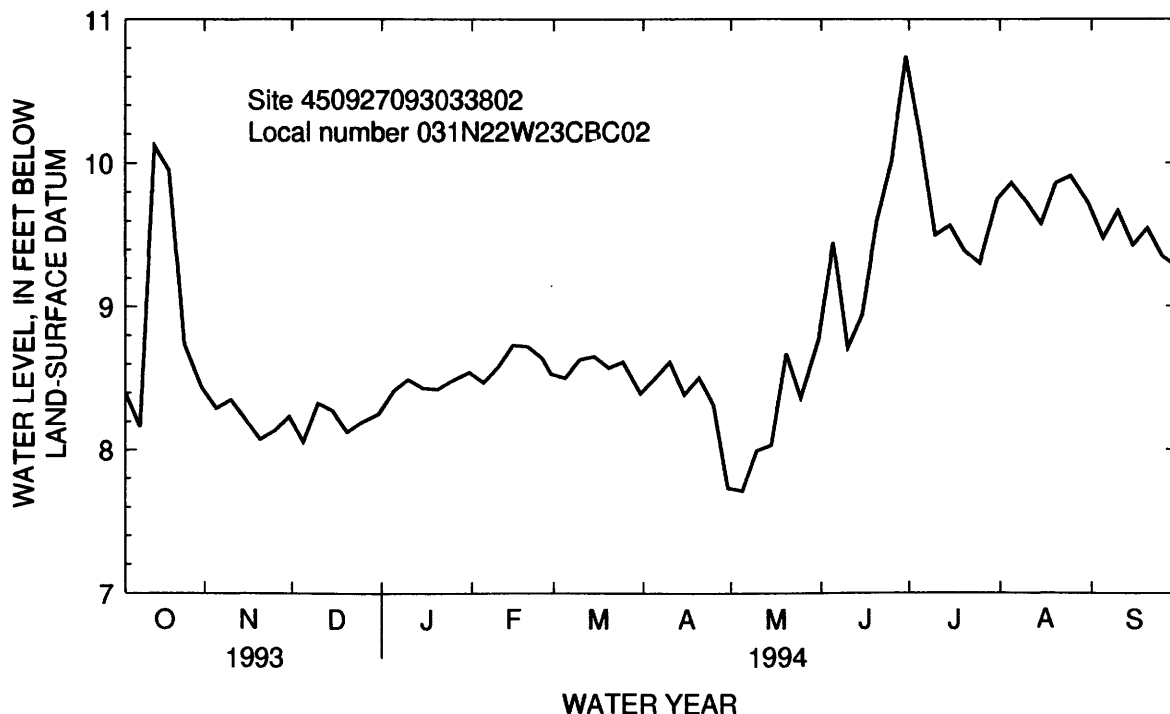
REMARKS.--Water level affected by nearby flowing wells.

PERIOD OF RECORD.--February 1971 to current year.

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 1993 TO SEPTEMBER 1994

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	8.40	8.29	8.05	8.41	8.47	8.50	8.50	7.71	9.45	10.17	9.86	9.48
10	8.16	8.35	8.32	8.49	8.58	8.63	8.61	7.99	8.71	9.50	9.73	9.67
15	10.12	8.21	8.27	8.43	8.73	8.65	8.38	8.03	8.94	9.57	9.58	9.43
20	9.95	8.07	8.12	8.42	8.72	8.57	8.50	8.67	9.60	9.39	9.86	9.55
25	8.74	8.13	8.19	8.48	8.64	8.61	8.31	8.36	10.01	9.30	9.91	9.35
EOM	8.44	8.23	8.25	8.54	8.53	8.39	7.73	8.77	10.74	9.75	9.72	9.27



BLUE EARTH COUNTY

440050094102801. Local number, 106N28W03DBA01.

LOCATION.--Lat 44°00'50", long 94°10'28", in NE¼NW¼SE¼, 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.--Iron-ton-Galesville Sandstones of Late Cambrian Age.

WELL CHARACTERISTICS.--Drilled, unused artesian well, diameter 16 in., depth 390 ft, cased to 150 ft.

INSTRUMENTATION.--Digital recorder with one-hour punch cycle.

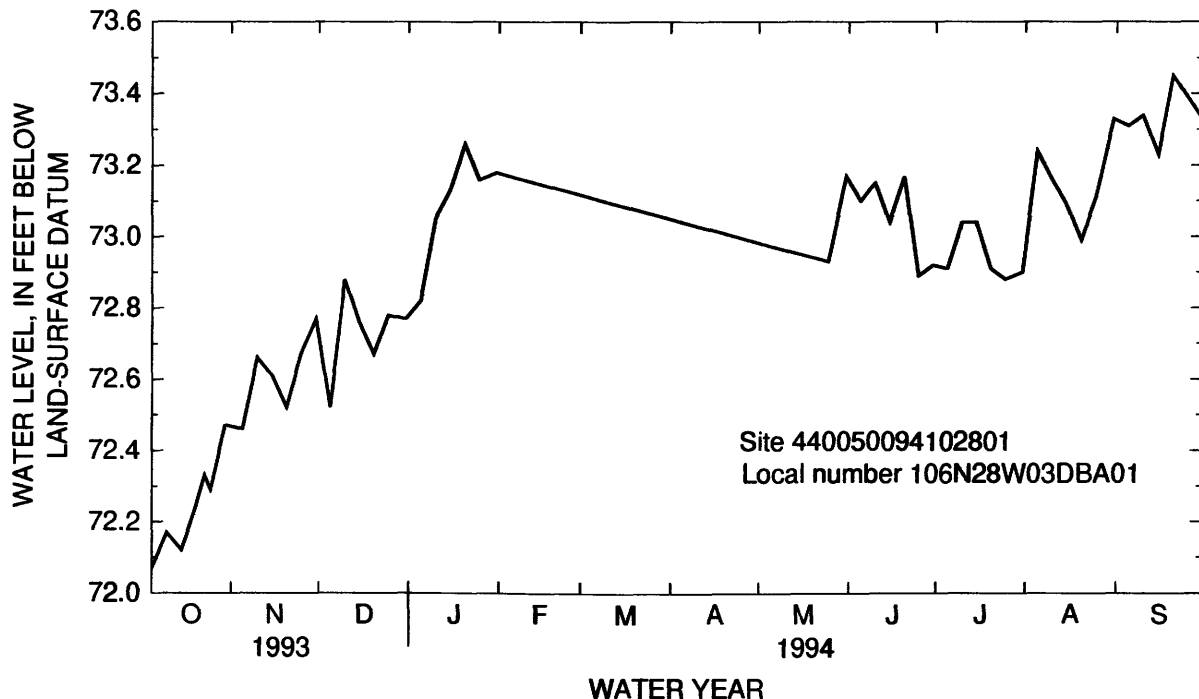
DATUM.--Altitude of land-surface datum is 1,005 ft. Measuring point: Top of recorder platform, 2.00 ft above land-surface datum.

PERIOD OF RECORD.--October 1973 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 71.25 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 1993 TO SEPTEMBER 1994

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	72.07	72.46	72.52	72.82	--	--	--	--	73.10	72.91	73.24	73.31
10	72.17	72.66	72.88	73.05	--	--	--	--	73.15	73.04	73.16	73.34
15	72.12	72.61	72.76	73.13	--	--	--	--	73.04	73.04	73.09	73.23
20	72.24	72.52	72.67	73.26	--	--	--	--	73.17	72.91	72.99	73.45
25	72.29	72.67	72.78	73.16	--	--	--	72.93	72.89	72.88	73.11	73.39
EOM	72.47	72.77	72.77	73.18	--	--	--	73.17	72.92	72.90	73.33	73.33



CLAY COUNTY

465237096383901. Local number, 139N47W05CDC01.

LOCATION.--Lat 46°52'37", long 96°38'39", in SW¹/₄SE¹/₄SW¹/₄ sec. 5, T.139 N., R.47 W., Hydrologic Unit 09020104, 2.4 mi east of Dilworth.

Owner: Steven Schroeder.

AQUIFER.--Surficial sand of Pleistocene Age.

WELL CHARACTERISTICS.--Drilled water-table observation well, diameter 8 in., depth 131.4 ft, slotted 91 to 107 ft.

INSTRUMENTATION.--Periodic measurements by USGS personnel.

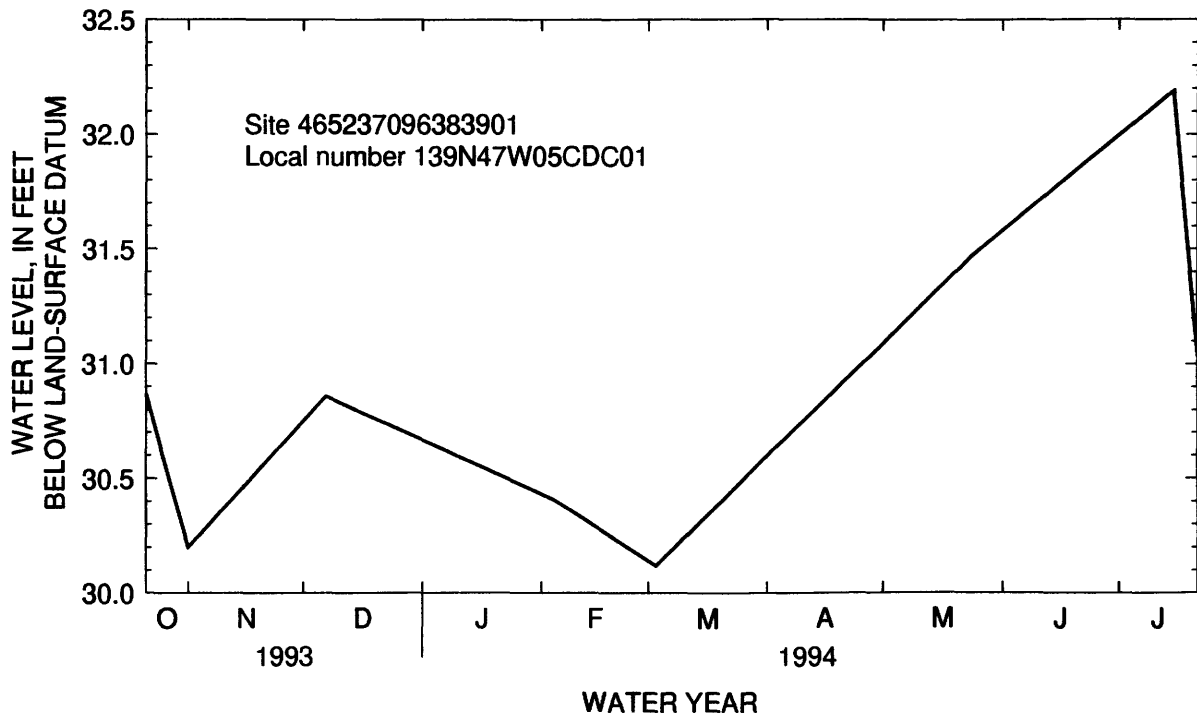
DATUM.--Land-surface datum is 916.7 ft National Geodetic Vertical Datum of 1929. Measuring point: Top of recorder platform, 3.60 ft above land-surface datum.

REMARKS.--Water level affected by pumping from nearby wells.

PERIOD OF RECORD.--January 1947 to current year.

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, 19, 1988.

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Oct. 21	30.87	Feb 04	30.41	July 15	32.19
Nov. 01	30.20	Mar 03	30.12	July 21	31.03
Dec 07	30.86	May 24	31.47		



DAKOTA COUNTY

445330093054301. Local number, 028N22W19DCC02.

LOCATION.--Lat 44°53'30", long 93°05'43", in SW1/4SW1/4SE1/4 sec. 19, T.28 N., R. 22W., Hydrologic Unit 07010206, in West St. Paul.

Owner: U.S. Geological Survey, 2-N.

AQUIFER.--Prairie du Chien Group of Early Ordovician Age.

WELL CHARACTERISTICS: Drilled artesian observation well, diameter 6 in., depth 539 ft, cased to 407 ft.

INSTRUMENTATION.--Digital recorder with 30-minute punch cycle.

DATUM.--Land-surface datum is 1,036.9 ft National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 2.60 ft above land-surface datum.

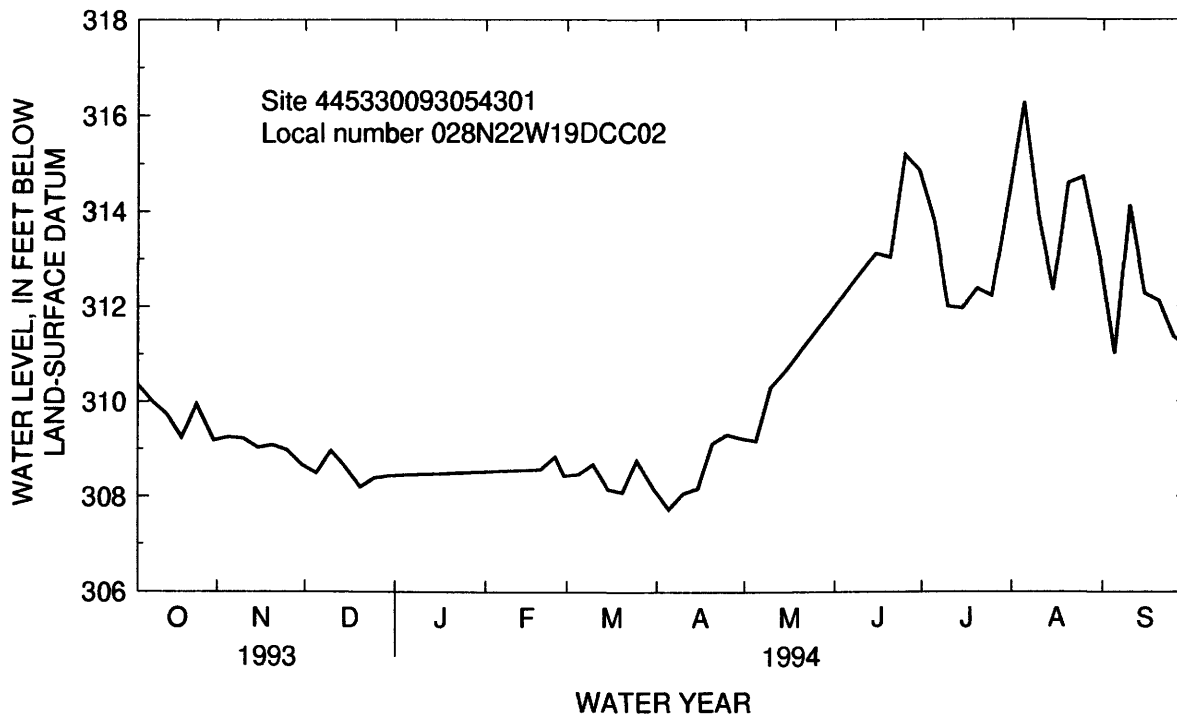
REMARKS.--Water-level affected by regional pumping.

PERIOD OF RECORD.--January 1971 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 307.730 ft below land-surface datum, Apr. 11, 1993; lowest, 328.0 ft below land-surface datum.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	310.35	309.24	308.47	---	---	308.45	307.73	309.15	315.12	313.81	316.28	311.00
10	310.00	309.21	308.95	---	---	308.66	308.05	310.27	312.49	312.00	313.85	314.13
15	309.73	309.01	308.59	---	---	308.15	308.16	310.62	313.11	311.96	312.34	312.28
20	309.23	309.07	308.18	---	308.55	308.08	309.10	313.60	313.03	312.38	314.59	312.12
25	309.94	308.96	308.37	---	308.82	308.74	309.28	311.79	315.19	312.23	314.72	311.36
FROM	309.17	308.65	308.42	---	308.42	308.15	309.20	312.14	314.86	314.41	312.96	311.15



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.--Digital recorder with one-hour punch cycle.

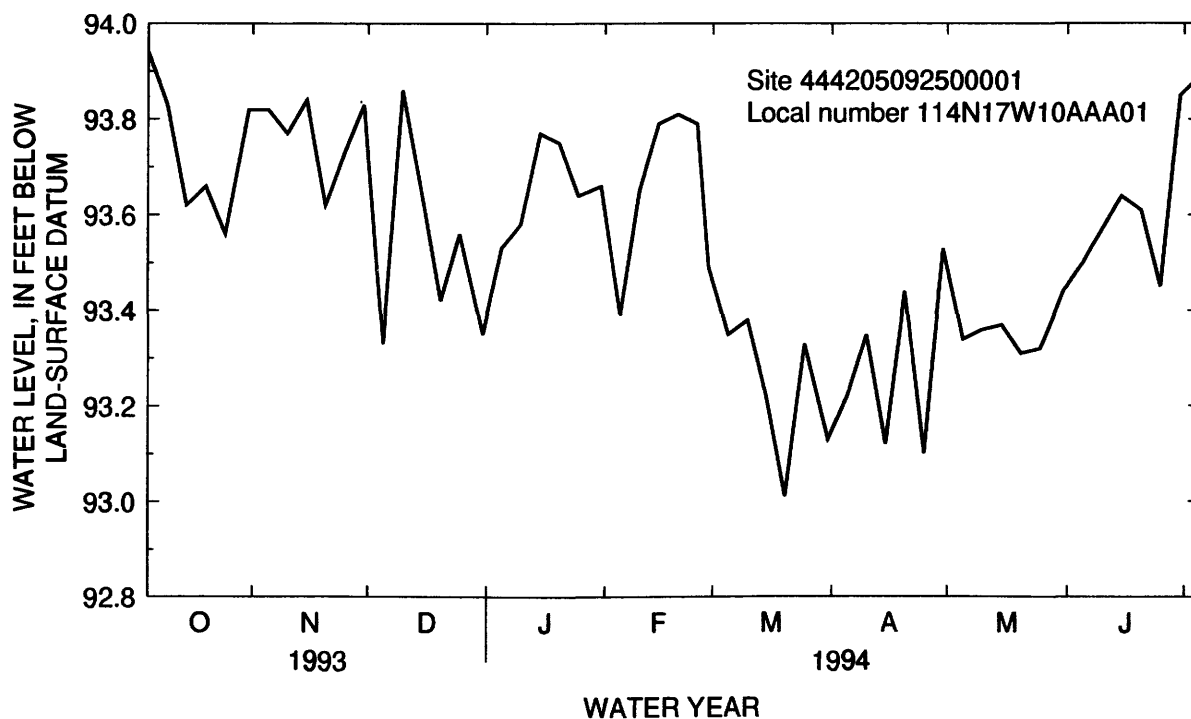
DATUM.--Altitude of land-surface datum is 827 ft. Measuring point: Top of platform, 2.50 ft above land-surface datum.

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

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 93.47 ft below land-surface datum, Sept. 30, 1993; lowest, 107.4 ft below land-surface datum, Mar. 12, 1978.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	93.94	93.82	93.33	93.53	93.39	93.35	93.22	93.34	93.50	93.89	---	---
10	93.83	93.77	93.86	93.58	93.65	93.38	93.35	93.36	93.57	---	---	---
15	93.62	93.84	93.65	93.77	93.79	93.22	93.12	93.37	93.64	---	---	---
20	93.66	93.62	93.42	93.75	93.81	93.01	93.44	93.31	93.61	---	---	---
25	93.56	93.73	93.56	93.64	93.79	93.33	93.10	93.32	93.45	---	---	---
EOM	93.82	93.83	93.35	93.66	93.49	93.13	93.53	93.44	93.85	---	---	---



HENNEPIN COUNTY

444801093202801. Local number, 027N24W30BDA01.

LOCATION.--Lat 44°48'01", long 93°20'28", in NE 1/4 SE 1/4 NW 1/4 sec.30, T.27 N., R.24 W., Hydrologic Unit 07020012, in Bloomington.

Owner: City of Bloomington, at Southwood Terrace.

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 330 ft, cased to 269 ft.

INSTRUMENTATION.--Digital recorder with 30-minute punch cycle.

DATUM.--Altitude of land-surface datum is 815 ft. Measuring point: Top of recorder platform. 2.20 ft above land-surface datum.

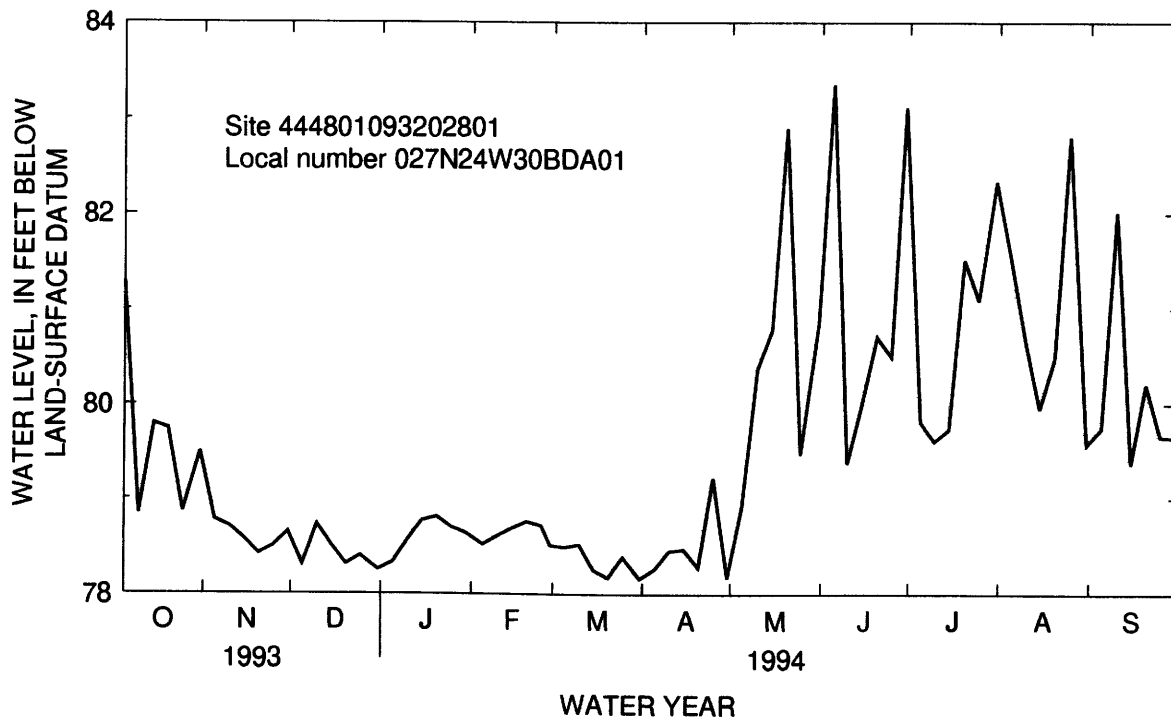
REMARKS.--Water level affected by pumping.

PERIOD OF RECORD.--March 1969 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 63.05 ft below land-surface datum, Apr. 15, 1969; lowest, 84.86 ft below land-surface datum, July 1, 1988.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	81.29	78.78	78.31	78.33	78.52	78.49	78.26	78.93	83.36	79.82	81.54	79.75
10	78.84	78.71	78.73	78.56	78.61	78.52	78.45	80.37	79.37	79.61	80.66	82.02
15	79.80	78.58	78.51	78.77	78.69	78.25	78.47	80.78	80.01	79.74	79.95	79.36
20	79.75	78.42	78.31	78.81	78.76	78.17	78.28	82.90	80.71	81.52	80.48	80.21
25	78.86	78.50	78.40	78.70	78.72	78.39	79.22	79.47	80.50	81.09	82.81	79.66
FROM	79.50	78.65	78.25	78.56	78.51	78.16	78.17	80.85	83.12	82.34	79.57	79.65



HENNEPIN COUNTY--Continued

450116093205301. Local number, 029N24W06CCC01.

LOCATION.--Lat 45°01'16", long 93°20'53", in SW1/4SW1/4SW1/4 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.--Digital recorder with 30-minute punch cycle.

DATUM.--Altitude of land-surface datum is 870 ft. Measuring point: Top of casing, 3.50 ft above land-surface datum.

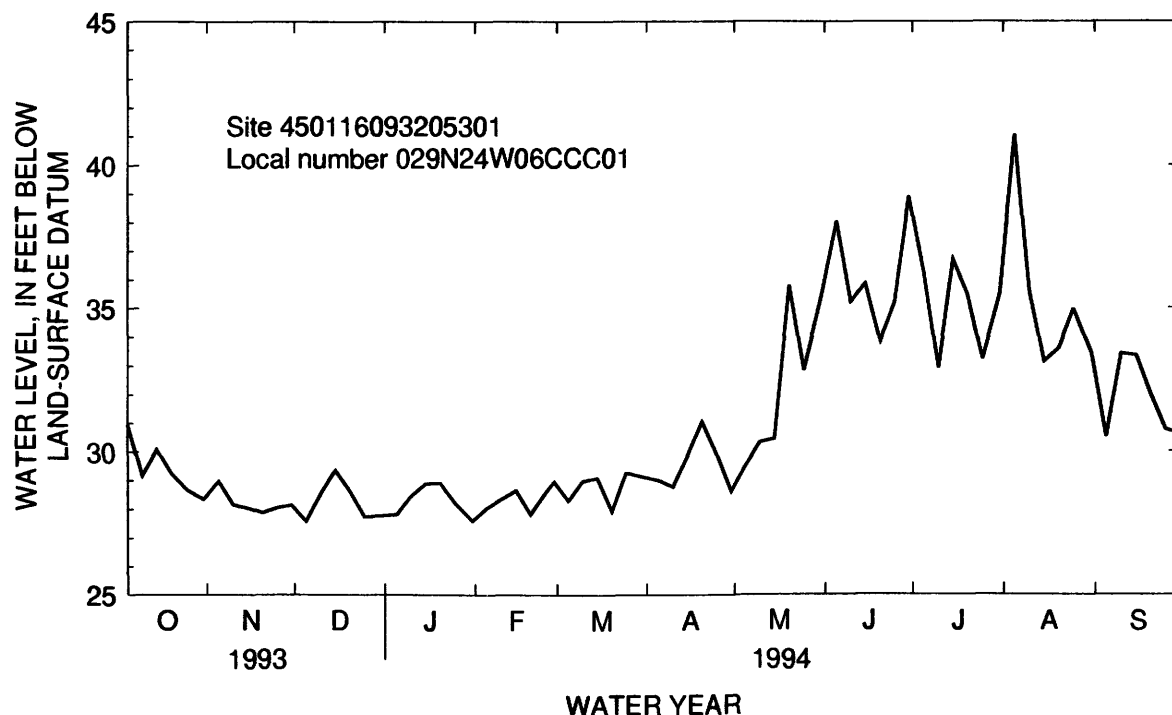
REMARKS.--Water level affected by pumping.

PERIOD OF RECORD.--March 1973 to current year.

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 1993 TO SEPTEMBER 1994

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT
5	30.96	28.97	27.59	27.80	28.02	28.29	28.98	29.52	38.05	36.24	41.06	30.51
10	29.16	28.16	28.53	28.45	28.33	28.96	28.76	30.33	35.22	32.91	35.55	33.40
15	30.08	28.04	29.35	28.86	28.63	29.06	29.85	30.44	35.86	36.70	33.14	33.34
20	29.23	27.88	28.62	28.88	27.80	27.93	31.03	35.80	33.85	35.47	33.59	32.00
25	28.69	28.05	27.74	28.20	28.54	29.25	29.91	32.84	35.19	33.22	34.97	30.76
EOM	28.35	28.13	27.83	27.58	27.93	29.10	28.62	35.46	38.92	35.53	33.41	30.60



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.--Graphic recorder with a one-inch = 5 days pen trace.

DATUM.--Altitude of land-surface datum is 930.8 ft National Geodetic Vertical Datum of 1929. Measuring point. Floor of recorder platform, 3.30 ft above land-surface datum.

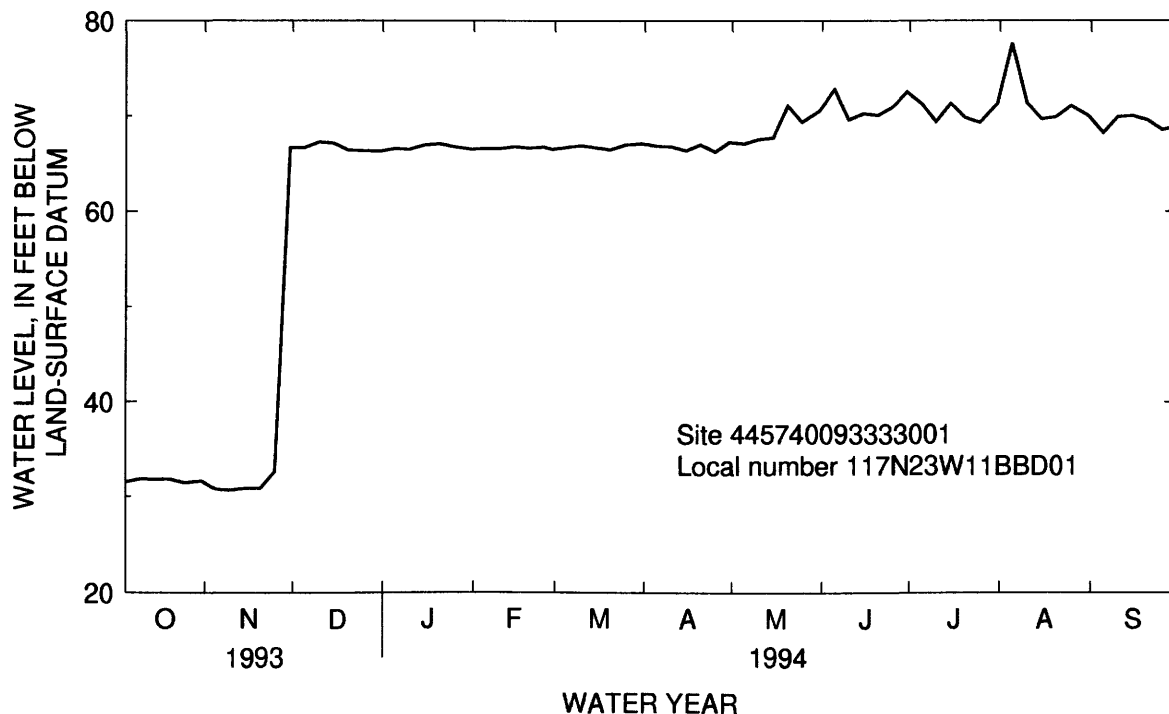
REMARKS.--Water level affected by pumping.

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

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 1993 TO SEPTEMBER 1994

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	31.48	30.72	30.98	30.84	30.19	---	---	31.61	---	---	38.97	34.70
10	31.19	30.67	31.67	31.12	30.56	---	---	32.08	---	35.19	35.04	34.68
15	31.75	30.84	30.82	31.47	30.75	---	31.29	32.98	---	35.92	36.26	---
20	31.81	30.86	30.66	31.39	30.97	---	31.40	33.36	---	34.34	36.17	35.70
25	31.44	32.60	30.29	31.16	30.55	---	32.78	33.79	---	35.58	36.35	35.51
EOM	31.57	30.97	30.74	31.09	30.76	---	32.27	33.87	---	36.40	---	35.37



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.--Digital recorder with a 30-minute punch cycle.

DATUM.--Altitude of land-surface datum is 933 ft. Measuring point: Top of recorder platform, 3.00 ft above land-surface datum.

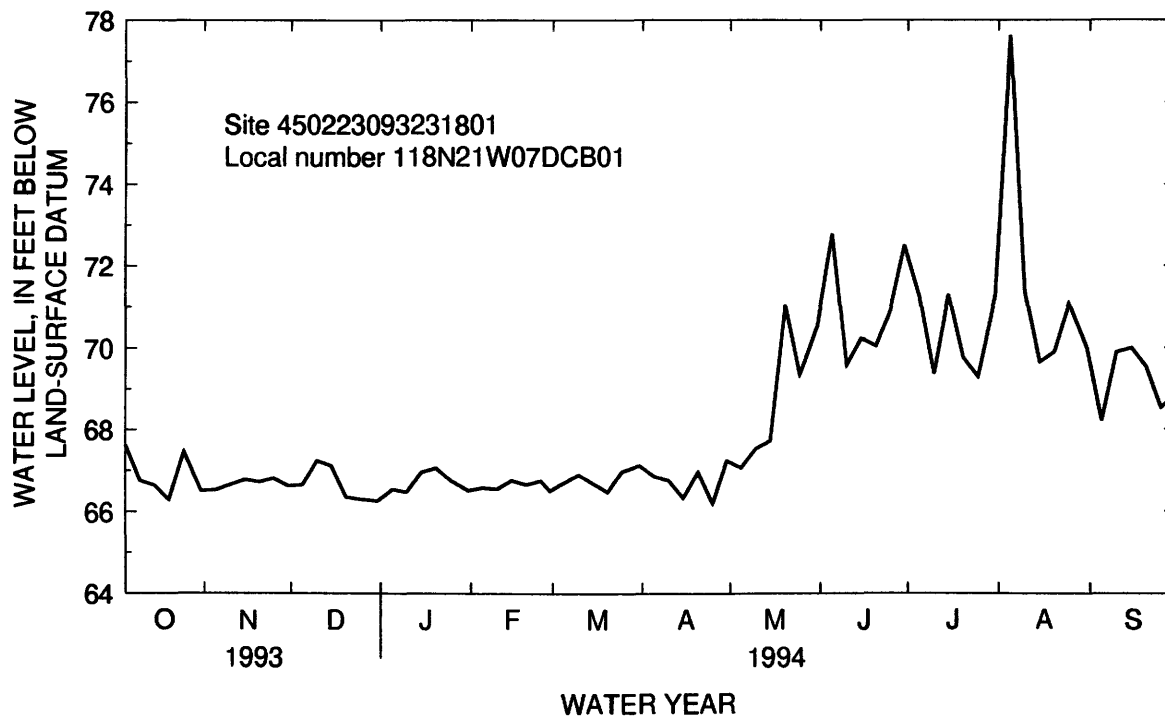
REMARKS.--Water level affected by pumping.

PERIOD OF RECORD.--October 1965 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 60.46 ft below land-surface datum, Dec. 17, 1967; lowest, 77.56 ft below land-surface datum, July 11, 1985.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	67.63	66.52	66.64	66.53	66.56	66.69	66.84	67.05	72.80	71.27	77.63	68.20
10	66.76	66.65	67.22	66.47	66.54	66.88	66.75	67.53	69.59	69.36	71.35	69.89
15	66.64	66.77	67.10	66.94	66.74	66.67	66.33	67.71	70.23	71.31	69.66	69.99
20	66.30	66.72	66.35	67.04	66.64	66.47	66.95	71.05	70.05	69.77	69.90	69.54
25	67.46	66.80	66.30	66.74	66.73	66.96	66.20	69.35	70.92	69.29	71.07	68.53
EOM	66.51	66.62	66.26	66.50	66.49	67.10	67.22	70.55	72.51	71.29	69.99	68.89



MORRISON COUNTY

460444094212501. Local number, 130N29W08DCC01.

LOCATION.--Lat 46°04'44", long 94°21'25", in SW¼SW¼SE¼ 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.--Weekly measurements by observer

DATUM.--Land-surface datum is 1,149.0 ft National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 2.10 ft above land-surface datum.

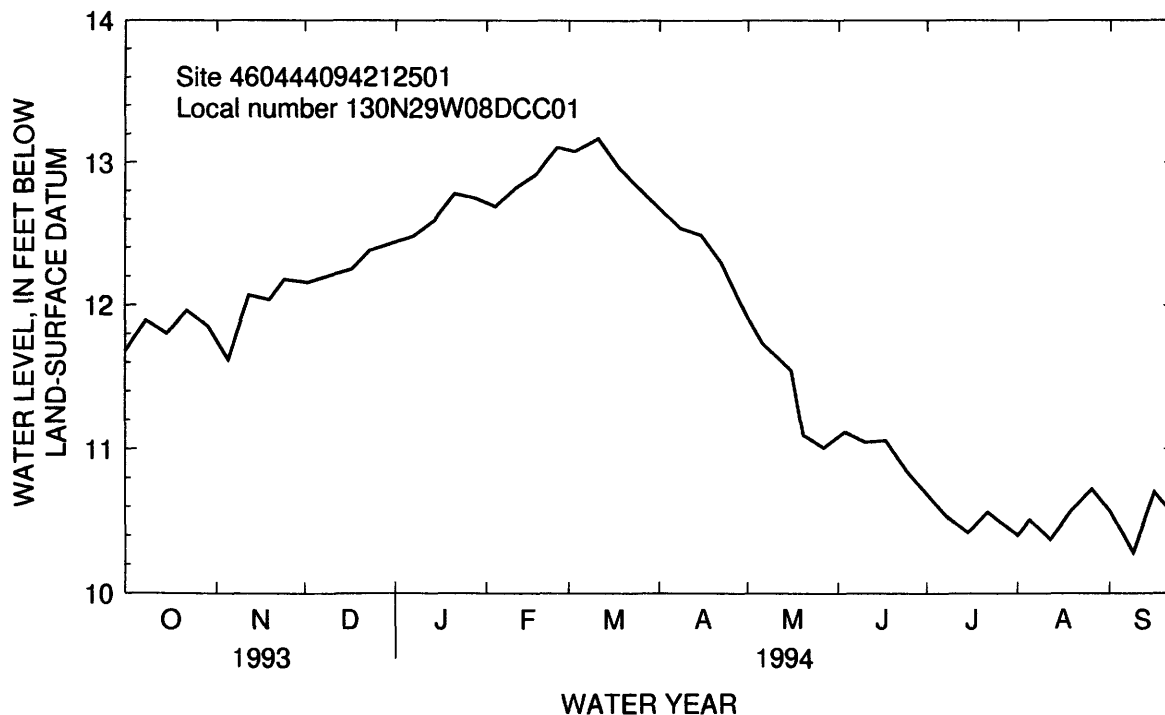
REMARKS.--Water levels used in monthly National Water Conditions Report.

PERIOD OF RECORD.--April 1949 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 7.35 ft below land-surface datum, July 28, 1972; lowest, 19.75 ft below land-surface datum, Aug. 4, 1961.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 01	11.68	JAN 07	12.48	May 02	11.88	AUG 01	10.40
08	11.89	14	12.59	06	11.74	05	10.51
15	11.80	21	12.78	16	11.55	12	10.37
22	11.96	28	12.75	20	11.10	19	10.57
29	11.85	FEB 04	12.69	27	11.01	26	10.72
NOV 05	11.62	11	12.82	Jun 03	11.12	SEP 01	10.57
12	12.07	18	12.92	10	11.05	09	10.28
19	12.04	25	13.11	17	11.06	16	10.70
24	12.18	MAR 03	13.08	24	10.85	23	10.53
DEC 02	12.16	11	13.17	Jul 01	10.69		
10	12.21	18	12.97	08	10.53		
17	12.25	25	12.82	15	10.42		
23	12.38	APR 08	12.54	22	10.56		
		15	12.49				
		22	12.30				



RAMSEY COUNTY

445700093051001. Local number, 029N22W31DDD01.

LOCATION.--Lat 44°57'00", long 93°05'10", in SE $\frac{1}{4}$ SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec.31, T.29 N., R.22 W., Hydrologic Unit 07010206, at 261 East 5th Street, St. Paul.

Owner: Control Data Corp.

AQUIFER.--Prairie du Chien Group of Early Ordovician Age and Jordan Sandstone of Late Cambrian Age.

WELL CHARACTERISTICS.--Drilled, unused artesian well, diameter 16 in. to 131 ft, 12 in. to 313 ft, depth 313 ft, cased to 151 ft.

INSTRUMENTATION.--Digital recorder with 15-minute punch cycle.

DATUM.--Altitude of land-surface datum is 750 ft. Measuring point: Top of recorder platform, 9.00 ft below land-surface datum.

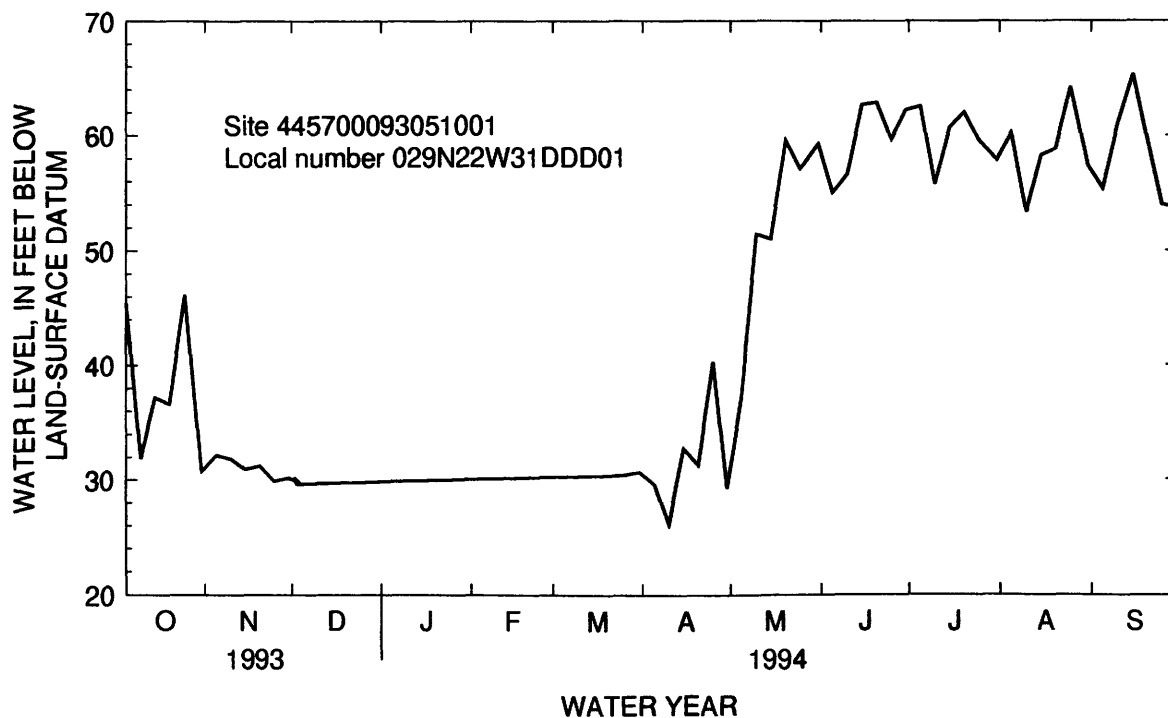
REMARKS.--Water level affected by pumping of nearby wells.

PERIOD OF RECORD.--December 1971 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 24.44 ft below land-surface datum, Apr. 11, 1993; lowest, 83.28 ft below land-surface datum, Aug. 4, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	45.45	32.16	---	---	---	---	29.54	37.34	55.00	62.53	60.20	55.39
10	31.86	31.85	---	---	---	---	26.08	51.42	56.63	55.75	53.35	60.99
15	37.21	30.96	---	---	---	---	32.73	51.01	62.69	60.66	58.26	65.34
20	36.61	31.25	---	---	---	---	31.25	59.53	62.89	62.05	58.81	59.64
25	46.21	29.88	---	---	---	30.34	40.30	57.10	59.65	59.52	64.23	54.02
EOM	30.75	30.17	---	---	---	30.63	29.24	59.30	62.22	57.87	57.32	53.70



RAMSEY COUNTY--Continued

450238093082501. Local number, 030N23W35BDC01.

LOCATION.--Lat 45°02'38", long 93°08'25", in SW¼SE¼NW¼ 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 12 in., depth 510 ft, cased to 465 ft.

INSTRUMENTATION.--Digital recorder with 30-minute punch cycle.

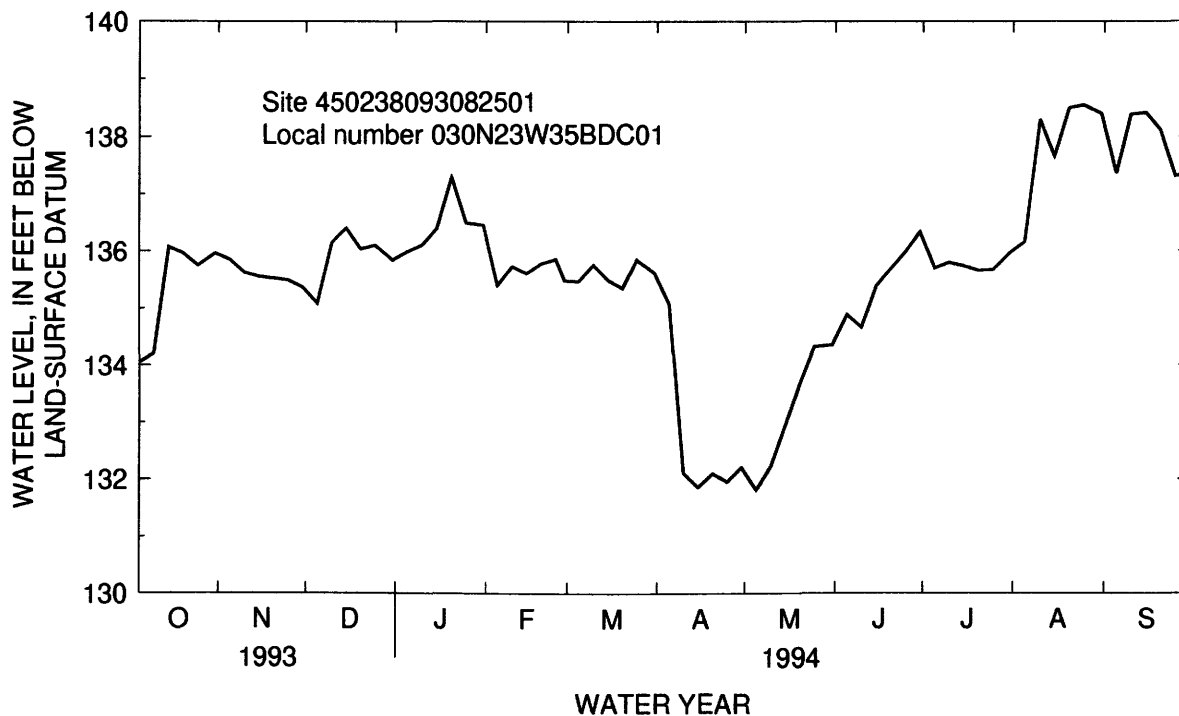
DATUM.--Altitude of land-surface datum is 960 ft. Measuring point: Top of recorder platform, 1.50 ft above land-surface datum.

PERIOD OF RECORD.--April 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 1993 TO SEPTEMBER 1994

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	134.04	135.85	135.08	135.98	135.39	135.46	135.07	131.80	134.88	135.70	136.16	137.36
10	134.21	135.62	136.15	136.10	135.72	135.75	132.09	132.21	134.66	135.80	138.29	138.38
15	136.07	135.55	136.40	136.39	135.60	135.48	131.85	132.94	135.38	135.74	137.66	138.41
20	135.96	135.52	136.03	137.29	135.77	135.34	132.08	133.68	135.69	135.66	138.49	138.11
25	135.75	135.49	136.10	136.49	135.85	135.84	131.94	134.32	135.98	135.67	138.54	137.31
END OF MONTH	135.96	135.36	135.84	136.45	135.47	135.61	132.19	134.35	136.33	135.97	138.39	137.37



SCOTT COUNTY

444427093353902. Local number. 115N23W28BDD02.

LOCATION.--Lat 44°44'27", long 93°35'39", in SE $\frac{1}{4}$ SE $\frac{1}{4}$ NW $\frac{1}{4}$ 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.--Digital recorder with one-hour punch cycle.

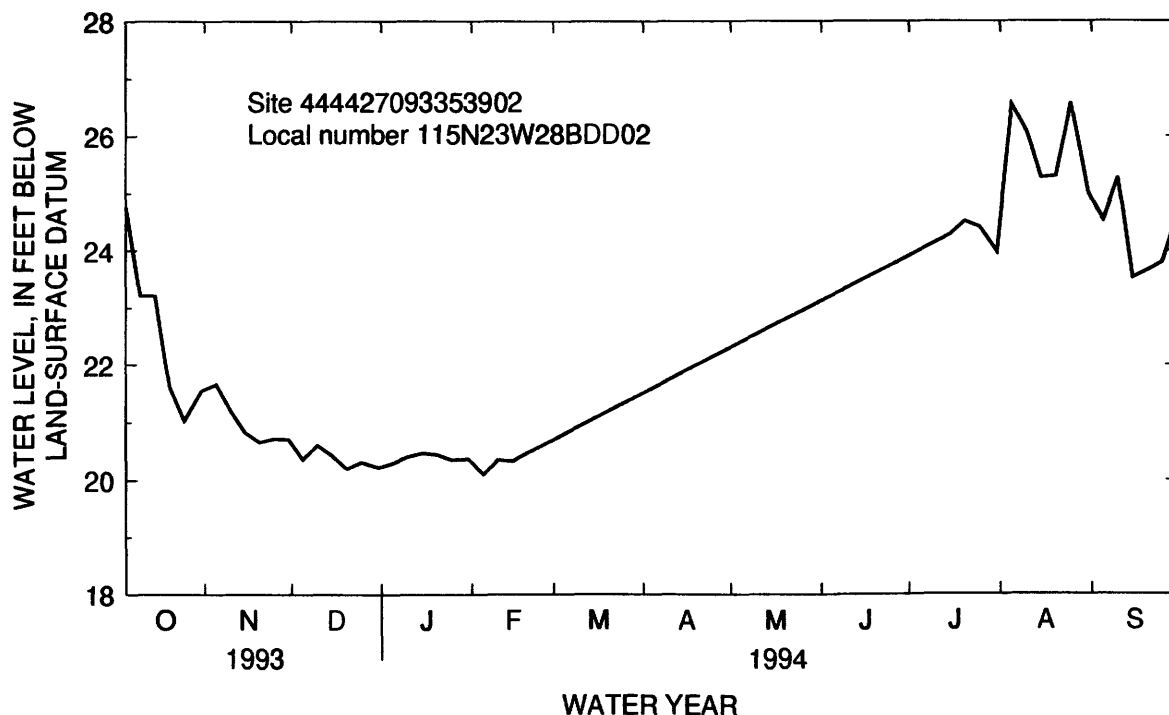
DATUM.--Altitude of land-surface datum is 758 ft. Measuring point: Top of casing, 1.00 ft above land-surface datum.

PERIOD OF RECORD.--November 1984 to current year.

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 1993 TO SEPTEMBER 1994

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	24.76	21.66	20.36	20.30	20.10	--	--	--	--	--	26.55	24.53
10	23.21	21.20	20.60	20.40	20.35	--	--	--	--	--	26.06	25.28
15	23.21	20.83	20.43	20.46	20.33	--	--	--	--	24.28	25.28	23.52
20	21.62	20.66	20.20	20.44	--	--	--	--	--	24.51	25.30	23.65
25	21.03	20.72	20.31	20.35	--	--	--	--	--	24.41	26.58	23.80
EOM	21.55	20.71	20.22	20.36	--	--	--	--	--	23.98	25.00	24.64



SCOTT COUNTY--Continued

44427093353903. Local number, 115N23W28BDD03.

LOCATION.--Lat 44°44'27", long 93°35'39", in SE $\frac{1}{4}$ SE $\frac{1}{4}$ NW $\frac{1}{4}$ sec.28, T.115 N., R.23 W., Hydrologic Unit 07020012, Merriam Junction.

Owner: Chicago and Northwestern Transportation Company.

AQUIFER.--Mount Simon Sandstone of Late Cambrian Age.

WELL CHARACTERISTICS.--Drilled artesian observationwell, diameter 4 in., depth 525 ft, screened 520 to 525 ft.

INSTRUMENTATION.--Digital recorder with one-hour punch cycle.

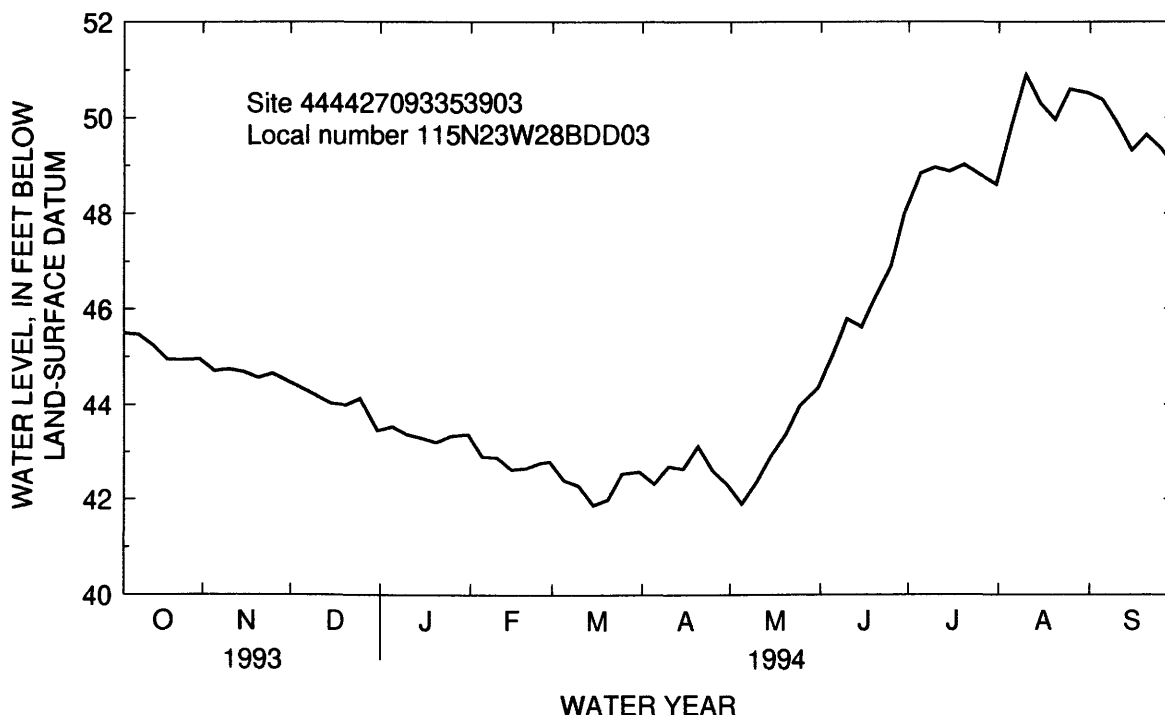
DATUM.--Altitude of land-surface datum is 758 ft. Measuring point: Top of casing, 1.00 ft above land-surface datum.

PERIOD OF RECORD.--November 1984 to current year.

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 1993 TO SEPTEMBER 1994

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT
5	45.50	44.69	---	43.53	42.89	42.39	42.31	41.89	45.02	48.84	49.77	50.38
10	45.47	44.73	---	43.36	42.87	42.27	42.67	42.34	45.79	48.96	50.90	49.91
15	45.24	44.67	44.02	43.29	42.61	41.87	42.62	42.90	45.62	48.88	50.30	49.31
20	44.94	44.55	43.99	43.19	42.64	41.98	43.11	43.35	46.29	49.02	49.96	49.64
25	44.93	44.64	44.12	43.33	42.75	42.52	42.58	43.97	46.90	48.83	50.59	49.35
FROM	44.95	---	43.45	43.36	42.78	42.56	42.30	44.33	48.08	48.61	50.52	48.92



WATONWAN COUNTY

440037094372601. Local number, 106N32W01DDB01.

LOCATION.--Lat 44°00'37", long 94°37'26", in NW¼,SE¼,SE¼ 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.--Altitude of land-surface datum is 1,056.2 ft National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 4.80 ft above land-surface datum.

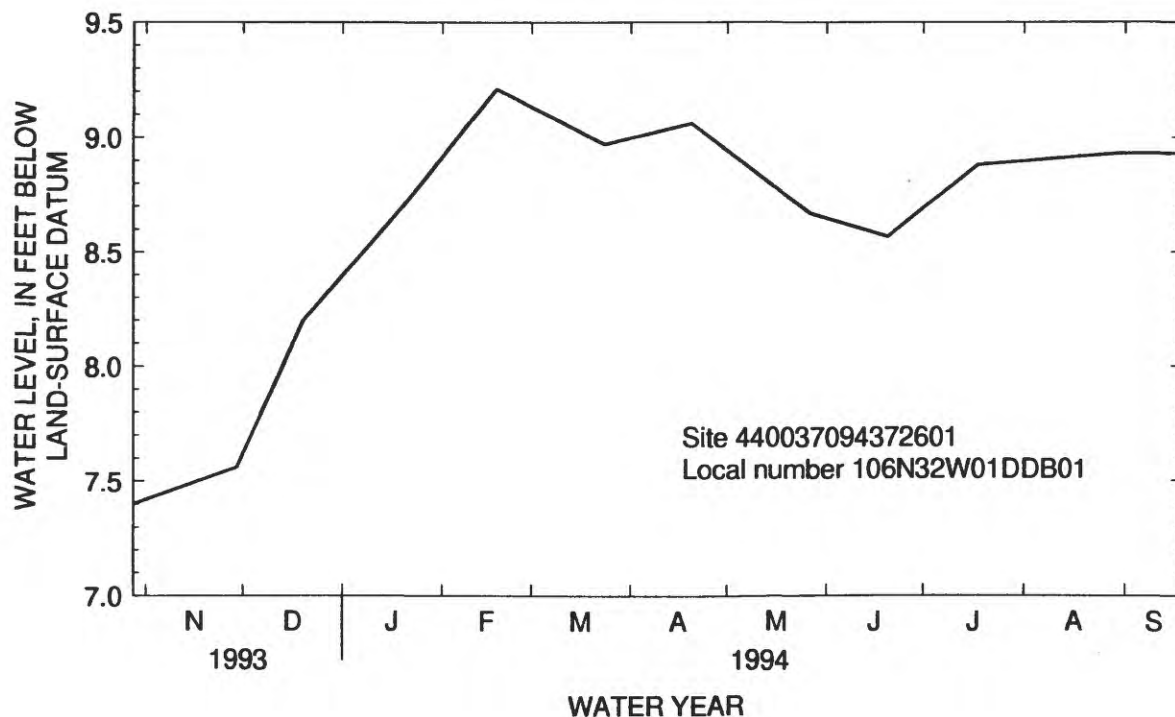
REMARKS.--Water levels used in monthly National Water Conditions Report.

PERIOD OF RECORD.--November 1965 to current year.

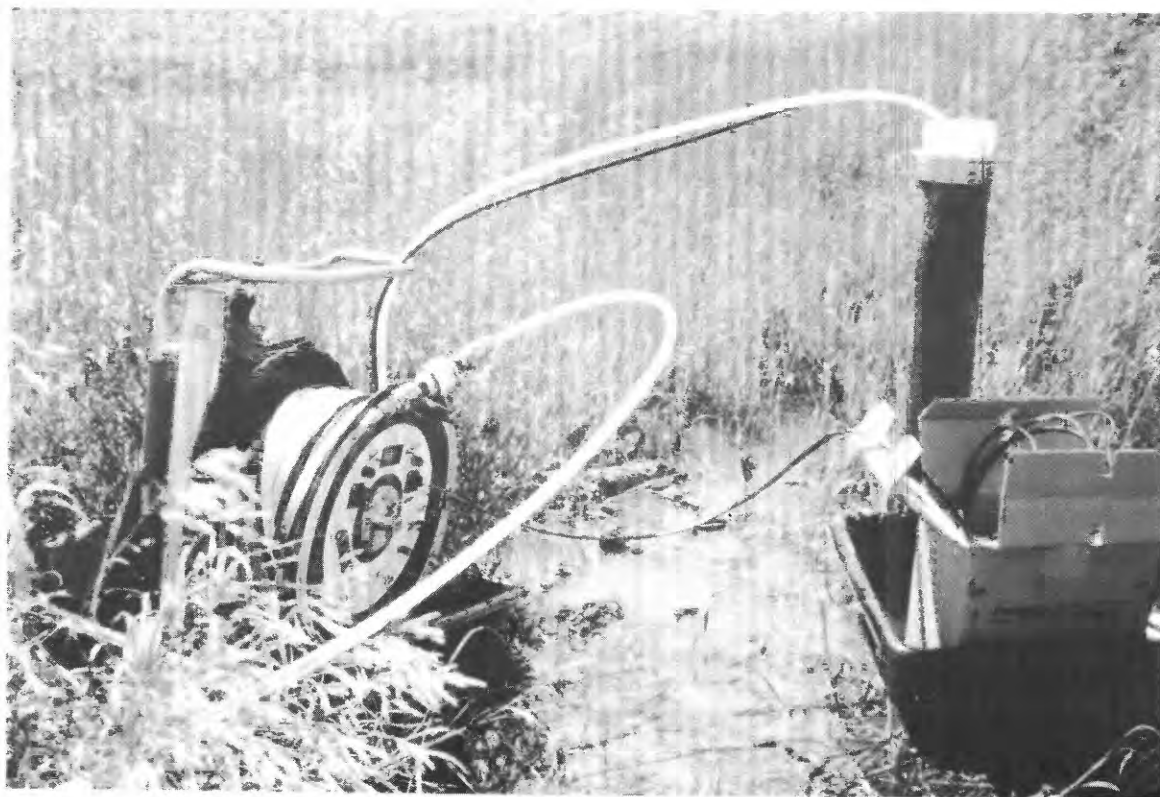
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 4.11 ft below land-surface datum, Apr. 27, 1969; lowest, 16.22 ft below land-surface datum, Mar. 7, 1990.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Oct 28	7.40	Jan 20	8.70	Apr. 20	9.06	Jul 18	8.88
Nov 29	7.56	Feb 18	9.21	May 27	8.67	Aug 30	8.93
Dec 20	8.20	Mar. 24	8.97	Jun 20	8.57	Sep 19	8.93



QUALITY OF GROUND WATER



Submersible Groundwater Sampling Pump

QUALITY OF GROUND WATER
WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
ANALYSES OF INORGANIC CHEMICALS
BELTRAMI COUNTY

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	SPE- CIFIC CON- DUCT- ANCE LAB (US/CM) (90095)	PH WATER WHOLE LAB (STAND- ARD UNITS) (00403)	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)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LITY LAB (MG/L AS CAO3) (90410)
472724095055200	09-06-94	1745	26.50	512	7.2	73	24	7.3	2.0	303
472740094512700	09-07-94	1045	12.50	--	--	--	--	--	--	--
472818094525200	09-07-94	1310	8.00	--	--	--	--	--	--	--
472938094522800	09-07-94	1130	14.00	1280	6.7	180	32	31	2.9	486
473029094565800	09-07-94	1240	18.00	320	6.8	47	11	2.1	0.40	163
473306094480000	09-07-94	0930	45.00	379	7.5	59	14	1.1	0.30	200
473413094554300	09-06-94	1520	24.00	453	7.4	62	18	1.7	6.4	221
473606094481200	09-07-94	1445	105.00	514	7.5	--	--	--	--	290

STATION NUMBER	DATE	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)
472724095055200	09-06-94	1.0	1.6	0.20	22	310	--	--	--
472740094512700	09-07-94	--	--	--	--	--	<0.010	3.70	3.70
472818094525200	09-07-94	--	--	--	--	--	--	--	--
472938094522800	09-07-94	2.1	140	0.10	33	836	--	--	--
473029094565800	09-07-94	2.8	1.4	0.10	20	198	--	--	--
473306094480000	09-07-94	7.4	0.80	<0.10	11	215	<0.010	0.091	0.091
473413094554300	09-06-94	4.1	3.8	0.10	21	283	--	--	--
473606094481200	09-07-94	1.8	0.80	0.10	25	316	--	--	--

QUALITY OF GROUND WATER
WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
ANALYSES OF INORGANIC CHEMICALS
BELTRAMI COUNTY

STATION NUMBER	DATE	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOS- PHORUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	ALUM- INUM, DIS- SOLVED (UG/L AS AL) (01106)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BARIUM, DIS- SOLVED (UG/L AS BA) (01005)	BORON, DIS- SOLVED (UG/L AS B) (01020)
472724095055200	09-06-94	--	--	--	--	--	--	--	--
472740094512700	09-07-94	0.010	<0.20	--	0.060	--	--	--	--
472818094525200	09-07-94	--	--	1.60	2.30	--	--	--	--
472938094522800	09-07-94	--	--	1.10	0.368	10	<1	180	50
473029094565800	09-07-94	--	--	--	--	<10	1	15	20
473306094480000	09-07-94	<0.010	<0.20	--	0.010	--	--	--	--
473413094554300	09-06-94	--	--	--	--	--	<1	--	--
473606094481200	09-07-94	--	--	--	--	--	--	--	--

STATION NUMBER	DATE	CADMIUM DIS- SOLVED (UG/L AS CD) (01025)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR) (01030)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	LEAD, DIS- SOLVED (UG/L AS PB) (01049)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)
472724095055200	09-06-94	--	--	--	--	--	--	--	4.5
472740094512700	09-07-94	--	--	--	--	--	--	--	2.5
472818094525200	09-07-94	--	--	--	--	--	--	--	6.0
472938094522800	09-07-94	<1.0	<1	4300	<1	680	<0.1	<1	18
473029094565800	09-07-94	<1.0	<1	<3	<1	1	<0.1	<1	0.8
473306094480000	09-07-94	--	--	--	--	--	--	--	2.4
473413094554300	09-06-94	--	--	5	<100	--	--	--	4.7
473606094481200	09-07-94	--	--	--	--	--	--	--	1.5

QUALITY OF GROUND WATER
WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
ANALYSES OF INORGANIC CHEMICALS
BLUE EARTH COUNTY

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	SPE- CIFIC CON- DUCT- ANCE LAB (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)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)
440046093580600	05-19-94	1440	12.00	830	790	7.4	7.5	9.0	4.6	86	34
440046093580602	08-23-94	1200	--	--	--	--	--	--	--	--	--
440046093580603	08-23-94	1210	--	--	--	--	--	--	--	--	--
440046093580603	09-29-94	0850	--	--	--	--	--	--	--	--	--
440046093580604	08-23-94	1220	--	--	--	--	--	--	--	--	--
440046093580604	09-29-94	0855	--	--	--	--	--	--	--	--	--
440046093580605	08-23-94	1230	--	--	--	--	--	--	--	--	--
440046093580605	09-29-94	0900	--	--	--	--	--	--	--	--	--
440047093580600	05-19-94	1430	12.00	671	519	7.1	7.2	9.5	6.6	97	28
440047093580603	09-29-94	0908	--	--	--	--	--	--	--	--	--
440047093580604	08-23-94	1140	--	--	--	--	--	--	--	--	--
440047093580604	09-29-94	0910	--	--	--	--	--	--	--	--	--
440047093580605	08-23-94	1150	--	--	--	--	--	--	--	--	--
440048093580600	05-19-94	1420	12.00	659	673	7.2	7.4	10.0	8.8	83	28
440048093580601	08-23-94	1100	--	--	--	--	--	--	--	--	--
440048093580602	08-23-94	1110	--	--	--	--	--	--	--	--	--
440048093580604	08-23-94	1120	--	--	--	--	--	--	--	--	--
440048093580604	09-29-94	0922	--	--	--	--	--	--	--	--	--
440048093580605	09-29-94	0924	--	--	--	--	--	--	--	--	--
440049093580600	05-19-94	1410	12.00	427	859	7.7	7.6	10.0	5.5	100	31
440049093580601	08-23-94	1020	--	--	--	--	--	--	--	--	--
440049093580602	08-23-94	1030	--	--	--	--	--	--	--	--	--
440049093580602	09-29-94	0924	--	--	--	--	--	--	--	--	--
440049093580603	09-29-94	0926	--	--	--	--	--	--	--	--	--
440049093580604	08-23-94	1040	--	--	--	--	--	--	--	--	--
440049093580604	09-29-94	0928	--	--	--	--	--	--	--	--	--
440049093580605	08-23-94	1050	--	--	--	--	--	--	--	--	--
440049093580605	09-29-94	0930	--	--	--	--	--	--	--	--	--
440051093580500	08-10-94	1510	10.22	997	--	7.0	--	11.0	5.1	--	--
440051093580500	08-22-94	1610	10.22	946	--	7.1	--	12.0	4.0	--	--
440051093580500	09-28-94	1330	10.22	--	--	--	--	--	--	--	--
440051093580503	08-22-94	1620	9.70	932	--	6.8	--	11.5	3.2	--	--
440051093580503	08-11-94	0910	9.70	1000	--	6.9	--	11.0	2.8	--	--
440051093580503	09-28-94	1442	9.70	--	--	--	--	--	--	--	--
440051093580504	08-23-94	0910	9.20	943	--	6.8	--	12.5	6.0	--	--
440051093580504	08-11-94	0900	9.20	915	--	6.9	--	11.5	3.4	--	--
440051093580504	09-28-94	1320	9.20	--	--	--	--	--	--	--	--
440052093580500	05-18-94	0920	17.00	--	1240	--	7.1	--	--	170	52
440052093580502	06-28-94	1200	--	1200	--	6.9	--	10.5	1.2	--	--
440052093580502	08-11-94	1000	--	1220	--	7.1	--	11.0	1.5	--	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

ANALYSES OF INORGANIC CHEMICALS

BLUE EARTH COUNTY

[illegible]

QUALITY OF GROUND WATER
WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
ANALYSES OF INORGANIC CHEMICALS
BLUE EARTH COUNTY

STATION NUMBER	DATE	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC DIS- SOLVED (MG/L AS N) (00623)	PHOS- PHORUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHORUS ORTHOS- SOLVED (MG/L AS P) (00671)	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)
440046093580600	05-19-94	2.20	2.20	<0.010	<0.20	<0.010	<0.010	--	20	110
440046093580602	08-23-94	--	<0.050	0.090	0.40	0.050	0.020	--	--	--
440046093580603	08-23-94	--	--	--	--	--	--	--	--	--
440046093580603	09-29-94	3.10	3.10	0.200	0.70	0.060	0.010	--	--	--
440046093580604	08-23-94	0.094	0.094	0.110	7.0	6.30	0.060	--	--	--
440046093580604	09-29-94	1.80	1.80	0.100	0.90	0.330	0.300	--	--	--
440046093580605	08-23-94	0.053	0.053	0.070	2.0	0.790	0.020	--	--	--
440046093580605	09-29-94	--	<0.050	0.040	0.20	<0.010	<0.010	--	--	--
440047093580600	05-19-94	2.90	2.90	0.010	<0.20	0.010	<0.010	--	43	28
440047093580603	09-29-94	1.00	1.00	0.090	1.4	0.090	0.020	--	--	--
440047093580604	08-23-94	2.30	2.30	0.010	0.60	0.090	0.070	--	--	--
440047093580604	09-29-94	3.80	3.80	0.040	0.50	0.200	0.080	--	--	--
440047093580605	08-23-94	2.20	2.20	0.100	0.70	0.170	0.160	--	--	--
440048093580600	05-19-94	3.60	3.60	0.020	<0.20	0.020	0.020	--	12	110
440048093580601	08-23-94	1.60	1.60	17.0	20	0.060	0.050	--	--	--
440048093580602	08-23-94	0.100	0.100	0.160	1.9	0.030	0.020	--	--	--
440048093580604	08-23-94	3.60	3.60	<0.010	1.5	0.920	0.030	--	--	--
440048093580604	09-29-94	2.60	2.60	0.090	0.70	0.190	0.080	--	--	--
440048093580605	09-29-94	2.80	2.80	0.050	0.70	0.080	0.010	--	--	--
440049093580600	05-19-94	5.20	5.20	0.040	0.30	0.020	0.020	--	110	90
440049093580601	08-23-94	--	<0.050	0.060	1.0	0.080	0.040	--	--	--
440049093580602	08-23-94	--	<0.050	0.110	0.50	0.030	0.040	--	--	--
440049093580602	09-29-94	0.340	0.340	0.080	0.50	0.020	<0.010	--	--	--
440049093580603	09-29-94	--	<0.050	0.180	0.80	0.100	0.020	--	--	--
440049093580604	08-23-94	0.150	0.150	0.010	0.40	0.110	0.040	--	--	--
440049093580604	09-29-94	--	<0.050	0.170	0.30	0.020	<0.010	--	--	--
440049093580605	08-23-94	0.091	0.091	0.040	0.30	0.040	0.030	--	--	--
440049093580605	09-29-94	0.380	0.380	0.090	0.60	0.040	<0.010	--	--	--
440051093580500	08-10-94	--	--	--	--	--	--	--	--	--
440051093580500	08-22-94	6.40	6.40	0.020	0.60	0.010	0.020	--	--	--
440051093580500	09-28-94	6.90	6.90	0.030	0.30	<0.010	<0.010	--	--	--
440051093580503	08-22-94	7.00	7.00	0.020	0.30	0.010	0.020	--	--	--
440051093580503	08-11-94	6.30	6.30	<0.010	<0.20	<0.010	<0.010	80	--	--
440051093580503	09-28-94	7.40	7.40	0.030	<0.20	<0.010	<0.010	--	--	--
440051093580504	08-23-94	6.50	6.50	0.030	0.20	<0.010	0.020	--	--	--
440051093580504	08-11-94	6.40	6.40	<0.010	0.90	<0.010	<0.010	80	--	--
440051093580504	09-28-94	6.30	6.30	0.010	0.20	<0.010	<0.010	--	--	--
440052093580500	05-18-94	0.250	0.250	0.220	0.30	<0.010	<0.010	--	39	1200
440052093580502	06-28-94	0.330	0.330	0.210	0.70	<0.010	<0.010	--	--	--
440052093580502	08-11-94	1.50	1.50	0.160	0.40	<0.010	<0.010	100	--	--

QUALITY OF GROUND WATER
 WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
 ANALYSES OF INORGANIC CHEMICALS
 BLUE EARTH COUNTY

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	SPE- CIFIC CON- DUCT- ANCE LAB (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)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)
440052093580502	09-28-94	1230	--	--	--	--	--	--	--	--	--
440052093580503	06-28-94	1210	--	1210	--	6.8	--	10.0	0.6	--	--
440052093580503	08-11-94	1020	--	1230	--	7.0	--	10.5	0.7	--	--
440052093580503	09-28-94	1240	--	--	--	--	--	--	--	--	--
440052093580504	06-28-94	1340	--	852	--	6.8	--	10.5	3.9	--	--
440052093580504	06-28-94	1220	--	1200	--	6.8	--	10.0	0.7	--	--
440052093580504	09-28-94	1250	--	--	--	--	--	--	--	--	--
440052093580504	08-11-94	1040	--	1210	--	7.0	--	10.5	0.7	--	--
440052093580505	06-28-94	1230	--	1190	--	6.8	--	10.0	0.6	--	--
440052093580505	09-28-94	1300	--	--	--	--	--	--	--	--	--
440052093580505	08-11-94	1100	--	1170	--	6.9	--	10.5	0.8	--	--
440053093580500	05-18-94	0925	15.00	648	1110	6.9	7.1	9.5	0.5	160	44
440053093580503	06-28-94	1300	--	1060	--	6.8	--	11.0	0.6	--	--
440053093580503	08-11-94	1200	--	1050	--	7.0	--	--	--	--	--
440053093580503	09-28-94	1200	--	--	--	--	--	--	--	--	--
440053093580504	06-28-94	1310	--	1050	--	6.8	--	10.5	0.4	--	--
440053093580504	09-28-94	1210	--	--	--	--	--	--	--	--	--
440053093580504	08-11-94	1220	--	1020	--	7.0	--	11.0	0.4	--	--
440053093580505	06-28-94	1320	--	1070	--	6.8	--	10.0	0.3	--	--
440053093580505	08-11-94	1240	--	1030	--	7.0	--	11.0	0.3	--	--
440053093580505	09-28-94	1220	--	--	--	--	--	--	--	--	--
440054093580500	05-18-94	0930	15.00	900	916	6.8	7.1	8.5	5.0	130	36
440054093580503	06-28-94	1330	--	849	--	6.8	--	11.0	3.8	--	--
440054093580503	08-10-94	1330	--	882	--	7.0	--	12.0	4.3	--	--
440054093580504	08-10-94	1340	--	873	--	7.0	--	11.5	3.0	--	--
440054093580504	06-28-94	1340	--	852	--	6.8	--	10.5	3.9	--	--
440054093580505	06-28-94	1350	--	857	--	6.8	--	10.0	3.3	--	--
440054093580505	08-10-94	1350	--	879	--	6.9	--	11.0	2.0	--	--
440055093580500	05-18-94	0940	15.00	688	753	6.8	7.1	8.5	6.8	99	28
440055093580501	06-28-94	1620	--	--	--	--	--	--	--	--	--
440055093580502	06-28-94	1625	--	--	--	--	--	--	--	--	--
440055093580502	08-23-94	0930	--	--	--	--	--	--	--	--	--
440055093580503	06-28-94	1630	--	--	--	--	--	--	--	--	--
440055093580504	06-28-94	1635	--	--	--	--	--	--	--	--	--
440055093580504	08-23-94	0950	--	--	--	--	--	--	--	--	--
440055093580505	06-28-94	1640	--	--	--	--	--	--	--	--	--
440055093580505	08-23-94	1000	--	--	--	--	--	--	--	--	--
440057093575501	08-22-94	1530	8.01	1210	--	6.7	--	11.5	1.5	--	--
440057093575501	08-09-94	1400	8.01	--	--	--	--	--	--	--	--
440057093575501	09-28-94	1010	8.01	--	--	--	--	--	--	--	--

QUALITY OF GROUND WATER
WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
ANALYSES OF INORGANIC CHEMICALS
BLUE EARTH COUNTY

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QUALITY OF GROUND WATER
WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
ANALYSES OF INORGANIC CHEMICALS
BLUE EARTH COUNTY

STATION NUMBER	DATE	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC DIS- SOLVED (MG/L AS N) (00623)	PHOS- PHORUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	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)
440052093580502	09-28-94	1.40	1.40	0.190	0.40	<0.010	<0.010	--	--	--
440052093580503	06-28-94	0.074	0.074	0.240	0.60	0.010	<0.010	--	--	--
440052093580503	08-11-94	0.770	0.770	0.210	0.40	0.030	0.010	--	--	--
440052093580503	09-28-94	0.910	0.910	0.240	0.40	<0.010	<0.010	--	--	--
440052093580504	06-28-94	15.0	15.0	0.030	0.80	<0.010	<0.010	--	--	--
440052093580504	06-28-94	0.150	0.150	0.250	0.60	<0.010	<0.010	--	--	--
440052093580504	09-28-94	1.00	1.00	0.180	0.40	<0.010	<0.010	--	--	--
440052093580504	08-11-94	1.10	1.10	0.190	0.40	0.020	<0.010	100	--	--
440052093580505	06-28-94	0.160	0.160	0.250	0.60	0.030	<0.010	--	--	--
440052093580505	09-28-94	0.880	0.880	0.220	0.40	<0.010	<0.010	--	--	--
440052093580505	08-11-94	1.80	1.80	0.200	0.40	<0.010	<0.010	100	--	--
440053093580500	05-18-94	3.30	3.30	0.050	<0.20	<0.010	0.010	--	58	520
440053093580503	06-28-94	1.50	1.50	0.060	0.30	0.010	<0.010	--	--	--
440053093580503	08-11-94	1.90	1.90	<0.010	0.60	0.010	<0.010	90	--	--
440053093580503	09-28-94	2.20	2.20	0.020	<0.20	0.030	<0.010	--	--	--
440053093580504	06-28-94	1.90	1.90	0.040	0.40	<0.010	<0.010	--	--	--
440053093580504	09-28-94	3.60	3.60	0.030	0.20	<0.010	<0.010	--	--	--
440053093580504	08-11-94	2.50	2.50	<0.010	<0.20	0.010	<0.010	90	--	--
440053093580505	06-28-94	1.80	1.80	0.030	0.50	0.040	<0.010	--	--	--
440053093580505	08-11-94	2.40	2.40	<0.010	<0.20	0.010	<0.010	100	--	--
440053093580505	09-28-94	3.20	3.20	0.020	0.30	<0.010	<0.010	--	--	--
440054093580500	05-18-94	18.0	18.0	0.030	<0.20	<0.010	0.020	--	28	21
440054093580503	06-28-94	15.0	15.0	0.030	0.50	0.010	<0.010	--	--	--
440054093580503	08-10-94	17.0	17.0	<0.010	0.40	<0.010	<0.010	--	--	--
440054093580504	08-10-94	16.0	16.0	<0.010	0.50	<0.010	<0.010	--	--	--
440054093580504	06-28-94	15.0	15.0	0.030	0.80	<0.010	<0.010	--	--	--
440054093580505	06-28-94	15.0	15.0	0.020	0.80	0.040	<0.010	--	--	--
440054093580505	08-10-94	14.0	14.0	<0.010	0.40	<0.010	<0.010	--	--	--
440055093580500	05-18-94	15.0	15.0	0.040	<0.20	<0.010	0.020	--	12	41
440055093580501	06-28-94	0.100	0.100	0.080	1.3	0.020	0.020	--	--	--
440055093580502	06-28-94	12.0	12.0	0.030	0.60	0.260	<0.010	--	--	--
440055093580502	08-23-94	12.0	12.0	<0.010	0.70	0.110	0.090	--	--	--
440055093580503	06-28-94	15.0	15.0	0.010	1.7	0.020	0.020	--	--	--
440055093580504	06-28-94	15.0	15.0	<0.010	0.40	<0.010	0.030	--	--	--
440055093580504	08-23-94	10.0	10.0	<0.010	0.80	0.190	0.220	--	--	--
440055093580505	06-28-94	13.0	13.0	0.020	1.1	0.030	<0.010	--	--	--
440055093580505	08-23-94	11.0	11.0	0.030	0.70	0.080	0.080	--	--	--
440057093575501	08-22-94	--	<0.050	0.040	0.60	0.010	<0.010	--	--	--
440057093575501	08-09-94	--	<0.050	0.040	<0.20	0.010	<0.010	100	--	--
440057093575501	09-28-94	--	<0.050	0.030	0.40	0.010	<0.010	--	--	--

QUALITY OF GROUND WATER
WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
ANALYSES OF INORGANIC CHEMICALS
BLUE EARTH COUNTY

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	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)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)
440057093575502	08-10-94	1220	7.00	1310	--	7.1	--	11.5	2.9	--	--
440057093575502	08-23-94	0840	7.00	1230	--	6.9	--	12.0	2.3	--	--
440057093575503	08-23-94	0830	7.50	1200	--	7.3	--	12.5	2.5	--	--
440057093575503	08-10-94	1150	7.50	1080	--	7.2	--	11.0	2.6	--	--
440057093575504	08-10-94	1130	5.30	--	--	--	--	--	--	--	--
440057093575504	08-23-94	0820	5.30	--	--	--	--	--	--	--	--
440057093575505	08-10-94	1240	8.90	--	--	--	--	--	--	--	--
440057093575505	08-22-94	1520	8.90	1190	--	6.8	--	11.0	1.2	--	--
440057093575505	09-28-94	1020	8.90	--	--	--	--	--	--	--	--
440057093575600	05-17-94	1525	18.00	--	1640	--	7.2	--	--	270	59
440057093575601	06-27-94	1420	11.50	1390	--	6.8	--	9.5	1.1	--	--
440057093575601	09-28-94	0920	11.50	--	--	--	--	--	--	--	--
440057093575601	08-09-94	1110	11.50	1440	--	7.0	--	10.5	0.5	--	--
440057093575602	06-27-94	1423	13.00	1490	--	6.7	--	10.0	0.5	--	--
440057093575602	08-09-94	1130	13.00	1580	--	7.0	--	10.5	0.5	--	--
440057093575602	09-28-94	0930	13.00	--	--	--	--	--	--	--	--
440057093575603	06-27-94	1430	11.50	1410	--	6.7	--	9.5	0.5	--	--
440057093575603	08-09-94	1140	11.50	1520	--	6.9	--	10.5	0.5	--	--
440057093575603	09-28-94	0940	11.50	--	--	--	--	--	--	--	--
440057093575604	06-27-94	1435	16.00	1310	--	6.8	--	9.5	E0.5	--	--
440057093575604	08-09-94	1210	16.00	1380	--	7.0	--	10.0	0.5	--	--
440057093575604	06-27-94	1440	16.00	1320	--	6.8	--	9.5	0.5	--	--
440057093575604	09-28-94	0950	16.00	--	--	--	--	--	--	--	--
440057093575605	06-27-94	1450	17.50	1280	--	6.8	--	10.0	0.4	--	--
440057093575605	09-28-94	1000	17.50	--	--	--	--	--	--	--	--
440057093575605	08-09-94	1220	17.50	1380	--	7.0	--	10.0	0.5	--	--
440058093575700	05-17-94	1600	18.00	1250	1370	6.7	7.1	12.5	0.6	220	59
440058093575701	06-27-94	1500	17.50	1340	--	6.8	--	10.5	0.5	--	--
440058093575701	09-28-94	0910	17.50	--	--	--	--	--	--	--	--
440058093575701	08-09-94	0900	17.50	1460	--	7.5	--	10.5	0.6	--	--
440058093575702	06-27-94	1510	16.00	1350	--	6.8	--	11.0	0.5	--	--
440058093575702	08-09-94	0930	16.00	1420	--	7.1	--	11.0	0.5	--	--
440058093575702	09-28-94	0900	16.00	--	--	--	--	--	--	--	--
440058093575703	06-27-94	1520	14.50	1360	--	6.7	--	11.5	0.5	--	--
440058093575703	08-09-94	0950	14.50	1430	--	7.0	--	11.5	0.4	--	--
440058093575703	09-28-94	0850	14.50	--	--	--	--	--	--	--	--
440058093575704	06-27-94	1530	13.00	1400	--	6.7	--	11.5	0.6	--	--
440058093575704	08-09-94	1020	13.00	1460	--	7.0	--	11.5	0.4	--	--
440058093575704	09-28-94	0840	13.00	--	--	--	--	--	--	--	--
440058093575705	06-27-94	1540	11.50	1440	--	6.7	--	12.0	0.6	--	--

QUALITY OF GROUND WATER
WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
ANALYSES OF INORGANIC CHEMICALS
BLUE EARTH COUNTY

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QUALITY OF GROUND WATER
WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
ANALYSES OF INORGANIC CHEMICALS
BLUE EARTH COUNTY

STATION NUMBER	DATE	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC DIS- SOLVED (MG/L AS N) (00623)	PHOS- PHORUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	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)
440057093575502	08-10-94	--	<0.050	0.050	0.60	<0.010	<0.010	110	--	--
440057093575502	08-23-94	--	<0.050	0.050	0.50	<0.010	0.010	--	--	--
440057093575503	08-23-94	0.079	0.079	0.060	0.70	<0.010	<0.010	--	--	--
440057093575503	08-10-94	--	<0.050	0.040	1.0	<0.010	<0.010	110	--	--
440057093575504	08-10-94	0.067	0.067	0.010	0.50	<0.010	<0.010	110	--	--
440057093575504	08-23-94	0.210	0.210	0.050	0.30	<0.010	0.020	--	--	--
440057093575505	08-10-94	--	<0.050	0.020	<0.20	<0.010	<0.010	110	--	--
440057093575505	08-22-94	0.074	0.074	0.040	0.50	<0.010	0.010	--	--	--
440057093575505	09-28-94	--	<0.050	0.020	0.20	<0.010	<0.010	--	--	--
440057093575600	05-17-94	0.270	0.270	0.290	0.50	<0.010	<0.010	--	400	1400
440057093575601	06-27-94	--	<0.050	0.510	1.3	<0.010	<0.010	--	--	--
440057093575601	09-28-94	--	<0.050	0.640	0.80	<0.010	<0.010	--	--	--
440057093575601	08-09-94	--	<0.050	0.530	0.70	0.010	<0.010	140	--	--
440057093575602	06-27-94	--	<0.050	0.320	0.60	<0.010	<0.010	--	--	--
440057093575602	08-09-94	0.076	0.076	0.230	0.90	<0.010	<0.010	--	--	--
440057093575602	09-28-94	--	<0.050	0.770	0.80	<0.010	<0.010	--	--	--
440057093575603	06-27-94	--	<0.050	0.540	1.3	<0.010	<0.010	--	--	--
440057093575603	08-09-94	--	<0.050	0.410	0.50	0.010	<0.010	120	--	--
440057093575603	09-28-94	--	<0.050	0.820	0.90	<0.010	<0.010	--	--	--
440057093575604	06-27-94	--	--	--	--	--	--	--	--	--
440057093575604	08-09-94	--	<0.050	0.440	1.0	0.010	<0.010	--	--	--
440057093575604	06-27-94	0.073	0.073	0.500	0.90	0.030	0.030	--	--	--
440057093575604	09-28-94	--	<0.050	0.750	0.80	<0.010	<0.010	--	--	--
440057093575605	06-27-94	0.100	0.100	0.460	1.1	<0.010	0.020	--	--	--
440057093575605	09-28-94	--	<0.050	0.630	0.70	<0.010	<0.010	--	--	--
440057093575605	08-09-94	--	<0.050	0.440	0.60	<0.010	<0.010	150	--	--
440058093575700	05-17-94	2.50	2.50	0.350	0.60	<0.010	<0.010	--	120	1200
440058093575701	06-27-94	0.092	0.092	0.410	1.0	<0.010	<0.010	--	--	--
440058093575701	09-28-94	--	<0.050	0.190	0.50	0.020	<0.010	--	--	--
440058093575701	08-09-94	0.140	0.140	0.290	0.50	0.020	<0.010	110	--	--
440058093575702	06-27-94	0.630	0.630	0.460	1.0	<0.010	<0.010	--	--	--
440058093575702	08-09-94	1.40	1.40	0.230	0.80	<0.010	<0.010	--	--	--
440058093575702	09-28-94	0.160	0.160	0.210	0.40	<0.010	<0.010	--	--	--
440058093575703	06-27-94	1.40	1.40	0.360	1.5	<0.010	<0.010	--	--	--
440058093575703	08-09-94	1.80	1.80	0.220	0.30	<0.010	<0.010	100	--	--
440058093575703	09-28-94	0.100	0.100	0.080	0.20	<0.010	<0.010	--	--	--
440058093575704	06-27-94	1.10	1.10	0.320	0.80	<0.010	<0.010	--	--	--
440058093575704	08-09-94	1.80	1.80	0.150	0.70	0.020	<0.010	--	--	--
440058093575704	09-28-94	0.160	0.160	0.030	<0.20	<0.010	<0.010	--	--	--
440058093575705	06-27-94	1.20	1.20	0.280	0.70	<0.010	<0.010	--	--	--

QUALITY OF GROUND WATER
 WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
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 BLUE EARTH COUNTY

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	SPF- CIFIC CON- DUCT- ANCE LAB (US/CM) (90095)	PH WATER WHOLE FIELD (STAND- ARDS) UNITS) (00400)	PH WATER WHOLE LAB (STAND- ARDS) UNITS) (00403)	TEMPER- ATURE WATER (DEG C) (00010)	OXYGEN, DIS- SOLVED (MG/L) (00300)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)
440058093575705	09-28-94	0830	11.50	--	--	--	--	--	--	--	--
440058093575705	08-09-94	1030	11.50	1500	--	6.9	--	12.0	0.4	--	--
440059093575800	05-16-94	1610	17.00	1290	--	6.8	--	10.0	0.6	--	--
440059093575800	05-17-94	1610	17.00	1290	1300	6.8	7.0	10.0	0.6	220	50
440059093575801	06-27-94	1550	--	1200	--	6.8	--	11.5	0.5	--	--
440059093575801	08-08-94	1620	--	1210	--	6.7	--	12.0	0.4	--	--
440059093575802	06-27-94	1600	--	1200	--	6.7	--	11.5	0.5	--	--
440059093575802	08-08-94	1630	--	1220	--	6.6	--	11.5	0.4	--	--
440059093575803	06-27-94	1610	--	1200	--	6.7	--	11.5	0.5	--	--
440059093575803	08-08-94	1640	--	1210	--	6.6	--	11.5	0.4	--	--
440059093575804	08-08-94	1650	--	1210	--	6.6	--	11.0	0.4	--	--
440059093575804	06-27-94	1620	--	1200	--	6.7	--	11.5	0.5	--	--
440059093575805	06-27-94	1640	--	1220	--	6.7	--	11.0	0.4	--	--
440059093575805	08-08-94	1700	--	1220	--	6.6	--	11.0	0.3	--	--
440100093575900	05-17-94	--	17.00	1020	--	7.0	--	9.5	E0.6	--	--
440100093575900	05-17-94	1630	17.00	1020	1050	7.0	7.2	9.5	0.6	140	40
440100093575901	06-27-94	1650	--	977	--	6.9	--	11.5	0.8	--	--
440100093575901	08-08-94	1510	--	958	--	7.4	--	12.0	0.6	--	--
440100093575902	06-27-94	1700	--	1010	--	6.9	--	11.0	0.5	--	--
440100093575902	08-08-94	1530	--	960	--	6.9	--	11.5	0.5	--	--
440100093575903	06-27-94	1710	--	1020	--	6.9	--	11.0	0.5	--	--
440100093575903	08-08-94	1540	--	981	--	6.9	--	11.0	0.4	--	--
440100093575904	08-08-94	1550	--	980	--	6.9	--	11.0	0.4	--	--
440100093575904	06-27-94	1720	--	1010	--	6.9	--	10.5	0.5	--	--
440100093575905	06-27-94	1730	--	991	--	6.9	--	10.5	0.4	--	--
440100093575905	06-27-94	1735	--	991	--	6.9	--	10.5	0.4	--	--
440100093575905	08-08-94	1600	--	977	--	6.9	--	11.0	0.4	--	--
440907093514401	10-07-93	1030	117.00	713	--	7.2	--	12.0	0.1	--	--

QUALITY OF GROUND WATER
WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
ANALYSES OF INORGANIC CHEMICALS
BLUE EARTH COUNTY

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QUALITY OF GROUND WATER
WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
ANALYSES OF INORGANIC CHEMICALS
BLUE EARTH COUNTY

STATION NUMBER	DATE	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOS- PHORUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	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)
440058093575705	09-28-94	0.380	0.380	0.020	<0.20	<0.010	<0.010	--	--	--
440058093575705	08-09-94	1.70	1.70	0.120	0.20	<0.010	<0.010	90	--	--
440059093575800	05-16-94	--	--	--	--	--	--	--	--	--
440059093575800	05-17-94	2.60	2.60	0.100	0.40	<0.010	<0.010	--	880	1800
440059093575801	06-27-94	1.90	1.90	0.040	0.40	<0.010	<0.010	--	--	--
440059093575801	08-08-94	1.80	1.80	0.060	0.50	<0.010	<0.010	--	--	--
440059093575802	06-27-94	1.90	1.90	0.040	0.30	<0.010	<0.010	--	--	--
440059093575802	08-08-94	2.20	2.20	0.040	0.50	<0.010	<0.010	--	--	--
440059093575803	06-27-94	1.90	1.90	0.040	0.30	<0.010	<0.010	--	--	--
440059093575803	08-08-94	1.90	1.90	0.050	0.50	<0.010	<0.010	--	--	--
440059093575804	08-08-94	1.90	1.90	0.060	0.40	<0.010	<0.010	--	--	--
440059093575804	06-27-94	1.60	1.60	0.060	0.60	<0.010	<0.010	--	--	--
440059093575805	06-27-94	1.20	1.20	0.080	0.60	<0.010	<0.010	--	--	--
440059093575805	08-08-94	1.50	1.50	0.060	0.50	0.010	<0.010	--	--	--
440100093575900	05-17-94	--	--	--	--	--	--	--	--	--
440100093575900	05-17-94	0.067	0.067	0.600	0.70	<0.010	<0.010	--	540	840
440100093575901	06-27-94	0.110	0.110	0.530	1.1	<0.010	<0.010	--	--	--
440100093575901	08-08-94	--	<0.050	0.520	1.0	<0.010	<0.010	--	--	--
440100093575902	06-27-94	0.080	0.080	0.610	1.4	<0.010	0.010	--	--	--
440100093575902	08-08-94	--	<0.050	0.530	0.80	<0.010	<0.010	--	--	--
440100093575903	06-27-94	--	<0.050	0.630	1.3	<0.010	<0.010	--	--	--
440100093575903	08-08-94	--	<0.050	0.570	0.80	<0.010	<0.010	--	--	--
440100093575904	08-08-94	--	<0.050	0.540	0.80	<0.010	<0.010	--	--	--
440100093575904	06-27-94	0.058	0.058	0.630	1.0	<0.010	<0.010	--	--	--
440100093575905	06-27-94	--	<0.050	0.600	1.0	<0.010	<0.010	--	--	--
440100093575905	06-27-94	--	<0.050	0.640	0.80	<0.010	<0.010	--	--	--
440100093575905	08-08-94	--	<0.050	0.530	1.0	<0.010	<0.010	--	--	--
440907093514401	10-07-93	--	<0.050	1.10	--	--	0.010	--	--	--

QUALITY OF GROUND WATER
WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
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GOODHUE COUNTY

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	PUMP OR FLOW PERIOD PRIOR TO SAM- PLING (MIN) (72004)	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)	OXID- ATION RED- UCTION POTEN- TIAL (MV) (00090)	TEMPER- ATURE WATER (DEG C) (00010)
443631092372001	09-09-94	1201	70.00	24	517	528	7.0	7.3	77	16.0
443650092375601	09-16-94	1251	52.00	29	475	--	7.3	--	265	16.5
443656092373901	09-16-94	1100	14.00	25	587	--	6.9	--	308	23.5
443744092384401	09-13-94	1230	30.00	35	298	314	7.5	7.8	236	12.0
443744092391701	08-02-94	1405	22.00	28	460	472	7.5	7.4	--	13.5
443745092381301	09-13-94	1050	32.30	40	417	437	7.2	7.6	157	13.0
443745092390201	09-08-94	1343	500.00	16	626	--	7.2	--	384	14.5
443746092383001	08-03-94	1140	18.00	45	305	307	7.4	7.3	0.3	13.0
443752092381501	09-08-94	1519	55.00	12	533	550	7.3	7.4	100	13.0
443756092390901	08-02-94	1100	18.69	48	492	514	7.4	7.4	--	13.5
443808092384401	08-05-94	1235	17.00	41	274	279	6.6	7.0	0.1	13.5
443814092393901	08-03-94	1405	10.95	36	386	389	7.2	7.2	0.3	16.5
443814092395301	09-07-94	1130	15.24	37	643	--	6.6	--	255	17.0
443830092390701	09-07-94	1445	12.00	36	409	428	7.1	7.5	220	15.5
443834092390301	08-04-94	1420	11.00	41	500	521	7.3	7.3	--	13.0
443839092394001	09-08-94	1040	11.00	25	569	587	6.8	7.1	220	16.5
443839092394901	08-05-94	1010	13.42	30	458	464	7.2	7.1	0.0	13.0

STATION NUMBER	DATE	OXYGEN, DIS- SOLVED (MG/L) (00300)	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)	ALKA- LITY WAT WH TOT IT FIELD MG/L AS CACO3 (00419)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)
443631092372001	09-09-94	0.1	62	25	6.4	264	8.8	9.1	0.20	27
443650092375601	09-16-94	0.2	--	--	--	201	--	--	--	--
443656092373901	09-16-94	0.3	--	--	--	237	--	--	--	--
443744092384401	09-13-94	11.6	36	10	9.9	121	7.4	13	0.10	16
443744092391701	08-02-94	9.1	60	22	4.4	166	7.5	30	0.20	19
443745092381301	09-13-94	0.1	50	15	15	158	26	21	0.20	14
443745092390201	09-08-94	0.2	--	--	--	186	--	--	--	--
443746092383001	08-03-94	10.5	41	11	2.5	96	9.0	3.1	0.20	19
443752092381501	09-08-94	0.6	63	22	18	182	66	27	0.20	14
443756092390901	08-02-94	8.6	70	24	4.0	189	41	12	0.20	19
443808092384401	08-05-94	4.8	32	9.7	2.9	51	30	7.8	0.10	14
443814092393901	08-03-94	6.9	49	18	4.5	163	20	5.5	0.10	10
443814092395301	09-07-94	5.3	--	--	--	136	--	--	--	--
443830092390701	09-07-94	5.1	55	21	5.2	208	17	5.0	<0.10	13
443834092390301	08-04-94	0.1	59	21	14	234	29	12	0.20	15
443839092394001	09-08-94	0.2	76	30	3.9	292	24	4.5	<0.10	15
443839092394901	08-05-94	4.0	61	22	5.4	237	19	7.9	0.20	15

QUALITY OF GROUND WATER
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GOODHUE COUNTY

STATION NUMBER	DATE	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC DIS- SOLVED (MG/L AS N) (00623)	PHOS- PHORUS ORTHOPHOS- PHATE DIS- SOLVED (MG/L AS P) (00671)	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)
443631092372001	09-09-94	--	--	--	--	--	--	--	--	--
443650092375601	09-16-94	<0.010	--	<0.050	0.030	<0.20	0.020	--	--	--
443656092373901	09-16-94	<0.010	0.650	0.650	0.090	0.30	0.130	--	--	--
443744092384401	09-13-94	--	--	--	--	--	--	--	--	--
443744092391701	08-02-94	0.010	7.30	7.30	0.030	<0.20	<0.010	--	--	--
443745092381301	09-13-94	--	--	--	--	--	--	--	--	--
443745092390201	09-08-94	--	--	--	--	--	--	--	--	--
443746092383001	08-03-94	<0.010	11.0	11.0	0.020	<0.20	0.040	--	--	--
443752092381501	09-08-94	--	--	--	--	--	--	--	--	--
443756092390901	08-02-94	<0.010	5.20	5.20	0.030	<0.20	<0.010	--	--	--
443808092384401	08-05-94	<0.010	9.80	9.80	0.040	<0.20	0.020	<1	18	<0.5
443814092393901	08-03-94	<0.010	6.40	6.40	0.030	<0.20	0.010	--	--	--
443814092395301	09-07-94	<0.010	27.0	27.0	0.020	<0.20	0.060	--	--	--
443830092390701	09-07-94	--	--	--	--	--	--	--	--	--
443834092390301	08-04-94	<0.010	--	<0.050	0.240	0.40	<0.010	<1	49	<0.5
443839092394001	09-08-94	--	--	--	--	--	--	--	--	--
443839092394901	08-05-94	<0.010	1.00	1.00	0.020	<0.20	<0.010	--	--	--

STATION NUMBER	DATE	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)	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)
443631092372001	09-09-94	--	--	--	--	120	--	--	3000	--
443650092375601	09-16-94	--	--	--	--	--	--	--	--	--
443656092373901	09-16-94	--	--	--	--	--	--	--	--	--
443744092384401	09-13-94	--	--	--	--	<3	--	--	<1	--
443744092391701	08-02-94	--	--	--	--	14	--	--	5	--
443745092381301	09-13-94	--	--	--	--	8	--	--	100	--
443745092390201	09-08-94	--	--	--	--	--	--	--	--	--
443746092383001	08-03-94	--	--	--	--	16	--	--	<1	--
443752092381501	09-08-94	--	--	--	--	180	--	--	2000	--
443756092390901	08-02-94	--	--	--	--	19	--	--	2	--
443808092384401	08-05-94	<1.0	<5	<3	<10	18	<10	<4	24	<0.1
443814092393901	08-03-94	--	--	--	--	12	--	--	1	--
443814092395301	09-07-94	--	--	--	--	--	--	--	--	--
443830092390701	09-07-94	--	--	--	--	6	--	--	<1	--
443834092390301	08-04-94	<1.0	<5	<3	<10	28	30	<4	1600	<0.1
443839092394001	09-08-94	--	--	--	--	9	--	--	17	--
443839092394901	08-05-94	--	--	--	--	11	--	--	4	--

QUALITY OF GROUND WATER
WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
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GOODHUE COUNTY

STATION NUMBER	DATE	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SILVER, DIS- SOLVED (UG/L AS AG) (01075)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)	VANA- DIUM, DIS- SOLVED (UG/L AS V) (01085)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C) (00681)
443631092372001	09-09-94	--	--	--	--	--	--	--	--
443650092375601	09-16-94	--	--	--	--	--	--	--	--
443656092373901	09-16-94	--	--	--	--	--	--	--	--
443744092384401	09-13-94	--	--	--	--	--	--	--	--
443744092391701	08-02-94	--	--	--	--	--	--	--	0.2
443745092381301	09-13-94	--	--	--	--	--	--	--	--
443745092390201	09-08-94	--	--	--	--	--	--	--	--
443746092383001	08-03-94	--	--	--	--	--	--	0.6	--
443752092381501	09-08-94	--	--	--	--	--	--	--	--
443756092390901	08-02-94	--	--	--	--	--	--	--	0.9
443808092384401	08-05-94	<10	<10	<1.0	110	<6	4	1.0	--
443814092393901	08-03-94	--	--	--	--	--	--	1.9	--
443814092395301	09-07-94	--	--	--	--	--	--	--	--
443830092390701	09-07-94	--	--	--	--	--	--	--	--
443834092390301	08-04-94	<10	<10	<1.0	120	<6	4	--	--
443839092394001	09-08-94	--	--	--	--	--	--	--	--
443839092394901	08-05-94	--	--	--	--	--	--	1.1	--

GRANT COUNTY

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	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)
455153095064801	08-16-94	1450	32.00	1750	6.9	12.5	0.0
'STATION NUMBER	DATE		NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)
455153095064801	8-16-94		<0.010	0.590	0.590	0.250	0.010

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

ANALYSES OF INORGANIC CHEMICALS

JACKSON COUNTY

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	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)
433755095113201	10-06-93	1300	26.00	486	7.6	10.0	1.0
434028094590801	10-06-93	1440	80.00	2840	6.9	10.5	0.1

STATION NUMBER	DATE	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)
433755095113201	10-06-93	0.020	0.750	0.750	0.020	<0.010
434028094590801	10-06-93	<0.010	--	<0.050	2.30	<0.010

MURRAY COUNTY

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	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, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)
435625095540301	10-06-93	0950	42.00	1160	7.1	10.0	0.1	<0.010	<0.050	0.290	<0.010
435625095540301	08-16-94	0900	42.00	1220	7.0	10.0	--	<0.010	<0.050	0.300	0.030

QUALITY OF GROUND WATER
 WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
 ANALYSES OF INORGANIC CHEMICALS
 OTTER TAIL COUNTY

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	PUMP OR FLOW PERIOD PRIOR TO SAM- PLING (MIN) (72004)	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)
460838095141801	06-07-94	1715	--	40	702	7.2	8.0	0.8
460900095150001	12-16-93	1610	18.00	22	655	7.3	8.5	0.7
460900095150001	06-07-94	1500	18.00	60	702	7.2	7.0	1.6
460913095221201	06-09-94	1435	--	34	620	7.1	9.0	2.3
461100095170701	06-10-94	1210	--	42	817	7.2	6.0	0.1
461237095161301	06-09-94	1815	--	37	634	6.8	10.0	0.1
461238095205501	06-08-94	1433	--	37	579	7.4	8.5	8.8
461255095373001	12-16-93	1505	45.00	25	328	7.5	9.0	0.1
461315095122901	06-09-94	1710	--	68	470	7.2	8.5	8.2
461319095415501	06-08-94	1720	32.00	30	568	7.3	9.0	5.7
461326095084801	06-07-94	1840	28.00	34	679	7.0	7.0	0.3
461415095183701	06-07-94	1150	--	47	509	7.4	8.5	0.1
461612095113601	06-09-94	1610	--	30	647	7.3	9.0	5.5
461732095373901	07-19-94	1455	34.70	27	439	7.4	8.5	10.1
461826095411501	07-20-94	0930	--	34	406	7.4	13.0	0.1
461855095435101	06-08-94	1850	--	35	460	8.1	8.0	0.6
461930095373000	07-19-94	1605	38.00	29	511	7.5	11.0	0.1
462024095352201	06-16-94	1550	42.00	63	544	7.4	9.0	0.9
462030095195601	07-19-94	1115	14.34	20	744	7.0	10.5	6.4
462044095453101	06-14-94	1750	--	36	619	7.2	9.5	3.8
462057095404801	06-14-94	1625	--	38	586	7.3	13.0	0.1
462100095343000	12-16-93	1350	83.00	32	427	7.6	9.5	0.2
462130095103301	07-19-94	1220	--	32	699	7.1	8.5	0.6
462320095463001	12-16-93	1010	70.00	40	744	7.1	8.5	0.1
462353095322801	07-20-94	1045	--	29	449	7.1	11.5	4.5
462454095352201	07-20-94	1145	--	35	851	7.0	10.5	3.2
462500095483000	12-16-93	1100	16.00	22	582	7.3	9.5	10.1
462530095343301	06-10-94	0950	--	38	575	7.2	9.5	0.4
462530095482001	06-14-94	1455	23.00	36	611	7.1	10.0	6.8
462531095415701	06-09-94	1150	37.00	38	537	7.3	10.5	3.0
462538095525701	06-17-94	1200	43.00	75	207	6.6	16.0	6.9
462600095540000	12-17-93	0940	80.00	43	1730	6.6	8.5	0.3
462625095112001	12-15-93	1000	20.00	50	672	7.3	10.5	10
462625095112001	12-15-93	1005	20.00	--	--	--	--	--
462625095112001	07-21-94	0940	20.00	32	639	7.4	11.0	8.5
462700095322001	06-16-94	1320	52.50	47	908	7.1	8.5	0.1
462710095351501	12-15-93	1320	25.00	40	545	7.1	9.5	3.7
462710095351501	07-20-94	1340	25.00	--	536	9.1	9.5	2.5
462715095323001	12-15-93	1140	60.00	35	631	7.0	9.0	0.1
462721095102101	06-17-94	1440	--	30	565	7.2	8.5	0.1

QUALITY OF GROUND WATER
WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
ANALYSES OF INORGANIC CHEMICALS
OTTER TAIL COUNTY

STATION NUMBER	DATE	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)
460838095141801	06-07-94	22	<0.010	15.0	15.0	0.010	<0.010
460900095150001	12-16-93	23	<0.010	15.0	15.0	0.040	<0.010
460900095150001	06-07-94	22	<0.010	13.0	13.0	0.020	<0.010
460913095221201	06-09-94	12	<0.010	9.90	9.90	0.020	0.010
461100095170701	06-10-94	8.2	0.080	21.0	21.0	0.030	0.200
461237095161301	06-09-94	5.1	0.010	0.440	0.440	0.130	0.040
461238095205501	06-08-94	13	<0.010	18.0	18.0	<0.010	0.010
461255095373001	12-16-93	3.9	<0.010	--	<0.050	1.20	0.030
461315095122901	06-09-94	5.6	<0.010	9.00	9.00	0.020	<0.010
461319095415501	06-08-94	4.4	<0.010	1.20	1.20	0.020	<0.010
461326095084801	06-07-94	16	<0.010	0.660	0.660	0.560	0.070
461415095183701	06-07-94	1.2	<0.010	--	<0.050	0.430	0.060
461612095113601	06-09-94	17	<0.010	19.0	19.0	0.010	<0.010
461732095373901	07-19-94	1.8	<0.010	1.10	1.10	0.010	0.010
461826095411501	07-20-94	10	<0.010	0.074	0.074	0.030	0.050
461855095435101	06-08-94	6.4	<0.010	--	<0.050	0.190	0.020
461930095373000	07-19-94	--	<0.010	--	<0.050	1.00	0.070
462024095352201	06-16-94	1.0	<0.010	--	<0.050	0.130	<0.010
462030095195601	07-19-94	16	0.040	29.0	29.0	0.030	<0.010
462044095453101	06-14-94	15	<0.010	13.0	13.0	0.010	<0.010
462057095404801	06-14-94	9.3	<0.010	0.130	0.130	0.130	0.010
462100095343000	12-16-93	0.90	<0.010	--	<0.050	0.160	0.070
462130095103301	07-19-94	7.1	<0.010	5.60	5.60	0.020	0.010
462320095463001	12-16-93	4.8	<0.010	--	<0.050	0.280	0.040
462353095322801	07-20-94	3.0	<0.010	5.00	5.00	0.020	<0.010
462454095352201	07-20-94	70	<0.010	3.80	3.80	0.030	<0.010
462500095483000	12-16-93	19	<0.010	13.0	13.0	0.040	0.020
462530095343301	06-10-94	19	0.020	7.00	7.00	0.030	0.010
462530095482001	06-14-94	10	<0.010	20.0	20.0	0.020	<0.010
462531095415701	06-09-94	22	<0.010	16.0	16.0	0.020	0.080
462538095525701	06-17-94	12	0.100	5.90	5.90	0.110	<0.010
462600095540000	12-17-93	160	0.040	50.0	50.0	1.00	<0.010
462625095112001	12-15-93	46	0.020	16.0	16.0	0.030	<0.010
462625095112001	12-15-93	48	0.020	16.0	16.0	0.040	<0.010
462625095112001	07-21-94	48	<0.010	15.0	15.0	0.030	<0.010
462700095322001	06-16-94	29	0.300	33.0	33.0	0.020	<0.010
462710095351501	12-15-93	6.8	0.020	6.50	6.50	0.030	0.020
462710095351501	07-20-94	7.7	<0.010	7.60	7.60	0.010	0.010
462715095323001	12-15-93	17	0.020	0.140	0.140	0.270	<0.010
462721095102101	06-17-94	7.7	<0.010	--	<0.050	0.620	0.070

QUALITY OF GROUND WATER
WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
ANALYSES OF INORGANIC CHEMICALS
OTTER TAIL COUNTY

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	PUMP OR FLOW PERIOD PRIOR TO SAM- PLING (MIN) (72004)	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)
462840095353901	07-20-94	1430	13.10	24	244	7.7	11.0	4.8
463049095453501	06-13-94	1645	--	10	511	7.4	13.0	0.2
463143095415101	06-13-94	1805	--	37	705	7.3	8.5	7.2
463320095254501	12-15-93	1440	20.00	22	655	7.3	8.5	0.7
463450095382001	06-17-94	1000	90.00	44	784	7.3	10.0	6.1
463532095322401	06-15-94	1220	30.00	35	1930	7.0	8.0	9.3
463533095350701	06-09-94	0955	--	40	508	7.3	11.0	6.0
463534095331201	06-15-94	1330	32.00	31	395	7.6	10.0	10.1
463535095360001	06-14-94	1135	30.00	39	559	7.1	10.5	10.1
463536095350801	07-20-94	1615	32.70	32	407	7.5	9.5	9.9
463554095355301	07-18-94	1805	33.80	35	468	7.2	9.5	9.5
463556095392101	06-16-94	1820	--	29	525	7.4	9.5	5.1
463601095373001	06-15-94	1530	25.00	41	497	7.3	9.5	0.0
463602095355901	06-17-94	0835	80.00	30	449	7.3	10.0	1.7
463604095375901	06-14-94	1000	91.00	36	574	7.3	9.0	0.2
463700095360000	12-15-93	1555	90.00	35	488	7.3	8.0	0.2
463900095360000	12-15-93	1700	68.00	30	645	7.3	8.0	0.2

STATION NUMBER	DATE	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)
462840095353901	07-20-94	1.0	<0.010	4.90	4.90	0.030	0.040
463049095453501	06-13-94	1.0	<0.010	0.110	0.110	0.290	0.060
463143095415101	06-13-94	26	<0.010	2.70	2.70	<0.010	<0.010
463320095254501	12-15-93	21	0.020	--	<0.050	0.120	0.040
463450095382001	06-17-94	28	<0.010	28.0	28.0	<0.010	<0.010
463532095322401	06-15-94	240	<0.010	35.0	35.0	<0.010	0.010
463533095350701	06-09-94	13	<0.010	9.90	9.90	0.020	<0.010
463534095331201	06-15-94	4.9	<0.010	5.60	5.60	<0.010	<0.010
463535095360001	06-14-94	14	0.010	0.370	0.370	0.020	<0.010
463536095350801	07-20-94	1.9	0.030	14.0	14.0	0.020	<0.010
463554095355301	07-18-94	1.7	0.010	14.0	14.0	0.020	0.010
463556095392101	06-16-94	7.4	<0.010	14.0	14.0	<0.010	0.040
463601095373001	06-15-94	16	<0.010	--	<0.050	0.030	0.070
463602095355901	06-17-94	4.7	<0.010	2.30	2.30	0.030	0.010
463604095375901	06-14-94	37	<0.010	0.840	0.840	0.010	0.060
463700095360000	12-15-93	4.9	0.030	3.00	3.00	0.040	<0.010
463900095360000	12-15-93	3.1	0.020	0.140	0.140	2.60	0.070

QUALITY OF GROUND WATER
 WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
 ANALYSES OF INORGANIC CHEMICALS
 REDWOOD COUNTY

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	SPF- 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)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)
441426095073704	06-30-94		1300	--	--	--	--	--	--	----
441426095073704	05-17-94		1015	--	--	1640	--	7.2	--	--180
441426095073705	06-30-94		1320	--	--	--	--	--	--	----
441427095073704	06-30-94		1240	--	--	--	--	--	--	----
441427095073704	05-17-94		0945	--	--	2200	--	7.0	--	--280
441428095073601	06-30-94		1340	--	1980	--	7.0	--	9.5	0.4--
441428095073601	05-16-94		1645	--	2210	2300	6.9	7.2	10.0	1260
441428095073702	05-17-94		0845	--	--	1970	--	7.6	--	--200
441428095073704	05-17-94		0900	--	--	--	--	--	--	----
441430095073702	05-16-94		1745	--	--	--	--	--	--	----
441430095073702	06-30-94		1130	--	--	--	--	--	--	----
441430095073704	06-30-94		1150	--	--	--	--	--	--	----
441430095073704	05-16-94		1800	--	--	3040	--	6.7	--	--350
441430095073705	06-30-94		1200	--	--	--	--	--	--	----
441430095073705	05-16-94		1810	--	--	3090	--	6.9	--	--340
441431095073702	05-16-94		1540	--	--	--	--	--	--	----
441431095073704	06-30-94		1100	--	--	--	--	--	--	----
441431095073704	05-16-94		1710	--	--	3030	--	6.7	--	--380
441431095073705	06-30-94		1120	--	--	--	--	--	--	----
441431095073705	05-16-94		1720	--	--	3010	--	6.7	--	--350
441432095073601	06-30-94		1030	--	2180	--	6.9	--	12.0	1.2--
441432095073601	05-17-94		0825	--	2320	2350	7.2	7.0	10.5	1.2250
441432095073601	05-16-94		1615	--	2320	--	7.2	--	10.5	1.2--
441432095073705	05-16-94		1500	--	--	--	--	--	--	----
441433095073701	06-30-94		1010	--	2290	--	7.3	--	10.5	1.9--
441433095073701	05-16-94		1515	--	2770	2860	7.6	7.3	9.5	2.3410
441753095160801	10-05-93		1215	44.00	--	--	--	--	--	----
441753095160801	10-05-93		1230	44.00	1070	--	7.0	--	12.0	0.2--
441753095160801	08-16-94		1130	44.00	1180	--	6.8	--	14.0	0.0--

QUALITY OF GROUND WATER
WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
ANALYSES OF INORGANIC CHEMICALS
REDWOOD COUNTY

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QUALITY OF GROUND WATER
WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
ANALYSES OF INORGANIC CHEMICALS
REDWOOD COUNTY

STATION NUMBER	DATE	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC DIS- SOLVED (MG/L AS N) (00623)	PHOS- PHORUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)
441426095073704	06-30-94	<0.010	--	<0.050	0.370	1.7	<0.010	<0.010	--	--
441426095073704	05-17-94	<0.010	0.051	0.051	0.360	1.0	0.030	0.020	41	2000
441426095073705	06-30-94	0.010	0.069	0.069	0.330	1.7	<0.010	0.020	--	--
441427095073704	06-30-94	<0.010	--	<0.050	0.210	1.3	<0.010	<0.010	--	--
44142709507370	05-17-94	0.020	0.061	0.061	0.220	1.2	0.040	0.030	1200	2300
441428095073601	06-30-94	0.020	0.082	0.082	0.350	1.9	0.040	0.020	--	--
441428095073601	05-16-94	0.020	0.064	0.064	0.380	2.3	0.040	0.050	57	6000
441428095073702	05-17-94	<0.010	0.420	0.420	0.830	3.2	0.110	0.030	900	2600
441428095073704	05-17-94	<0.010	0.190	0.190	0.750	2.9	0.080	0.030	--	--
441430095073702	05-16-94	<0.010	0.098	0.098	0.920	2.3	0.050	0.020	--	--
441430095073702	06-30-94	0.010	0.075	0.075	0.780	2.6	<0.010	0.010	--	--
441430095073704	06-30-94	<0.010	--	<0.050	0.520	2.0	0.030	<0.010	--	--
441430095073704	05-16-94	0.010	0.110	0.110	0.760	2.1	0.060	0.020	4800	4700
441430095073705	06-30-94	<0.010	--	<0.050	0.500	1.9	<0.010	<0.010	--	--
441430095073705	05-16-94	0.020	0.200	0.200	0.590	2.1	0.060	0.010	11000	2700
441431095073702	05-16-94	0.010	0.120	0.120	0.430	2.0	0.030	0.020	--	--
441431095073704	06-30-94	<0.010	--	<0.050	0.390	1.2	<0.010	<0.010	--	--
441431095073704	05-16-94	0.020	--	<0.050	0.630	1.9	0.060	0.050	12000	5500
441431095073705	06-30-94	<0.010	--	<0.050	0.340	1.2	0.010	<0.010	--	--
441431095073705	05-16-94	<0.010	0.057	0.057	0.470	1.7	0.010	<0.010	3600	1300
441432095073601	06-30-94	0.090	0.180	0.180	0.100	3.0	1.40	<0.010	--	--
441432095073601	05-17-94	--	--	--	--	--	--	--	340	220
441432095073601	05-16-94	0.100	0.380	0.380	0.070	1.1	0.020	0.020	--	--
441432095073705	05-16-94	0.270	0.660	0.660	0.740	3.6	0.110	0.040	--	--
441433095073701	06-30-94	0.010	0.240	0.240	0.110	1.8	0.030	0.010	--	--
441433095073701	05-16-94	0.120	1.60	1.60	0.120	1.7	0.260	0.130	1600	1600
441753095160801	10-05-93	<0.010	0.050	0.050	0.030	--	--	<0.010	--	--
441753095160801	10-05-93	<0.010	13.0	13.0	0.090	--	--	0.020	--	--
441753095160801	08-16-94	<0.010	17.0	17.0	0.100	--	--	<0.010	--	--

QUALITY OF GROUND WATER
 WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
 ANALYSES OF INORGANIC CHEMICALS
 SWIFT COUNTY

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	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, NITRITE SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA SOLVED (MG/L AS N) (00608)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)
451351095352001	10-04-93	1600	65.00	927	7.4	13.0	0.1	<0.010	<0.050	2.10	0.020

TODD COUNTY

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	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)
454641094584701	05-03-94	1040	59.00	694	6.9	9.0	0.1
454744094464701	05-03-94	1420	--	519	7.2	9.0	0.1
454744094464701	05-03-94	1425	--	--	--	--	--
454755095003201	05-03-94	1220	54.00	964	6.8	7.0	0.2
454831094462601	07-22-94	1205	18.00	641	7.2	11.0	2.2
455049094503001	05-04-94	0845	30.00	634	7.1	9.5	0.1
455321094535701	05-03-94	1625	135.00	510	7.4	8.5	0.1
455647094515401	07-26-94	1215	--	384	7.5	10.5	6.6
455951094562501	05-04-94	1200	112.00	738	6.9	9.0	0.1
455958094395501	05-04-94	1315	59.00	414	7.4	9.0	3.7
460041094595101	07-27-94	1245	135.00	563	7.3	10.0	0.1
460412094515301	07-26-94	1600	25.00	669	7.1	12.5	5.4
460624094473501	07-27-94	1115	12.00	375	7.4	10.5	2.7
460735094545701	07-26-94	1415	12.00	507	7.4	11.5	8.9
461234094480200	07-21-94	1530	--	415	7.3	10.0	4.8
461527094443901	07-21-94	1435	14.00	362	6.9	12.0	4.8
461843094444101	07-21-94	1340	10.00	91	8.2	21.0	7.4
462203094443601	07-21-94	1125	39.00	410	7.3	12.5	5.4

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

ANALYSES OF INORGANIC CHEMICALS

TODD COUNTY

STATION NUMBER	DATE	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)
454641094584701	05-03-94	1.3	<0.010	--	<0.050	0.480	<0.010
454744094464701	05-03-94	2.4	<0.010	--	<0.050	0.060	<0.010
454744094464701	05-03-94	2.3	<0.010	--	<0.050	0.070	<0.010
454755095003201	05-03-94	1.1	<0.010	--	<0.050	0.720	0.050
454831094462601	07-22-94	26	0.050	13.0	13.0	0.120	<0.010
455049094503001	05-04-94	14	0.010	3.20	3.20	0.040	<0.010
455321094535701	05-03-94	1.8	<0.010	--	<0.050	0.440	0.140
455647094515401	07-26-94	13	<0.010	19.0	19.0	<0.010	0.430
455951094562501	05-04-94	1.1	<0.010	--	<0.050	1.40	0.010
455958094395501	05-04-94	7.5	<0.010	12.0	12.0	0.020	<0.010
460041094595101	07-27-94	0.50	<0.010	0.066	0.066	1.50	0.020
460412094515301	07-26-94	28	0.280	2.30	2.30	0.200	<0.010
460624094473501	07-27-94	14	0.010	11.0	11.0	0.030	<0.010
460735094545701	07-26-94	18	<0.010	1.40	1.40	<0.010	<0.010
461234094480200	07-21-94	4.2	0.010	--	<0.050	0.060	<0.010
461527094443901	07-21-94	5.1	0.010	--	<0.050	0.300	<0.010
461843094444101	07-21-94	1.1	0.010	0.590	0.590	0.040	0.040
462203094443601	07-21-94	5.9	0.010	--	<0.050	0.070	<0.010

WADENA COUNTY

STATIONNUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	PUMP OR FLOW PERIOD PRIOR TO SAM- PLING (MIN) (72004)	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)
462215094591501	12-13-93	1645	42.00	40	1	6.8	10.0	0.5
462300094500001	12-14-93	0930	18.00	12	416	7.5	8.5	0.1
462530095050001	12-13-93	1720	24.00	20	688	7.0	10.0	0.1
462600095070000	12-13-93	1515	54.00	75	793	7.0	9.5	1.8
462800095003000	12-14-93	1610	15.00	15	433	7.2	9.0	1.7
462815094532001	12-14-93	1325	87.00	25	554	7.2	9.0	7.3
462830095041501	12-14-93	1930	12.00	15	578	6.9	8.5	0.1
462900094510000	12-14-93	1225	21.00	20	355	7.3	10.0	0.1
462900094510000	12-14-93	1230	21.00	--	--	--	--	--
462900095023000	12-13-93	1815	23.00	30	457	7.3	8.5	2.2
463000094563000	12-14-93	1420	10.00	5	392	7.3	11.5	0.1
463000094583001	12-14-93	1535	65.00	30	456	7.2	7.5	0.1
463145094480001	12-14-93	1130	26.00	20	196	7.9	9.0	0.6
464130094563000	12-14-93	1730	15.00	15	123	8.4	10.5	5.5

QUALITY OF GROUND WATER
WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
ANALYSES OF INORGANIC CHEMICALS
WADENA COUNTY

STATION NUMBER	DATE	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)
462215094591501	12-13-93	82	0.030	0.880	0.880	0.600	<0.010
462300094500001	12-14-93	2.6	0.020	0.110	0.110	0.270	0.030
462530095050001	12-13-93	19	0.020	0.140	0.140	0.140	<0.010
462600095070000	12-13-93	64	0.020	4.30	4.30	0.030	<0.010
462800095003000	12-14-93	3.3	0.020	2.20	2.20	0.040	0.050
462815094532001	12-14-93	13	0.020	19.0	19.0	0.030	0.010
462830095041501	12-14-93	2.3	0.020	—	<0.050	0.280	<0.010
462900094510000	12-14-93	4.5	0.030	0.450	0.450	0.040	0.020
462900094510000	12-14-93	4.3	0.030	0.330	0.330	0.040	0.020
462900095023000	12-13-93	4.6	0.040	4.60	4.60	0.130	<0.010
463000094563000	12-14-93	2.2	0.140	2.90	2.90	0.040	0.410
463000094583001	12-14-93	3.1	0.020	0.160	0.160	0.070	0.010
463145094480001	12-14-93	0.50	0.030	0.250	0.250	0.030	0.010
464130094563000	12-14-93	1.6	0.020	1.20	1.20	0.030	0.020

WATONWAN COUNTY

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	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, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)
440037094372601	10-06-93	1645	22.00	1560	6.7	13.0	0.3	<0.010	<0.050	0.090	<0.010
440037094372601	08-15-94	1615	22.00	1190	7.0	12.5	0.3	<0.010	<0.050	0.110	<0.010

YELLOW MEDICINE COUNTY

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	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, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)
444307096245801	10-05-93	1014	25.00	579	7.1	14.5	0.1	<0.010	<0.050	0.150	0.060

QUALITY OF GROUND WATER
WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
ANALYSES OF ORGANIC CHEMICALS
BELTRAMI COUNTY

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	SPF- CIFIC CON- DUCT- ANCE LAB	PH WATER WHOLE LAB (STAND- ARD	ALKA- LINITY LAB (MG/L AS CACO3)	ETHANF, 1112- TETRA- CHLORO- WAT UNF	ETHANE, 1,1,1- TRI- ETHANE TOTAL	ETHANE, 1,1,2,2 TETRA- CHLORO- WAT UNF	ETHANE, 1,1,2- TRI- ETHANE TOTAL	1,1-DI- CHLORO- ETHANE TOTAL
				(US/CM) (90095)	(UNITS) (00403)	(90410)	(77562)	(34506)	(34516)	(34511)	(34496)
472818094525200	09-07-94	1310	8.00	--	--	--	<3.0	<3.0	<3.0	<3.0	<3.0
472938094522800	09-07-94	1130	14.00	1280	6.7	486	--	--	--	--	--
473029094565800	09-07-94	1240	18.00	320	6.8	163	<3.0	<3.0	<3.0	<3.0	<3.0
473306094480000	09-07-94	0930	45.00	379	7.5	200	--	--	--	--	--
473413094554300	09-06-94	1520	24.00	453	7.4	221	--	--	--	--	--
473606094481200	09-07-94	1445	105.00	514	7.5	290	--	--	--	--	--

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	BENZENE 1,3-DI- CHLORO- PROPANE WAT. WH TOTAL (UG/L) (77173)	1,4-DI- CHLORO- WATER UNFLTRD REC (UG/L) (34571)	123-TRI CHLORO- PROPANE WATER WHOLE TOTAL (UG/L) (77443)	2,2-DI CHLORO- PRO- PANE WAT. WH TOTAL (UG/L) (77170)	2- CHLORO- ETHYL- VINYL- ETHER TOTAL (UG/L) (34576)	ACRO- LEIN TOTAL (UG/L) (34210)	ACRYLO- NITRILE TOTAL (UG/L) (34215)	BROMO- BENZENE WATER, WHOLE, TOTAL (UG/L) (34030)	BROMO- BENZENE WATER, WHOLE, TOTAL (UG/L) (81555)
47281809452520009-07-94	<3.0	<3.0	<3.0	<3.0	<3.0	<20	<20	<3.0	<3.0

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		BENZENE			O-CHLORO-TOLUENE			P-ISO-PROPYL-CHLORO-TOLUENE			BENZENE		
		N-BUTYL	N-PROPYL							PSEUDO-CUMENE	SEC BUTYL		
		WATER UNFLTRD	WATER UNFLTRD	NAPHTH-ALENE	WATER WHOLE	WATER UNFLTRD	WATER WHOLE		PHENOLS	WATER UNFLTRD	WATER UNFLTRD		
		REC	REC	TOTAL	TOTAL	REC	REC		TOTAL	REC	REC		
		(UG/L) (77342)	(UG/L) (77224)	(UG/L) (34696)	(UG/L) (77275)	(UG/L) (77277)	(UG/L) (77356)		(UG/L) (32730)	(UG/L) (77222)	(UG/L) (77350)		
472818094525200	09-07-94	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0		1	<3.0	<3.0		
472938094522800	09-07-94	--	--	--	--	--	--		2	--	--		
473029094565800	09-07-94	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0		5	<3.0	<3.0		
473306094480000	09-07-94	--	--	--	--	--	--		<1	--	--		
473413094554300	09-06-94	--	--	--	--	--	--		<1	--	--		
473606094481200	09-07-94	--	--	--	--	--	--		1	--	--		

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QUALITY OF GROUND WATER
WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
ANALYSES OF ORGANIC CHEMICALS
BLUE EARTH COUNTY

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	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)	ALKA- LITY LAB (MG/L) CAC03) (90410)	ETHANE, 1112- TETRA- CHLORO- WAT UNF REC (UG/L) (77562)
440907093514401	10-07-93	1030	117.00	713	--	7.2	--	12.0	0.1	--	<0.2

		ETHANE,				1,2,3- BENZENE		1,2- BENZENE			
		1,1,1- TRI- CHLORO- ETHANE TOTAL (UG/L) (34506)	1,1,2,2- TETRA- CHLORO- WAT REC (UG/L) (34516)	1,1,2- TRI- CHLORO- UNF (UG/L) (34511)	1,1-DI- CHLORO- ETHANE TOTAL (UG/L) (34496)	1,1-DI- CHLORO- ETHYL- ENE TOTAL (UG/L) (34501)	TRI- CHLORO- BENZENE WAT, WH TOTAL (UG/L) (77613)	1,2,4- TRI- CHLORO- WAT REC (UG/L) (34551)	DIBROMO ETHANE WHOLE TOTAL (UG/L) (77651)	O- CHLORO- WATER UNFLTRD TOTAL (UG/L) (34536)	1,2-DI- CHLORO- ETHANE TOTAL (UG/L) (32103)
440907093514401	10-07-93	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.2	<0.20	<0.2

		BENZENE		BENZENE 123-TRI		2,2-DI	2-			
		1,2-DI-	1,3-DI-	1,3-DI-	1,4-DI-	CHLORO-CHLORO-CHLORO-	CHLORO-CHLORO-CHLORO-	ETHYL-	ACRO-	ACRYLO-
		CHLORO-CHLORO-PROPANE	CHLORO-CHLORO-PROPANE	CHLORO-CHLORO-PROPANE	CHLORO-CHLORO-PROPANE	CHLORO-CHLORO-PROPANE	CHLORO-CHLORO-PROPANE	VINYL-ETHER	LEIN	NITRILE
		TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL
		(UG/L)	(UG/L)	(UG/L)	(UG/L)	(UG/L)	(UG/L)	(UG/L)	(UG/L)	(UG/L)
		(34541)	(34546)	(34566)	(77173)	(34571)	(77443)	(77170)	(34576)	(34210)
440907093514401	10-07-93	<0.2	<0.2	<0.20	<0.2	<0.20	<0.2	<0.2	<1.0	<20

BROMO- BENZENE TOTAL (UG/L) (34030)	BROMO- WATER, WHOLE TOTAL (UG/L) (81555)	BROMO- FORM TOTAL (UG/L) (32104)	CARBON- TETRA- CHLO- RIDE TOTAL (UG/L) (32102)	CHLORO- BENZENE TOTAL (UG/L) (34301)	CHLORO- DI- BROMO- METHANE TOTAL (UG/L) (32105)	CHLORO- ETHANE TOTAL (UG/L) (34311)	CIS- 1,3-DI- CHLORO- PROPENE TOTAL (UG/L) (32106)	CIS-1,2- DI- CHLORO- ETHENE TOTAL (UG/L) (34704)	CIS-1,2- DI- CHLORO- ETHENE TOTAL (UG/L) (77093)
440907093514401	10-07-93	<0.2	<0.2	<0.2	<0.20	<0.2	<0.2	<0.2	<0.2

STATION NUMBER	DATE	DIBROMO	DI-	DI-		FREON-	HEXA-	MESIT-		METHYL-
		CHLORO-	DI-	CHLORO-		113	CHLORO-	YLENE		
		PROPANE	CHLORO-	DI-		WATER	BUT-	WATER	METHYL-	
		WATER	BROMO-	FLUORO-	ETHYL-	UNFLTRD	ADIENE	UNFLTRD	BROMIDE	CHLO-
TOT.REC	TOTAL	TOTAL	TOTAL	TOTAL	REC	TOTAL	REC	TOTAL	TOTAL	
(UG/L)	(UG/L)	(UG/L)	(UG/L)	(UG/L)	(UG/L)	(UG/L)	(UG/L)	(UG/L)	(UG/L)	
(82625)	(32101)	(34668)	(34371)	(77652)	(39702)	(77226)	(34413)	(34418)		
440907093514401	10-07-93	<1.0	<0.2	<0.2	<0.2	<0.5	<0.2	<0.20	<0.2	<0.2

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QUALITY OF GROUND WATER
WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
ANALYSES OF ORGANIC CHEMICALS
JACKSON COUNTY

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	SPE- CIFIC 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)	ETHANE, 1112- TETRA- WAT UNF (77562)	ETHANE, 1,1,1- TRI- ETHANE (UG/L) (34506)	ETHANE, 1,1,2,2- TETRA- WAT UNF (34516)	ETHANE, 1,1,2- TRI- ETHANE (UG/L) (34511)
433755095113201	10-06-93	1300	26.00	486	7.6	10.0	1.0	<0.2	<0.2	<0.2	<0.2
434028094590801	10-06-93	1440	80.00	2840	6.9	10.5	0.1	<0.2	<0.2	<0.2	<0.2

STATION NUMBER	DATE	TIME	1,1-DI- CHLORO- ETHANE TOTAL (UG/L) (34496)	1,1-DI- CHLORO- ETHYL- ENE TOTAL (UG/L) (34501)	1,2,3- TRI- CHLORO- WAT. WH REC (UG/L) (77613)	BENZENE 1,2,4- TRI- CHLORO- WAT UNF REC (UG/L) (34551)	1,2- ETHANE WATER WHOLE TOTAL (UG/L) (77651)	BENZENE O- CHLORO- WATER UNFLTRD REC (UG/L) (34536)	1,2-DI- CHLORO- ETHANE TOTAL (UG/L) (32103)	1,2-DI- CHLORO- PROPANE TOTAL (UG/L) (34541)	1,2- TRANS DI CHLORO- ETHENE TOTAL (UG/L) (34546)
433755095113201	10-06-93		<0.2	<0.2	<0.20	<0.20	<0.2	<0.20	<0.2	<0.2	<0.2
434028094590801	10-06-93		<0.2	<0.2	<0.20	<0.20	<0.2	<0.20	<0.2	<0.2	<0.2

STATION NUMBER	DATE	TIME	BENZENE 1,3-DI- CHLORO- WATER UNFLTRD REC (UG/L) (34566)	BENZENE 1,3-DI- CHLORO- PROPANE WAT. WH TOTAL (UG/L) (77173)	BENZENE 1,4-DI- CHLORO- WATER UNFLTRD REC (UG/L) (34571)	123-TRI CHLORO- PROPANE WATER WHOLE TOTAL (UG/L) (77443)	2,2-DI CHLORO- PRO- PANE WAT, WH TOTAL (UG/L) (77170)	2- CHLORO- ETHYL- VINYL- ETHER TOTAL (UG/L) (34576)	ACRO- LEIN TOTAL (UG/L) (34210)	ACRYLO- NITRILE TOTAL (UG/L) (34215)	BENZENE TOTAL (UG/L) (34030)
433755095113201	10-06-93		<0.20	<0.2	<0.20	<0.2	<0.2	<1.0	<20	<20	<0.2
434028094590801	10-06-93		<0.20	<0.2	<0.20	<0.2	<0.2	<1.0	<20	<20	<0.2

STATION NUMBER	DATE	TIME	BROMO- BENZENE WATER, WHOLE, TOTAL (UG/L) (81555)	BROMO- FORM TOTAL (UG/L) (32104)	CARBON TETRA- CHLO- RIDE TOTAL (UG/L) (32102)	CHLORO- DI- CHLORO- BENZENE TOTAL (UG/L) (34301)	BROMO- METHANE TOTAL (UG/L) (32105)	CHLORO- ETHANE TOTAL (UG/L) (34311)	CIS 1,3-DI- CHLORO- PROPENE TOTAL (UG/L) (34704)	CIS-1,2 -DI- CHLORO- ETHENE WATER TOTAL (UG/L) (77093)
433755095113201	10-06-93		<0.2	<0.2	<0.2	<0.20	<0.2	<0.2	<0.2	<0.2
434028094590801	10-06-93		<0.2	<0.2	<0.2	<0.20	<0.2	<0.2	<0.2	<0.2

QUALITY OF GROUND WATER
 WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
 ANALYSES OF ORGANIC CHEMICALS
 JACKSON COUNTY

STATION NUMBER	DATE	DIBROMO- CHLORO- PROPANE WATER WHOLE TOT.REC (UG/L) (82625)	DI- CHLORO- BROMO- METHANE TOTAL (UG/L) (32101)	DI- CHLORO- FLUORO- METHANE TOTAL (UG/L) (34668)	ETHYL- BENZENE TOTAL (UG/L) (34371)	FREON- 113 WATER REC (UG/L) (77652)	HEXA- CHLORO- BUT- ADIENE TOTAL (UG/L) (39702)	MESIT- YLENE WATER REC (UG/L) (77226)	METHYL- BROMIDE TOTAL (UG/L) (34413)	METHYL- CHLO- RIDE TOTAL (UG/L) (34418)
		<1.0	<0.2	<0.2	<0.2	<0.5	<0.2	<0.20	<0.2	<0.2
433755095113201	10-06-93	<1.0	<0.2	<0.2	<0.2	<0.5	<0.2	<0.20	<0.2	<0.2
434028094590801	10-06-93	<1.0	<0.2	<0.2	<0.2	<0.5	<0.2	<0.20	<0.2	<0.2

STATION NUMBER	DATE	METHYL- ENE CHLO- RIDE TOTAL (UG/L) (34423)	BENZENE N-BUTYL WATER UNFLTRD REC (UG/L) (77342)	BENZENE N-PROPYL WATER UNFLTRD REC (UG/L) (77224)	NAPHTH- ALENE TOTAL (UG/L) (34696)	O- CHLORO- TOLUENE WATER WHOLE TOTAL (UG/L) (77275)	P-ISO- CHLOR- TOLUENE WATER UNFLTRD REC (UG/L) (77277)	PSEUDO- CUMENE WATER UNFLTRD REC (UG/L) (77356)	BENZENE SEC BUTYL- WATER UNFLTRD REC (UG/L) (77350)
		<0.2	<0.20	<0.20	<0.2	<0.2	<0.20	<0.20	<0.20
433755095113201	10-06-93	<0.2	<0.20	<0.20	<0.2	<0.2	<0.20	<0.20	<0.20
434028094590801	10-06-93	<0.2	<0.20	<0.20	<0.2	<0.2	<0.20	<0.20	<0.20

STATION NUMBER	DATE	BENZENE TERT- BUTYL- WATER UNFLTRD REC (UG/L) (77128)	TETRA- CHLORO- ETHYL- ENE TOTAL (UG/L) (34475)	TOLUENE TOTAL (UG/L) (34010)	TRANS- 1,3-DI- CHLORO- PROPENE TOTAL (UG/L) (34699)	TRI- CHLORO- ETHYL- ENE TOTAL (UG/L) (39180)	TRI- CHLORO- FLUORO- METHANE TOTAL (UG/L) (34488)	VINYL CHLO- RIDE TOTAL (UG/L) (39175)	XYLENE WATER UNFLTRD REC (UG/L) (81551)
		<0.2	<0.20	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20
433755095113201	10-06-93	<0.2	<0.20	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20
434028094590801	10-06-93	<0.2	<0.20	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20

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QUALITY OF GROUND WATER
WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
ANALYSES OF ORGANIC CHEMICALS
MURRAY COUNTY

STATION NUMBER	DATE	DIBROMO- CHLORO- PROPANE WATER TOT.REC (UG/L) (82625)	DI- CHLORO- BROMO- METHANE TOTAL (UG/L) (32101)	DI- CHLORO- FLUORO- METHANE TOTAL (UG/L) (34668)	ETHYL- BENZENE TOTAL (UG/L) (34371)	FREON- 113 WATER REC (UG/L) (77652)	HEXA- CHLORO- BUT- ADIENE TOTAL (UG/L) (39702)	MESIT- YLENE WATER REC (UG/L) (77226)	METHYL- BROMIDE TOTAL (UG/L) (34413)	METHYL- CHLO- RIDE TOTAL (UG/L) (34418)
435625095540301	10-06-93	<1.0	0.7	<0.2	<0.2	<0.5	<0.2	<0.20	<0.2	0.3
		METHYL- ENE CHLO- RIDE TOTAL (UG/L) (34423)	BENZENE N-BUTYL- WATER UNFLTRD REC (UG/L) (77342)	BENZENE N-PROPYL- WATER UNFLTRD REC (UG/L) (77224)	NAPHTH- ALENE TOTAL (UG/L) (34696)	O- CHLORO- TOLUENE WATER WHOLE TOTAL (UG/L) (77275)	P-ISO- TOLUENE WATER UNFLTRD REC (UG/L) (77277)	P-ISO- TOLUENE WATER WHOLE REC (UG/L) (77356)	PSEUDO- CUMENE WATER UNFLTRD REC (UG/L) (77222)	BENZENE SEC- BUTYL- WATER UNFLTRD REC (UG/L) (77350)
435625095540301	10-06-93	0.4	<0.20	<0.20	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20
		BENZENE TERT- BUTYL- WATER UNFLTRD TOTAL (UG/L) (77128)	BENZENE TETRA- CHLORO- ETHYL- WATER UNFLTRD REC (UG/L) (77353)	BENZENE ETHYL- WATER UNFLTRD TOTAL (UG/L) (34475)	TOLUENE TOTAL (UG/L) (34010)	TRANS- 1,3-DI- CHLORO- PROPENE TOTAL (UG/L) (34699)	TRI- CHLORO- ETHYL- ENE TOTAL (UG/L) (39180)	TRI- CHLORO- FLUORO- METHANE TOTAL (UG/L) (34488)	VINYL- CHLO- RIDE TOTAL (UG/L) (39175)	XYLENE WATER UNFLTRD REC (UG/L) (81551)
435625095540301	10-06-93	<0.2	<0.20	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20

OTTER TAIL COUNTY

STATION NUMBER	DATE	TIME	PUMP OR FLOW DEPTH OF WELL, TOTAL (FEET) (72008)	PRIOR TO SAM- PLING (MIN) (72004)	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)	ATRA- ZINE, DISS, REC (UG/L) (39632)
			23.00	36	611	7.1	10.0	6.8	5.0

QUALITY OF GROUND WATER
WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
ANALYSES OF ORGANIC CHEMICALS
REDWOOD COUNTY

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	SPE- CIFIC CON- DUCT- ANCE LAB (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)	ALKA- LITY LAB (MG/L CACO3) (90410)	ETHANE, 1112- TETRA- CHLORO- WAT UNF REC (UG/L) (77562)
441753095160801	10-05-93	1215	44.00	--	--	--	--	--	--	--	<0.2
441753095160801	10-05-93	1230	44.00	1070	--	7.0	--	12.0	0.2	--	<0.2

STATION NUMBER	DATE	ETHANE, 1,1,1- TRI- CHLORO- ETHANE TOTAL (UG/L) (34506)	ETHANE, 1,1,2,2- TETRA- CHLORO- WAT UNF REC (UG/L) (34516)	ETHANE, 1,1,2- TRI- CHLORO- ETHANE TOTAL (UG/L) (34511)	ETHANE, 1,1-DI- CHLORO- ETHANE TOTAL (UG/L) (34496)	ETHANE, 1,1-DI- CHLORO- ETHYL- ENE TOTAL (UG/L) (34501)	BENZENE 1,2,3- TRI- CHLORO- WAT, WH REC (UG/L) (77613)	BENZENE 1,2,4- TRI- CHLORO- WAT UNF REC (UG/L) (34551)	BENZENE 1,2- DIBROMO ETHANE WATER WHOLE UNFLTRD REC (UG/L) (77651)	BENZENE O- CHLORO- WATER UNFLTRD REC (UG/L) (34536)	ETHANE, 1,2-DI- CHLORO- ETHANE TOTAL (UG/L) (32103)
441753095160801	10-05-93	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.2	<0.20	<0.2
441753095160801	10-05-93	0.3	<0.2	<0.2	0.2	<0.2	<0.20	<0.20	<0.2	<0.20	0.6

STATION NUMBER	DATE	BENZENE 1,2-DI- CHLORO- PROPANE TOTAL (UG/L) (34541)	BENZENE 1,2- TRANS- DICHLO- RO- ETHENE TOTAL (UG/L) (34546)	BENZENE 1,3-DI- CHLORO- WATER UNFLTRD REC (UG/L) (34566)	BENZENE 1,3-DI- CHLORO- PROPANE WAT, WH TOTAL (UG/L) (77173)	BENZENE 1,4-DI- CHLORO- WATER UNFLTRD REC (UG/L) (34571)	BENZENE 1,2,3- TRI- CHLORO- WATER WHOLE TOTAL (UG/L) (77443)	BENZENE 2,2-DI- CHLORO- PROPANE WAT, WH TOTAL (UG/L) (77170)	BENZENE 2- ETHYL- VINYL- ETHER TOTAL (UG/L) (34576)	BENZENE ACRO- LEIN TOTAL (UG/L) (34210)	BENZENE ACRYLO- NITRILE TOTAL (UG/L) (34215)
441753095160801	10-05-93	<0.2	<0.2	<0.20	<0.2	<0.20	<0.2	<0.2	<1.0	<20	<20
441753095160801	10-05-93	<0.2	<0.2	<0.20	<0.2	<0.20	<0.2	<0.2	<1.0	<20	<20

		BROMO-BENZENE			CARBON-TETRA-CHLORIDE	CHLORO-DI-BROMO-CHLORO-ETHANE			CIS-1,3-DI-CHLORO-PROPENE	CIS-1,2-DI-CHLORO-ETHENE
		WATER, TOTAL	BROMO-FORM TOTAL	CHLORIDE TOTAL	BENZENE TOTAL	METHANE TOTAL	ETHANE TOTAL	FORM TOTAL	PROPENE TOTAL	WATER TOTAL
		(UG/L)	(UG/L)	(UG/L)	(UG/L)	(UG/L)	(UG/L)	(UG/L)	(UG/L)	(UG/L)
		(34030)	(81555)	(32104)	(32102)	(34301)	(32105)	(34311)	(32106)	(34704)
		(77093)								
441753095160801	10-05-93	<0.2	<0.2	<0.2	<0.2	<0.20	<0.2	<0.2	0.2	<0.2
441753095160801	10-05-93	<0.2	<0.2	<0.2	<0.2	<0.20	<0.2	<0.2	<0.2	<0.2

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

ANALYSES OF ORGANIC CHEMICALS

REDWOOD COUNTY

STATION NUMBER	DATE	DIBROMO- CHLORO- PROPANE	DI- CHLORO- BROMO- METHANE	DI- CHLORO- DI- METHANE	ETHYL- BENZENE	FRON- 113 WATER UNFLTRD	HEXA- CHLORO- BUT- ADIENE	MESIT- YLENE WATER UNFLTRD	METHYL- BROMIDE	METHYL- CHLO- RIDE
		TOT.REC (UG/L) (82625)	TOTAL (UG/L) (32101)	TOTAL (UG/L) (34668)	TOTAL (UG/L) (34371)	REC (UG/L) (77652)	TOTAL (UG/L) (39702)	REC (UG/L) (77226)	TOTAL (UG/L) (34413)	TOTAL (UG/L) (34418)
441753095160801	10-05-93	<1.0	<0.2	<0.2	<0.2	<0.5	<0.2	<0.20	<0.2	<0.2
441753095160801	10-05-93	<1.0	<0.2	<0.2	<0.2	<0.5	<0.2	<0.20	<0.2	<0.2

		METHYL- ENE CHLO- RIDE TOTAL (UG/L) (34423)	BENZENE N-BUTYL WATER UNFLTRD REC (UG/L) (77342)	BENZENE N-PROPYL WATER UNFLTRD REC (UG/L) (77224)	NAPHTH- ALENE TOTAL (UG/L) (34696)	O- CHLORO- TOLUENE WATER WHOLE TOTAL (UG/L) (77275)	P-ISO- PROPYL- TOLUENE WATER WHOLE TOTAL (UG/L) (77277)	PSEUDO- CUMENE WATER UNFLTRD REC (UG/L) (77356)	BENZENE SEC BUTYL- WATER UNFLTRD REC (UG/L) (77222)
441753095160801	10-05-93	<0.2	<0.20	<0.20	<0.2	<0.2	<0.20	<0.20	<0.20
441753095160801	10-05-93	<0.2	<0.20	<0.20	<0.2	<0.2	<0.20	<0.20	<0.20

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QUALITY OF GROUND WATER
 WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
 ANALYSES OF ORGANIC CHEMICALS
 SWIFT COUNTY

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH	TEMPER- ATURE WATER (DEG C) (00010)	OXYGEN, DIS- SOLVED (MG/L) (00300)	ETHANE,	1,1,1- TRI- ETHANE TOTAL (34506)	ETHANE,	1,1,2,2- TETRA- WAT UNF (34516)	1,1,2- TRI- ETHANE TOTAL (34511)
					WATER WHOLE FIELD (STAND- ARD UNITS) (00400)			1112- TETRA- CHLORO- REC (77562)		1,1,2- TETRA- CHLORO- REC (34516)		
451351095352001	10-04-93	1600	65.00	927	7.4	13.0	0.1	<0.2	<0.2	<0.2	<0.2	<0.2
			1,1-DI- CHLORO- ETHANE TOTAL (UG/L) (34496)	1,1-DI- CHLORO- ETHYL- ENE TOTAL (UG/L) (34501)	1,2,3- TRI- CHLORO- BENZENE WAT, WH REC (UG/L) (77613)	BENZENE 1,2,4- TRI- CHLORO- WAT UNF REC (UG/L) (34551)	1,2- DIBROMO ETHANE WATER WHOLE TOTAL (UG/L) (77651)	BENZENE O- CHLORO- WATER UNFLTRD REC (UG/L) (34536)	1,2-DI- CHLORO- ETHANE TOTAL (UG/L) (32103)	1,2-DI- CHLORO- PROPANE TOTAL (UG/L) (34541)	1,2- TRANS DI CHLORO- ETHENE TOTAL (UG/L) (34546)	
			<0.2	<0.2	<0.20	<0.20	<0.2	<0.20	<0.2	<0.2	<0.2	<0.2
			BENZENE 1,3-DI- CHLORO- WATER UNFLTRD REC (UG/L) (34566)	1,3-DI- CHLORO- PROPANE WAT, WH TOTAL (UG/L) (77173)	BENZENE 1,4-DI- CHLORO- WATER UNFLTRD REC (UG/L) (34571)	123-TRI CHLORO- PROPANE WATER WHOLE TOTAL (UG/L) (77443)	2,2-DI CHLORO- PRO- PANE WAT, WH TOTAL (UG/L) (77170)	2- ETHYL- VINYL- ETHER TOTAL (UG/L) (34576)	ACRO- LEIN TOTAL (UG/L) (34210)	ACRYLO- NITRILE TOTAL (UG/L) (34215)	BENZENE TOTAL (UG/L) (34030)	
			<0.20	<0.2	<0.20	<0.2	<0.2	<1.0	<20	<20	<0.2	
			BROMO- BENZENE WATER, WHOLE, TOTAL (UG/L) (81555)	BROMO- FORM TOTAL (UG/L) (32104)	CARBON- TETRA- CHLO- RIDE TOTAL (UG/L) (32102)	CHLORO- BROMO- BENZENE TOTAL (UG/L) (34301)	CHLORO- DI- BROMO- METHANE TOTAL (UG/L) (32105)	CHLORO- ETHANE TOTAL (UG/L) (34311)	CHLORO- FORM TOTAL (UG/L) (32106)	CIS 1,3-DI- CHLORO- PROPENE TOTAL (UG/L) (34704)	CIS-1,2 -DI- CHLORO- ETHENE WATER TOTAL (UG/L) (77093)	
			<0.2	<0.2	<0.2	<0.20	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH	TEMPERATURE		ETHANE,	ETHANE,	ETHANE,	ETHANE,
					WATER WHOLE FIELD (STAND- ARD UNITS) (00400)	OXYGEN, DIS- SOLVED WATER (DEG C) (00010)	1112- TETRA- WAT UNF REC (77562)	1,1,1- TRI- CHLORO- ETHANE TOTAL (34506)	1,1,2,2 TETRA- WAT UNF REC (34516)	1,1,2- TRI- CHLORO- ETHANE TOTAL (34511)	
440037094372601	10-06-93	1645	22.00	1560	6.7	13.0	0.3	<0.2	<0.2	<0.2	<0.2

ID	DATE	1,1-DI- CHLORO- ETHANE	1,1-DI- CHLORO- ETHYL- BENZENE	1,2,3- TRI- CHLORO- BENZENE	BENZENE 1,2,4- TRI- CHLORO- WAT UNF	1,2- DIBROMO ETHANE WATER WHOLE	BENZENE O- CHLORO- WATER UNFLTRD	1,2-DI- CHLORO- ETHANE TOTAL	1,2-DI- CHLORO- PROPANE TOTAL	1,2- TRANSDI- CHLORO- ETHENE TOTAL
		(UG/L) (34496)	(UG/L) (34501)	(UG/L) (77613)	(UG/L) (34551)	(UG/L) (77651)	(UG/L) (34536)	(UG/L) (32103)	(UG/L) (34541)	(UG/L) (34546)
440037094372601	10-06-93	<0.2	<0.2	<0.20	<0.20	<0.2	<0.20	<0.2	<0.2	<0.2

		BENZENE			BENZENE			123-TRI	2,2-DI	2-	ACRO- LEIN TOTAL (UG/L) (34210)	ACRYLO- NITRILE TOTAL (UG/L) (34215)	BENZENE TOTAL (UG/L) (34030)
		1,3-DI-	1,3-DI-	1,4-DI-	CHLORO-	CHLORO-	CHLORO-	CHLORO-	CHLORO-				
		CHLORO-	CHLORO-	CHLORO-	PROPANE	PRO-	ETHYL-	ETHYL-					
		WATER	PROPANE	WATER	WATER	PANE	VINYL-	ETHER					
		UNFLTRD	WAT. WH	UNFLTRD	WHOLE	WAT. WH	TOTAL	TOTAL					
REC	TOTAL	REC	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL				
(UG/L)	(UG/L)	(UG/L)	(UG/L)	(UG/L)	(UG/L)	(UG/L)	(UG/L)	(UG/L)	(UG/L)	(UG/L)			
(34566)	(77173)	(34571)	(77443)	(77170)	(34576)	(34210)	(34215)	(34030)					
440037094372601	10-06-93	<0.20	<0.2	<0.20	<0.2	<0.2	<1.0	<20	<20	<0.2			

		BROMO- BENZENE WATER, WHOLE, TOTAL (UG/L) (81555)	BROMO- FORM TOTAL (UG/L) (32104)	CARBON- TETRA- CHLO- RIDE TOTAL (UG/L) (32102)	CHLORO- DI- CHLORO- BENZENE TOTAL (UG/L) (34301)	BROMO- METHANE TOTAL (UG/L) (32105)	CHLORO- ETHANE TOTAL (UG/L) (34311)	CHLORO- FORM TOTAL (UG/L) (32106)	CIS 1,3-DI- CHLORO- PROPENE TOTAL (UG/L) (34704)	CIS-1,2 -DI- CHLORO- ETHENE WATER TOTAL (UG/L) (77093)
440037094372601	10-06-93	<0.2	<0.2	<0.2	<0.20	<0.2	<0.2	<0.2	<0.2	<0.2

QUALITY OF GROUND WATER
 WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
 ANALYSES OF ORGANIC CHEMICALS
 WATONWAN COUNTY

STATION NUMBER	DATE	DIBROMO- CHLORO- PROPANE WATER WHOLE	DI- CHLORO- BROMO- METHANE	DI- CHLORO- FLUORO- METHANE	ETHYL- BENZENE	FREON- 113 WATER UNFLTRD	HEXA- CHLORO- BUT- ADIENE	MESIT- YLENE WATER UNFLTRD	METHYL- BROMIDE	METHYL- CHLO- RIDE
		TOT.REC	TOTAL	TOTAL	TOTAL	REC	TOTAL	REC	TOTAL	TOTAL
		(UG/L)	(UG/L)	(UG/L)	(UG/L)	(UG/L)	(UG/L)	(UG/L)	(UG/L)	(UG/L)
		(82625)	(32101)	(34668)	(34371)	(77652)	(39702)	(77226)	(34413)	(34418)
440037094372601	10-06-93	<1.0	<0.2	<0.2	<0.2	<0.5	<0.2	<0.20	<0.2	<0.2
		METHYL- ENE CHLO- RIDE TOTAL (UG/L) (34423)	BENZENE N-BUTYL WATER UNFLTRD REC (UG/L) (77342)	BENZENE N-PROPYL WATER UNFLTRD REC (UG/L) (77224)	NAPHTH- ALENE TOTAL (UG/L) (34696)	O- CHLORO- TOLUENE WATER WHOLE TOTAL (UG/L) (77275)	P-ISO- TOLUENE WATER UNFLTRD REC (UG/L) (77277)	PSEUDO- CUMENE WATER UNFLTRD REC (UG/L) (77356)	BENZENE SEC BUTYL- WATER UNFLTRD REC (UG/L) (77222)	BENZENE SEC BUTYL- WATER UNFLTRD REC (UG/L) (77350)
440037094372601	10-06-93	<0.2	<0.20	<0.20	<0.2	<0.2	<0.20	<0.20	<0.20	<0.20
		STYRENE TOTAL (UG/L) (77128)	BENZENE TERT- BUTYL- WATER UNFLTRD REC (UG/L) (77353)	TETRA- CHLORO- ETHYL- ENE TOTAL (UG/L) (34475)	TOLUENE TOTAL (UG/L) (34010)	TRANS- 1,3-DI- CHLORO- PROPENE TOTAL (UG/L) (34699)	TRI- CHLORO- ETHYL- ENE TOTAL (UG/L) (39180)	TRI- CHLORO- FLUORO- METHANE TOTAL (UG/L) (34488)	VINYL CHLO- RIDE TOTAL (UG/L) (39175)	XYLENE WATER UNFLTRD REC (UG/L) (81551)
440037094372601	10-06-93	<0.2	<0.20	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20

QUALITY OF GROUND WATER
 WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
 ANALYSES OF ORGANIC CHEMICALS
 YELLOW MEDICINE COUNTY

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	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)	ETHANE, 1,1,2- TETRA- CHLORO- WAT UNF REC (77562)	ETHANE, 1,1,1- TRI- CHLORO- WAT UNF TOTAL (34506)	ETHANE, 1,1,2,2- TETRA- CHLORO- WAT UNF REC (34516)	ETHANE, 1,1,2- TRI- CHLORO- WAT UNF TOTAL (34511)
444307096245801	10-05-93	1014	25.00	579	7.1	14.5	0.1	<0.2	<0.2	<0.2	<0.2

STATION NUMBER	DATE	TIME	1,1-DI- CHLORO- ETHANE TOTAL (UG/L) (34496)	1,1-DI- CHLORO- ETHYL- ENE TOTAL (UG/L) (34501)	1,2,3- TRI- CHLORO- WAT, WH REC (UG/L) (77613)	BENZENE 1,2,4- TRI- CHLORO- WAT UNF REC (UG/L) (34551)	1,2- DIBROMO ETHANE WATER WHOLE TOTAL (UG/L) (77651)	BENZENE O- CHLORO- WATER UNFLTRD REC (UG/L) (34536)	1,2-DI- CHLORO- ETHANE TOTAL (UG/L) (32103)	1,2-DI- CHLORO- PROPANE TOTAL (UG/L) (34541)	1,2- TRANS DI CHLORO- ETHENE TOTAL (UG/L) (34546)
444307096245801	10-05-93		<0.2	<0.2	<0.20	<0.20	<0.2	<0.20	<0.2	<0.2	<0.2

STATION NUMBER	DATE	TIME	BENZENE 1,3-DI- CHLORO- WATER UNFLTRD REC (UG/L) (34566)	BENZENE 1,3-DI- CHLORO- PROPANE WAT, WH TOTAL (UG/L) (77173)	BENZENE 1,4-DI- CHLORO- WATER UNFLTRD REC (UG/L) (34571)	123-TRI CHLORO- PROPANE WATER WHOLE TOTAL (UG/L) (77443)	2,2-DI CHLORO- PRO- PANE WAT, WH TOTAL (UG/L) (77170)	2- CHLORO- ETHYL- VINYL- ETHER TOTAL (UG/L) (34576)	ACRO- LEIN TOTAL (UG/L) (34210)	ACRYLO- NITRILE TOTAL (UG/L) (34215)	BENZENE TOTAL (UG/L) (34030)
444307096245801	10-05-93		<0.20	<0.2	<0.20	<0.2	<0.2	<1.0	<20	<20	<0.2

QUALITY OF GROUND WATER
WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
ANALYSES OF ORGANIC CHEMICALS
YELLOW MEDICINE COUNTY

[illegible]

QUALITY OF GROUND WATER
 WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
 ANALYSES OF RADIOCHEMICAL
 BLUE EARTH COUNTY

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	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)
440046093580600	05-19-94	1440	12.00	830	790	7.4	7.5	9.0
440047093580600	05-19-94	1430	12.00	671	519	7.1	7.2	9.5
440048093580600	05-19-94	1420	12.00	659	673	7.2	7.4	10.0
440049093580600	05-19-94	1410	12.00	427	859	7.7	7.6	10.0
440051093580500	09-28-94	1330	10.22	--	--	--	--	--
440051093580503	08-11-94	0910	9.70	1000	--	6.9	--	11.0
440051093580503	09-28-94	1442	9.70	--	--	--	--	--
440051093580504	08-11-94	0900	9.20	915	--	6.9	--	11.5
440051093580504	09-28-94	1320	9.20	--	--	--	--	--
440052093580500	05-18-94	0920	17.00	--	1240	--	7.1	--
440052093580503	08-11-94	1020	--	1230	--	7.0	--	10.5
440052093580503	09-28-94	1240	--	--	--	--	--	--
440052093580504	06-28-94	1220	--	1200	--	6.8	--	10.0
440052093580504	08-11-94	1040	--	1210	--	7.0	--	10.5
440052093580505	08-11-94	1100	--	1170	--	6.9	--	10.5
440053093580500	05-18-94	0925	15.00	648	1110	6.9	7.1	9.5
440053093580503	08-11-94	1200	--	1050	--	7.0	--	--
440053093580503	09-28-94	1200	--	--	--	--	--	--
440053093580504	06-28-94	1310	--	1050	--	6.8	--	10.5
440053093580504	08-11-94	1220	--	1020	--	7.0	--	11.0
440054093580500	05-18-94	0930	15.00	900	916	6.8	7.1	8.5
440054093580504	06-28-94	1340	--	852	--	6.8	--	10.5
440055093580500	05-18-94	0940	15.00	688	753	6.8	7.1	8.5
440057093575501	08-09-94	1400	8.01	--	--	--	--	--
440057093575501	09-28-94	1010	8.01	--	--	--	--	--
440057093575503	08-10-94	1150	7.50	1080	--	7.2	--	11.0
440057093575505	09-28-94	1020	8.90	--	--	--	--	--
440057093575600	05-17-94	1525	18.00	--	1640	--	7.2	--
440057093575601	08-09-94	1110	11.50	1440	--	7.0	--	10.5

QUALITY OF GROUND WATER
WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
ANALYSES OF RADIOCHEMICAL
BLUE EARTH COUNTY

STATION NUMBER	DATE	OXYGEN, DIS- SOLVED (MG/L) (00300)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	H-2 / II-1 STABLE ISOTOPE RATIO PER MIL (82082)	O-18 / O-16 STABLE ISOTOPE RATIO PER MIL (82085)	N15/N14 NO3 FRAC WATER FLTRD 0.45 U PER MIL (82690)	N15/N14 NH4 FRAC WATER FLTRD 0.45 U PER MIL (82691)
440046093580600	05-19-94	4.6	262	-66.4	-9.63	--	--
440047093580600	05-19-94	6.6	248	-70.8	-10.12	--	--
440048093580600	05-19-94	8.8	268	-68.1	-9.86	--	--
440049093580600	05-19-94	5.5	302	-60.3	-8.99	--	--
440051093580500	09-28-94	--	--	--	--	6.3	--
440051093580503	08-11-94	2.8	--	--	--	7.5	--
440051093580503	09-28-94	--	--	--	--	1.6	--
440051093580504	08-11-94	3.4	--	--	--	7.6	--
440051093580504	09-28-94	--	--	--	--	3.7	--
440052093580500	05-18-94	--	289	-60.8	-9.08	--	--
440052093580503	08-11-94	0.7	--	--	--	6.8	--
440052093580503	09-28-94	--	--	--	--	7.3	--
440052093580504	06-28-94	0.7	--	-61.8	-9.02	--	--
440052093580504	08-11-94	0.7	--	--	--	6.9	--
440052093580505	08-11-94	0.8	--	--	--	6.6	--
440053093580500	05-18-94	0.5	280	-59.1	-8.72	--	--
440053093580503	08-11-94	--	--	--	--	21.1	--
440053093580503	09-28-94	--	--	--	--	15.0	--
440053093580504	06-28-94	0.4	--	-58.8	-8.77	--	--
440053093580504	08-11-94	0.4	--	--	--	19.7	--
440054093580500	05-18-94	5.0	257	-57.5	-8.59	--	--
440054093580504	06-28-94	3.9	--	-57.9	-8.54	--	--
440055093580500	05-18-94	6.8	260	-56.5	-8.52	--	--
440057093575501	08-09-94	--	--	--	--	0.1	--
440057093575501	09-28-94	--	--	--	--	3.6	--
440057093575503	08-10-94	2.6	--	--	--	<0	--
440057093575505	09-28-94	--	--	--	--	0.3	--
440057093575600	05-17-94	--	341	-63.7	-9.41	--	--
440057093575601	08-09-94	0.5	--	--	--	<0	3.3

QUALITY OF GROUND WATER
WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
ANALYSES OF RADIOCHEMICAL
BLUE EARTH COUNTY

STATIONNUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	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)
440057093575603	08-09-94	1140	11.50	1520	--	6.9	--	10.5
440057093575604	06-27-94	1440	16.00	1320	--	6.8	--	9.5
440057093575605	08-09-94	1220	17.50	1380	--	7.0	--	10.0
440058093575701	08-09-94	0900	17.50	1460	--	7.5	--	10.5
440058093575703	06-27-94	1520	14.50	1360	--	6.7	--	11.5
440058093575703	08-09-94	0950	14.50	1430	--	7.0	--	11.5
440058093575703	09-28-94	0850	14.50	--	--	--	--	--
440058093575705	08-09-94	1030	11.50	1500	--	6.9	--	12.0
440059093575804	06-27-94	1620	15.00	1200	--	6.7	--	11.5
440100093575900	05-17-94	1630	17.00	1020	1050	7.0	7.2	9.5
440100093575904	06-27-94	1720	15.00	1010	--	6.9	--	10.5

STATION NUMBER	DATE	OXYGEN, DIS- SOLVED (MG/L) (00300)	ALKA- LITY LAB (MG/L AS CACO3) (90410)	H-2 / H-1 STABLE ISOTOPE RATIO PER MIL (82082)	O-18 / O-16 STABLE ISOTOPE RATIO PER MIL (82085)	N15/N14 NO3 FRAC WATER FLTRD 0.45 U PER MIL (82690)	N15/N14 NH4 FRAC WATER FLTRD 0.45 U PER MIL (82691)
440057093575603	08-09-94	0.5	--	--	--	<0	3.4
440057093575604	06-27-94	0.5	--	-63.8	-9.25	--	--
440057093575605	08-09-94	0.5	--	--	--	1.3	2.9
440058093575701	08-09-94	0.6	--	--	--	21.5	--
440058093575703	06-27-94	0.5	--	-62.6	-8.98	--	--
440058093575703	08-09-94	0.4	--	--	--	16.8	--
440058093575703	09-28-94	--	--	--	--	22.2	--
440058093575705	08-09-94	0.4	--	--	--	16.3	--
440059093575804	06-27-94	0.5	--	-62.8	-9.33	--	--
440100093575900	05-17-94	0.6	389	-62.3	-9.30	--	--
440100093575904	06-27-94	0.5	--	-64.2	-9.23	--	--

QUALITY OF GROUND WATER
WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
ANALYSES OF RADIOCHEMICAL
HUBBARD COUNTY

STATION NUMBER	DATE	TIME	N15/N14 NO3 FRAC WATER FLTRD 0.45 U PER MIL (82690)
465255095065701	10-14-93	0900	3.0
465330095070001	10-14-93	1030	1.6

QUALITY OF GROUND WATER
WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
ANALYSES OF RADIOCHEMICAL
SHERBURNE COUNTY

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	H-2 / H-1 STABLE ISOTOPE RATIO PER MIL (82082)	O-18 / O-16 STABLE ISOTOPE RATIO PER MIL (82085)
453133093371501	11-12-93	1200	--	-81.4	-11.23
453139093370001	11-10-93	1200	19.50	-77.3	-10.68
453139093370001	03-10-94	1400	19.50	-71.8	-9.96
453139093370001	04-06-94	1250	19.50	-70.2	-9.87
453139093370001	06-07-94	1200	19.50	-77.1	-10.82
453142093371401	10-07-93	1450	--	-65.0	-9.41
453142093371401	11-09-93	1200	--	-67.3	-9.79
453142093371401	03-10-94	1130	--	-133.0	-17.87
453142093371401	03-24-94	1615	--	-126.0	-16.98
453142093371401	04-06-94	1015	--	-78.3	-10.80
453142093371401	05-05-94	1100	--	-71.3	-10.05
453142093371401	06-06-94	1200	--	-74.0	-10.41
453142093371422	06-06-94	1200	--	-118.0	-15.86
453142093371427	10-07-93	1435	2.62	-61.0	-9.12
453142093371427	11-09-93	1200	2.62	-62.2	-9.00
453142093371427	03-24-94	1545	2.62	-97.3	-13.79
453142093371427	04-07-94	1155	2.62	-94.3	-13.42
453142093371427	05-05-94	1550	2.62	-120.0	-15.97
453142093371427	06-06-94	1200	2.62	-99.4	-13.53
453142093371428	10-07-93	1440	5.91	-55.1	-8.21
453142093371428	11-09-93	1200	5.91	-60.4	-8.60
453142093371428	03-24-94	1550	5.91	-142.0	-19.18
453142093371428	04-07-94	1200	5.91	-143.0	-19.30
453142093371428	05-05-94	1600	5.91	-133.0	-17.92
453142093371429	10-07-93	1445	7.87	-82.4	-11.28
453142093371429	11-09-93	1200	7.87	-67.5	-9.36
453142093371429	03-24-94	1600	7.87	-144.0	-19.18
453142093371429	04-07-94	1205	7.87	-141.0	-18.80
453142093371429	05-05-94	1525	7.87	-58.5	-8.29
453142093371429	06-07-94	1200	7.87	-70.3	-9.78
453142093371432	10-07-93	1420	--	-66.2	-9.30
453142093371432	11-09-93	1200	--	-62.8	-8.59
453142093371432	03-24-94	1520	--	-99.7	-13.29
453142093371432	04-07-94	1215	--	-114.0	-15.14
453142093371432	05-05-94	1505	--	-121.0	-16.20
453142093371432	06-06-94	1200	--	-119.0	-16.13
453143093371101	10-07-93	1220	--	-85.7	-12.10
453143093371101	11-10-93	1200	--	-83.7	-11.66
453143093371101	03-10-94	0950	--	-80.1	-10.93
453143093371101	03-24-94	1500	--	-78.9	-10.80
453143093371101	04-06-94	1245	--	-78.0	-10.72
453143093371101	05-05-94	1010	--	-79.0	-11.00
453143093371101	06-07-94	1200	--	-79.7	-11.32
453143093371127	10-07-93	1315	2.62	-35.3	-5.49
453143093371127	11-10-93	1200	2.62	-44.3	-7.04
453143093371127	03-23-94	1415	2.62	-141.0	-19.32
453143093371127	04-07-94	1110	2.62	-141.0	-19.60
453143093371127	05-05-94	1430	2.62	-119.0	-16.53
453143093371127	06-07-94	1200	2.62	-88.9	-12.10

QUALITY OF GROUND WATER
 WATER QUALITY DATA, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
 ANALYSES OF RADIOCHEMICAL
 SHERBURNE COUNTY

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	H-2 / H-1 STABLE ISOTOPE RATIO PER MIL (82082)	O-18 / O-16 STABLE ISOTOPE RATIO PER MIL (82085)
453143093371128	10-07-93	1320	5.91	-57.6	-7.98
453143093371128	11-10-93	1200	5.91	-54.3	-7.78
453143093371128	03-24-94	1445	5.91	-134.0	-18.07
453143093371128	04-07-94	1115	5.91	-61.5	-8.20
453143093371128	05-05-94	1435	5.91	-130.0	-17.73
453143093371128	06-07-94	1200	5.91	-107.0	-14.94
453143093371129	10-07-93	1325	9.19	-76.4	-10.48
453143093371129	11-10-93	1200	9.19	-73.4	-10.09
453143093371129	03-24-94	1445	9.19	-59.9	-8.14
453143093371129	05-05-94	1440	9.19	-86.0	-11.81
453143093371129	06-06-94	1200	9.19	-67.5	-9.41
453143093371131	05-05-94	1415	--	-60.9	-8.52
453143093371131	06-06-94	1200	--	-64.7	-9.11
453143093371132	10-07-93	1240	--	-53.0	-8.26
453143093371132	05-05-94	1405	--	-93.0	-12.78
453143093371132	06-06-94	1200	--	-82.6	-11.50
453148093371801	11-12-93	1200	--	-68.7	-9.86
453148093371801	03-10-94	1330	--	-70.1	-9.96
453148093371801	04-06-94	0945	--	-67.8	-9.74
453148093371801	06-07-94	1200	--	-81.4	-11.55

CHEMICAL QUALITY OF PRECIPITATION

CHEMICAL QUALITY OF PRECIPITATION

461458094295000 PRECIPITATION STATION AT CAMP RIPLEY, MN

WATER-QUALITY RECORDS

LOCATION.--Lat 46°14'58", long 94°29'50", in NE 1/4 sec.18, T.132 N., R.30 W., Morrison County, Hydrologic Unit 07010104, approximately 500 ft southwest of the abandoned Gilgal Church and approximately 5 miles south of the town of Pillager.

PERIOD OF RECORD.--October 1983 to current year (weekly composite).

INSTRUMENTATION.--Samples are collected in a polyethylene bucket by an electrically operated wet/dry collector. A recording rain gage and a standard U.S. Weather Service bulk rain gage measure rainfall quantity.

REMARKS.--An observer collects only the wetfall bucket and services the rain gages weekly. If there is enough wetfall, specific conductance and pH are determined, with the remaining contents sent to the Illinois State Water Survey Laboratory for analysis.

CHEMICAL ANALYSIS, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

WEEKLY COMPOSITE

DATE	TIME	TOTAL PRECIP- ITATION FOR DEFINED PERIOD (IN) (00193)	SPEC. CONDUCT- TANCE CK.SOL. ATM DEP WET TOT (US/CM) (83152)	SPEC. CONDUCT- TANCE FIELD ATM DEP WET TOT (US/CM) (83154)	SPEC. CONDUCT- TANCE LAB ATM DEP WET TOT (US/CM) (83156)	PH FIELD ATM DEP WET T (UNITS) (83106)	PH LAB ATM DEP WET T (UNITS) (83107)	CALCIUM ATM DEP WET DIS (MG/L) (82932)
OCT								
05-12	1930	0.0	--	--	2.0	--	6.12	0.110
OCT								
12-19	1930	0.06	20.9	11.1	12.5	5.10	6.37	0.380
OCT								
19-26	1930	0.30	21.4	6.2	7.3	5.20	5.87	0.050
OCT 26-								
NOV 02	1930	0.02	--	--	9.0	--	6.64	0.320
NOV								
02-09	2030	0.98	--	--	--	--	--	--
NOV								
09-16	1900	0.47	21.0	8.2	7.6	4.70	4.90	0.050
NOV								
16-23	2030	0.05	--	--	21.5	--	6.44	0.980
NOV								
23-26	2030	1.05	21.6	11.1	13.9	4.50	4.61	0.100
NOV								
26-30	1800	0.15	21.9	12.2	9.8	4.50	4.79	0.160
NOV 30-								
DEC 07	2030	0.15	21.4	18.2	19.9	4.60	4.87	0.190
DEC								
07-14	2100	0.10	21.6	9.7	7.8	4.90	5.37	0.150
DEC								
14-21	2030	0.32	22.4	11.5	10.3	4.70	4.78	0.080
DEC								
21-29	2100	0.0	--	--	1.7	--	5.88	0.010
DEC 29 1993-								
JAN 04 1994	0100	0.35	22.8	8.2	7.4	4.70	4.93	0.060
JAN								
04-11	2030	0.52	23.0	5.2	5.1	4.70	5.05	0.030
JAN								
11-18	2030	0.22	22.4	7.5	7.5	4.80	4.86	0.070
JAN								
18-25	2100	0.10	23.5	17.9	17.1	4.50	4.45	0.090
JAN 25-								
FEB 01	2100	0.15	23.0	14.5	14.4	4.50	4.52	0.070
FEB								
01-08	2045	0.22	22.5	4.7	4.4	4.90	5.06	0.030
FEB								
08-15	2200	0.32	22.5	13.9	14.6	4.50	4.54	0.100
FEB								
15-22	2100	0.01	--	--	33.9	--	6.86	--
FEB 22-								
MAR 01	2100	0.33	21.9	5.1	4.5	4.70	5.14	0.060
MAR								
01-08	2100	0.01	--	--	14.6	--	6.68	1.36

CHEMICAL QUALITY OF PRECIPITATION

CHEMICAL ANALYSIS, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

WEEKLY COMPOSITE--Continued

DATE	TIME	TOTAL PRECIP- ITATION FOR DEFINED PERIOD (IN) (00193)	SPEC. CONDUCT- ANCE CK.SOL. ATM DEP WET TOT (US/CM) (83152)	SPEC. CONDUCT- ANCE FIELD ATM DEP WET TOT (US/CM) (83154)	SPEC. CONDUCT- ANCE LAB ATM DEP WET TOT (US/CM) (83156)	PH FIELD ATM DEP WET T (UNITS) (83106)	PH LAB ATM DEP WET T (UNITS) (83107)	CALCIUM ATM DEP WET DIS (MG/L) (82932)
MAR 08-15	2100	0.0	--	--	2.0	--	5.43	0.010
MAR 15-22	2030	0.78	23.9	11.4	10.4	5.10	6.26	0.320
MAR 22-29	2030	0.73	22.5	11.8	8.6	4.70	5.81	0.380
MAR 29- APR 05	2030	0.10	23.4	22.8	20.2	5.20	5.73	0.250
APR 05-12	1930	0.18	23.0	28.8	27.6	5.20	6.27	0.690
APR 12-19	1930	0.94	20.3	4.2	4.0	5.00	6.03	0.110
APR 19-26	1930	1.89	23.0	9.8	10.9	5.30	5.89	0.460
APR 26- MAY 03	2030	--	22.4	5.8	6.2	5.10	5.98	0.260
MAY 03-10	1930	0.23	21.9	16.1	15.9	5.20	6.27	0.290
MAY 10-17	1915	1.20	23.0	8.9	6.0	4.60	5.99	0.280
MAY 17-24	1930	0.65	22.8	11.4	7.6	4.70	6.01	0.230
MAY 24-31	2045	--	22.8	16.0	14.6	5.40	6.53	0.720

DATE	MAG- NESIUM ATM DEP WET DIS (MG/L) (83002)	SODIUM ATM DEP WET DIS (MG/L) (83138)	POTAS- SIUM ATM DEP WET DIS (MG/L) (83120)	SULFATE ATM DEP WET DIS AS SO4 (MG/L) (83160)	CHLO- RIDE ATM DEP WET DIS (MG/L) (82944)	NI- TROGEN NITRATE ATM DEP WET DIS AS NO3 (MG/L) (83071)	NI- TROGEN AMMON. ATM DEP WET DIS AS NH4 (MG/L) (83047)	PHOS- PHORUS ORTHO ATM DEP WET DIS AS PO4 (MG/L) (83111)
OCT 05-12	<0.003	0.015	<0.003	<0.03	0.04	<0.03	<0.020	<0.020
OCT 12-19	0.078	0.170	0.022	1.38	0.10	1.53	0.860	<0.020
OCT 19-26	0.010	0.073	0.018	0.92	0.09	1.17	0.730	<0.020
OCT 26- NOV 02	0.098	0.250	0.062	0.68	0.36	0.68	0.330	<0.070
NOV 02-09	--	--	--	--	--	--	--	--
NOV 09-16	0.007	0.066	0.005	0.65	0.09	0.79	0.170	<0.020
NOV 16-23	0.111	0.236	0.116	1.54	0.23	4.47	1.21	<0.020
NOV 23-26	0.010	0.041	0.010	0.50	0.07	1.71	0.100	<0.020
NOV 26-30	0.006	0.045	0.007	0.24	0.07	1.71	0.090	<0.020
NOV 30- DEC 07	0.019	0.074	0.020	1.68	0.12	3.41	1.10	<0.003
DEC 07-14	0.019	0.084	0.011	0.50	0.08	1.72	0.390	<0.003
DEC								

CHEMICAL QUALITY OF PRECIPITATION

CHEMICAL ANALYSIS, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

WEEKLY COMPOSITE--Continued

DATE	MAG- NESIUM ATM DEP WET DIS (MG/L) (83002)	SODIUM ATM DEP WET DIS (MG/L) (83138)	POTAS- SIUM ATM DEP WET DIS (MG/L) (83120)	SULFATE ATM DEP WET DIS AS SO4 (MG/L) (83160)	CHLO- RIDE ATM DEP WET DIS (MG/L) (82944)	NI- TROGEN NITRATE ATM DEP WET DIS AS NO3 (MG/L) (83071)	NI- TROGEN AMMON. ATM DEP WET DIS AS NH4 (MG/L) (83047)	PHOS- PHORUS ORTHO ATM DEP WET-DIS AS PO4 (MG/L) (83111)
14-21 DEC	0.007	0.049	0.016	0.50	0.12	1.59	0.240	0.005
21-29 DEC 29 1993-	<0.003	0.066	<0.003	0.04	0.08	0.15	0.080	<0.003
JAN 04 1994	0.008	0.055	0.007	0.37	0.08	1.14	0.240	<0.003
JAN 04-11	<0.003	0.022	0.003	0.12	0.04	0.76	0.060	<0.003
JAN 11-18	0.007	0.061	0.007	0.30	0.09	0.88	0.080	<0.003
JAN 18-25	0.013	0.061	0.007	0.24	0.14	2.65	0.210	<0.003
JAN 25- FEB 01	0.010	0.059	0.005	0.56	0.07	1.60	0.040	<0.003
FEB 01-08	0.005	0.054	0.003	0.17	0.08	0.47	0.050	<0.003
FEB 08-15	0.013	0.031	0.008	0.21	0.04	2.11	0.060	<0.003
FEB 15-22	--	--	--	--	--	--	--	--
FEB 22- MAR 01	0.007	0.028	0.009	0.12	0.05	0.64	0.070	<0.003
MAR 01-08	0.216	0.209	0.063	1.04	0.28	1.60	0.560	0.056
MAR 08-15	0.004	0.151	0.003	<0.03	0.18	0.16	0.110	0.004
MAR 15-22	0.042	0.067	0.015	1.09	0.07	1.58	0.930	<0.003
MAR 22-29	0.036	0.047	0.032	1.27	0.04	1.30	0.590	<0.003
MAR 29- APR 05	0.049	0.044	0.021	3.18	0.05	2.26	1.90	<0.003
APR 05-12	0.072	0.071	0.064	3.81	0.10	5.23	2.51	0.005
APR 12-19	0.017	0.030	0.011	0.35	0.05	0.50	0.280	<0.003
APR 19-26	0.048	0.040	0.044	1.17	0.06	1.37	0.770	<0.003
APR 26- MAY 03	0.032	0.030	0.027	0.47	<0.03	0.76	0.290	<0.003
MAY 03-10	0.071	0.022	0.018	1.94	0.04	2.70	1.58	<0.003
MAY 10-17	0.059	0.017	0.014	0.66	<0.03	0.91	0.500	<0.003
MAY 17-24	0.044	0.029	0.030	0.62	0.05	1.39	0.600	<0.003
MAY 24-31	0.121	0.063	0.096	0.96	0.11	2.17	1.04	<0.003

CHEMICAL QUALITY OF PRECIPITATION

CHEMICAL ANALYSIS, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

WEEKLY COMPOSITE--Continued

DATE	TIME	TOTAL PRECIP- ITATION FOR DEFINED PERIOD (IN) (00193)	SPEC. CONDC- TANCE CK.SOL. ATM DEP WET TOT (US/CM) (83152)	SPEC. CONDC- TANCE FIELD ATM DEP WET TOT (US/CM) (83154)	SPEC. CONDC- TANCE LAB ATM DEP WET TOT (US/CM) (83156)	PH FIELD ATM DEP WET T (UNITS) (83106)	PH LAB ATM DEP WET T (UNITS) (83107)	CALCIUM ATM DEP WET DIS (MG/L) (82932)
MAY 31- JUN 07	1945	0.47	22.0	14.1	10.8	4.80	5.89	0.280
JUN 07-14	1930	0.30	22.3	10.8	8.4	6.00	6.58	0.470
JUN 14-21	1945	2.00	21.9	12.0	11.9	5.40	5.79	0.410
JUN 21-28	2000	0.60	21.4	9.6	9.6	5.00	6.35	0.280
JUN 28- JUL 05	2015	0.25	--	--	9.9	--	4.92	0.120
JUL 05-12	1530	1.05	21.9	6.9	7.0	5.10	4.99	0.080
JUL 12-19	1930	2.35	21.9	9.6	5.7	5.10	5.77	0.120
JUL 19-26	1930	0.90	22.0	4.3	2.8	5.60	5.54	0.050
JUL 26- AUG 02	1930	0.04	--	--	22.9	--	6.45	1.50
AUG 02-09	1930	2.10	22.0	8.0	9.2	5.70	6.40	0.310
AUG 09-16	1930	0.31	22.5	11.4	10.9	5.10	5.17	0.220
AUG 16-23	1930	0.47	21.9	9.2	8.8	5.40	5.73	0.320
AUG 23-30	1930	0.52	23.0	7.4	7.4	5.50	5.49	0.190
AUG 30- SEP 06	1945	0.34	21.9	13.8	15.8	4.70	4.60	0.130
SEP 06-13	1930	0.11	21.9	21.0	19.6	5.80	6.23	0.790
SEP 13-20	1400	2.10	20.7	7.2	8.5	5.50	5.41	0.270
SEP 20-27	1930	0.38	20.8	5.6	6.9	5.50	5.65	0.180
SEP 27- OCT 04	2000	1.08	--	--	10.3	4.70	4.87	0.070

CHEMICAL QUALITY OF PRECIPITATION

CHEMICAL ANALYSIS, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994

WEEKLY COMPOSITE--Continued

DATE	MAG- NESIUM ATM DEP WET DIS (MG/L) (83002)	SODIUM ATM DEP WET DIS (MG/L) (83138)	POTAS- SIUM ATM DEP WET DIS (MG/L) (83120)	SULFATE ATM DEP WET DIS AS SO4 (MG/L) (83160)	CHLO- RIDE ATM DEP WET DIS (MG/L) (82944)	NI- TROGEN NITRATE ATM DEP WET DIS AS NO3 (MG/L) (83071)	NI- TROGEN AMMON. ATM DEP WET DIS AS NH4 (MG/L) (83047)	PHOS- PHORUS ORTHO ATM DEP WET DIS AS PO4 (MG/L) (83111)
MAY 31-								
JUN 07	0.057	0.035	0.014	1.31	0.06	1.81	0.920	<0.003
JUN								
07-14	0.135	0.069	0.052	0.49	0.04	0.94	0.760	<0.003
JUN								
14-21	0.056	0.112	0.061	1.40	0.12	1.99	0.750	<0.003
JUN								
21-28	0.065	0.019	0.033	0.94	0.05	1.15	0.890	<0.003
JUN 28-								
JUL 05	0.022	0.057	0.026	0.79	0.07	1.25	0.370	<0.003
JUL								
05-12	0.010	0.072	0.013	0.52	0.10	0.70	0.170	<0.003
JUL								
12-19	0.017	0.023	0.010	0.56	0.04	0.84	0.380	0.004
JUL								
19-26	0.010	0.011	0.013	0.20	<0.03	0.26	0.110	<0.003
JUL 26-								
AUG 02	0.256	0.067	0.119	1.90	0.20	3.90	1.36	0.005
AUG								
02-09	0.070	0.013	0.028	1.15	0.04	0.94	0.750	<0.003
AUG								
09-16	0.034	0.026	0.029	1.35	0.07	1.57	0.690	0.003
AUG								
16-23	0.031	0.033	0.046	0.83	0.08	1.59	0.680	<0.003
AUG								
23-30	0.025	0.100	0.019	0.69	0.14	1.22	0.540	<0.003
AUG 30-								
SEP 06	0.018	0.020	0.012	1.52	0.05	1.26	0.360	<0.003
SEP								
06-13	0.113	0.309	0.824	1.90	0.92	2.84	0.340	0.007
SEP								
13-20	0.019	0.050	0.030	1.07	0.10	1.29	0.520	<0.003
SEP								
20-27	0.041	0.052	0.017	0.74	0.11	0.99	0.500	<0.003
SEP 27-								
OCT 04	0.004	0.010	0.009	0.64	<0.03	0.67	0.160	<0.003

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CONVERSION FACTORS AND VERTICAL DATUM

Multiply	By	To obtain
<i>Length</i>		
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
<i>Area</i>		
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
<i>Volume</i>		
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
<i>Flow</i>		
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
<i>Mass</i>		
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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