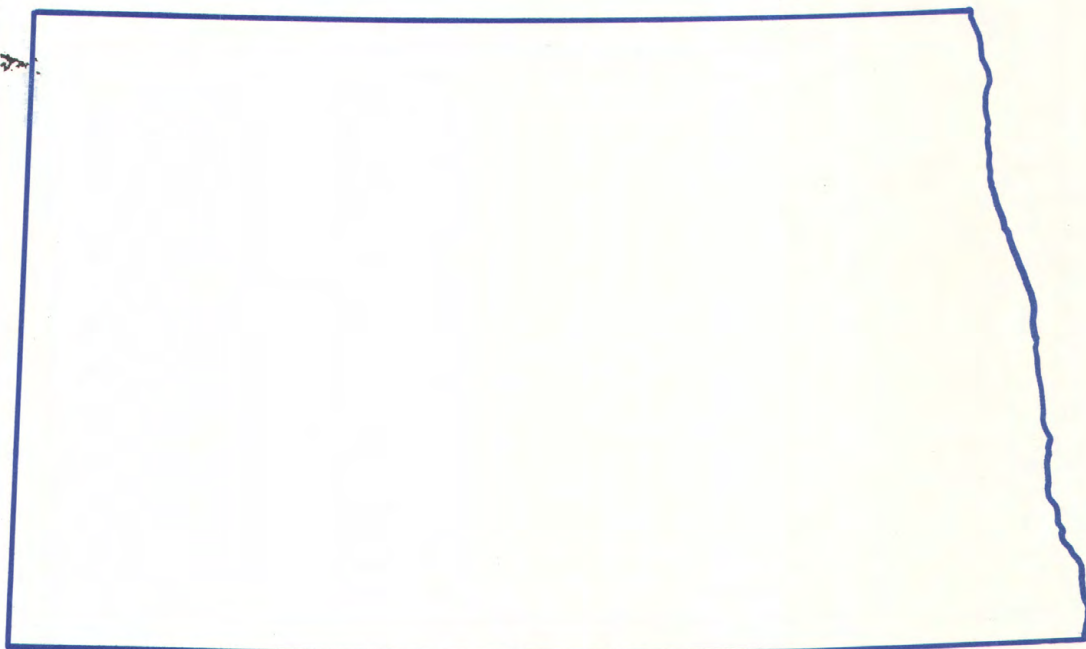
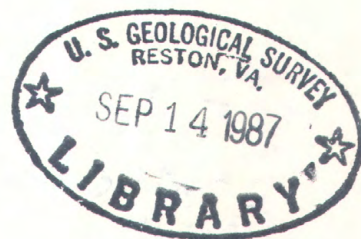


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# Water Resources Data North Dakota Water Year 1986



U.S. GEOLOGICAL SURVEY WATER-DATA REPORT ND-86-1  
Prepared in cooperation with the State of North Dakota  
and with other agencies



## CALENDAR FOR WATER YEAR 1986

1985

## OCTOBER

S	M	T	W	T	F	S
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## NOVEMBER

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1986

## JANUARY

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## SEPTEMBER

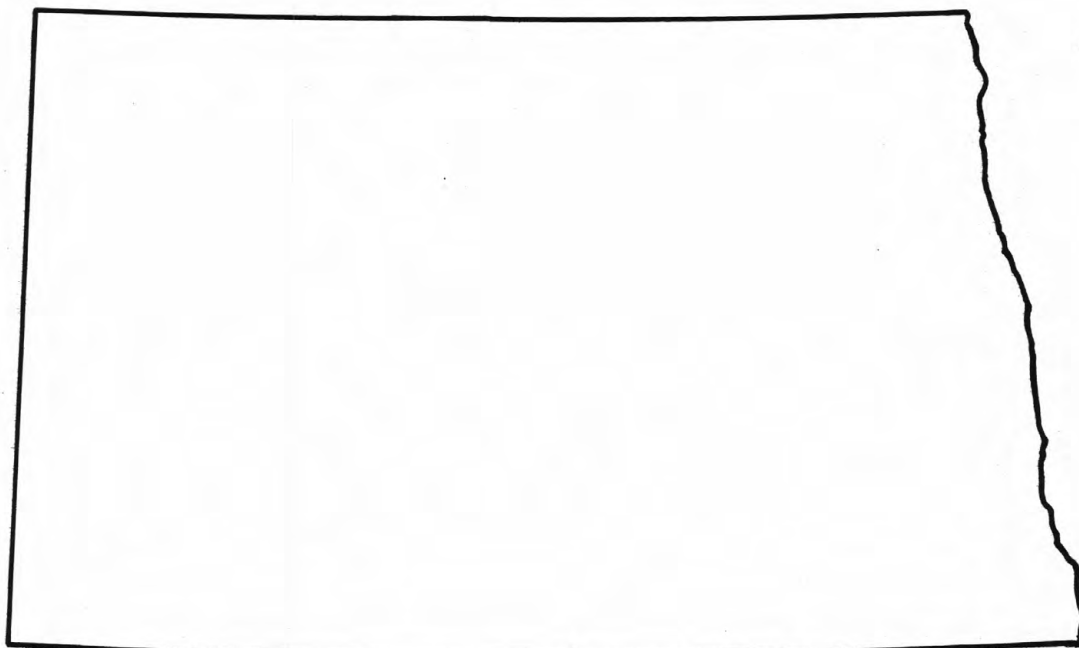
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# Water Resources Data North Dakota Water Year 1986

by R.E. Harkness, N.D. Haffield, and G.L. Ryan



U.S. GEOLOGICAL SURVEY WATER-DATA REPORT ND-86-1  
Prepared in cooperation with the State of North Dakota  
and with other agencies



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1987



## PREFACE

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

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. In addition to the authors, who had primary responsibility for assuring that the information contained herein is accurate, complete, and adheres to U.S. Geological Survey policy and established guidelines, the following individuals contributed significantly to the collection, processing, and tabulation of the data:

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## INTRODUCTION

The 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 North Dakota each water year. These data, accumulated during many water years, constitute a valuable data base for developing an improved understanding of the water resources of the State. To make these data readily available to interested parties outside the U.S. Geological Survey, the data are published annually in this report series entitled "Water Resources Data - North Dakota."

This report series includes records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels in and quality of water from ground-water wells. This volume contains records for water discharge at 107 gaging stations; stage only at 22 gaging stations; contents and/or stage at 14 lakes and reservoirs; water quality at 100 gaging stations, 8 lakes, 10 crest-stage gages, 5 miscellaneous sites, and 68 wells; and water levels in 31 observation wells. Also included are data for 5 crest-stage partial-record stations. Locations of these sites are shown on figures 1, 2, and 3. Discharge measurements were made at 7 miscellaneous partial-record stations and data are included for 2 precipitation-chemistry stations. These data represent that part of the National Water Data System collected by the U.S. Geological Survey and cooperating State and Federal agencies in North Dakota.

This series of annual reports for North Dakota 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 format 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 North Dakota 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 5 and 6." 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 ground-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 may be consulted in the libraries of the principal cities of the United States and may be purchased from U.S. Geological Survey, Books and Open-File Reports, Federal Center, Building 41, Box 25425, Denver, CO 80225.

Publications similar to this report are published annually by the U.S. 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 the volume number. For example this volume is identified as "U.S. Geological Survey Water-Data Report ND-86-1." For archiving and general distribution, the reports for 1971-74 water years also are identified as water-data reports. These water-data reports are for sale in paper copy or in microfiche by the National Technical Information Service, U.S. Department of Commerce, Springfield, VA 22161.

Additional information, including current prices, for ordering specific reports may be obtained from the District Chief at the address given on the back of the title page or by telephoning (701) 255-4011, extension 610.

## COOPERATION

The U.S. Geological Survey and agencies of the State of North Dakota have had cooperative agreements for the collection of streamflow records since 1903, ground-water levels since 1937, and water-quality records since 1946. Organizations that assisted in collecting the data in this report through cooperative agreement with the Survey are: North Dakota State Water Commission, Vernon Fahy, Chief Engineer; North Dakota Public Service Commission, Leo Reinbold succeeded by Dale V. Sandstrom, President; Lower Heart River Water Resources District, R.E. Sylvester, Chairman; Oliver County Board of Commissioners, Emil Hintz, Chairman; City of Dickinson, A.E. Baumgartner, Mayor.

Assistance with funds or services was given by the U.S. Army Corps of Engineers for 26 streamflow-gaging stations, 19 river-stage stations, 2 reservoir stations, 3 crest-stage stations, 2 continuous water-quality monitoring stations, and 18 wells; the International Joint Commission of the U.S. State Department for 8 streamflow-gaging stations and 1 reservoir; the U.S. Fish and Wildlife Service for 6 streamflow-gaging stations, water-quality at 10 stations, and daily sediment at 6 stations; the U.S. Soil Conservation Service for 1 streamflow-gaging station and 1 crest-stage gage; the U.S. Bureau of Reclamation for 3 streamflow-gaging stations, 2 reservoir stations, water-quality at 11 streamflow stations, and 2 stations on reservoirs; and other U.S. Department of Interior agencies concerned with the Missouri River basin for 6 streamflow-gaging stations, 1 reservoir station, 2 river stage stations, 3 continuous water-quality monitoring stations, and 17 water-quality sampling stations.

Certain stations are maintained under agreement with Canada and the records are obtained and compiled in a manner equally acceptable to both countries. Most of these are designated as "international gaging stations".

Organizations that provided data are acknowledged in station descriptions.



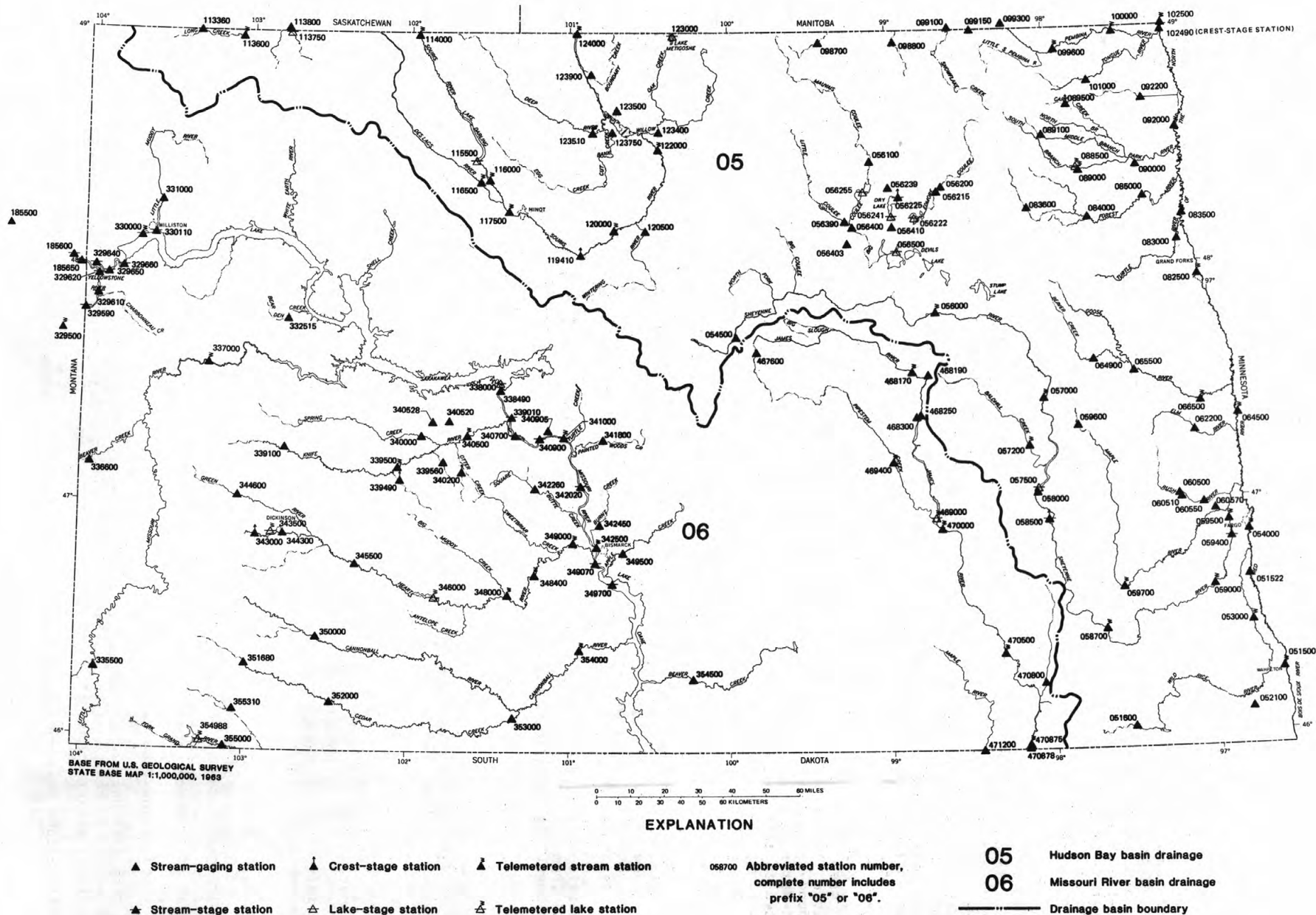


Figure 1.--Location of active surface-water gaging stations.

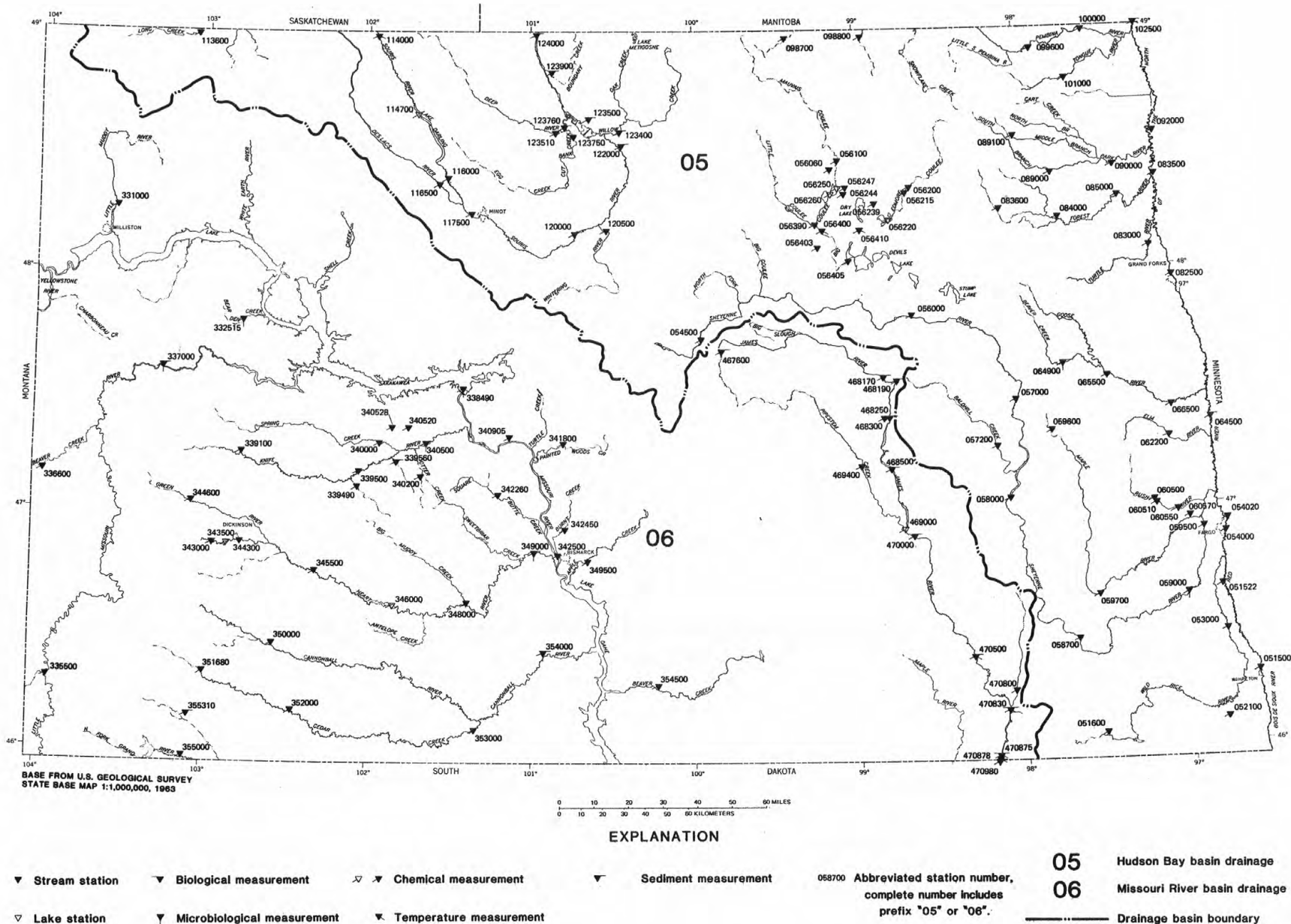


Figure 2.--Location of active surface-water-quality stations.

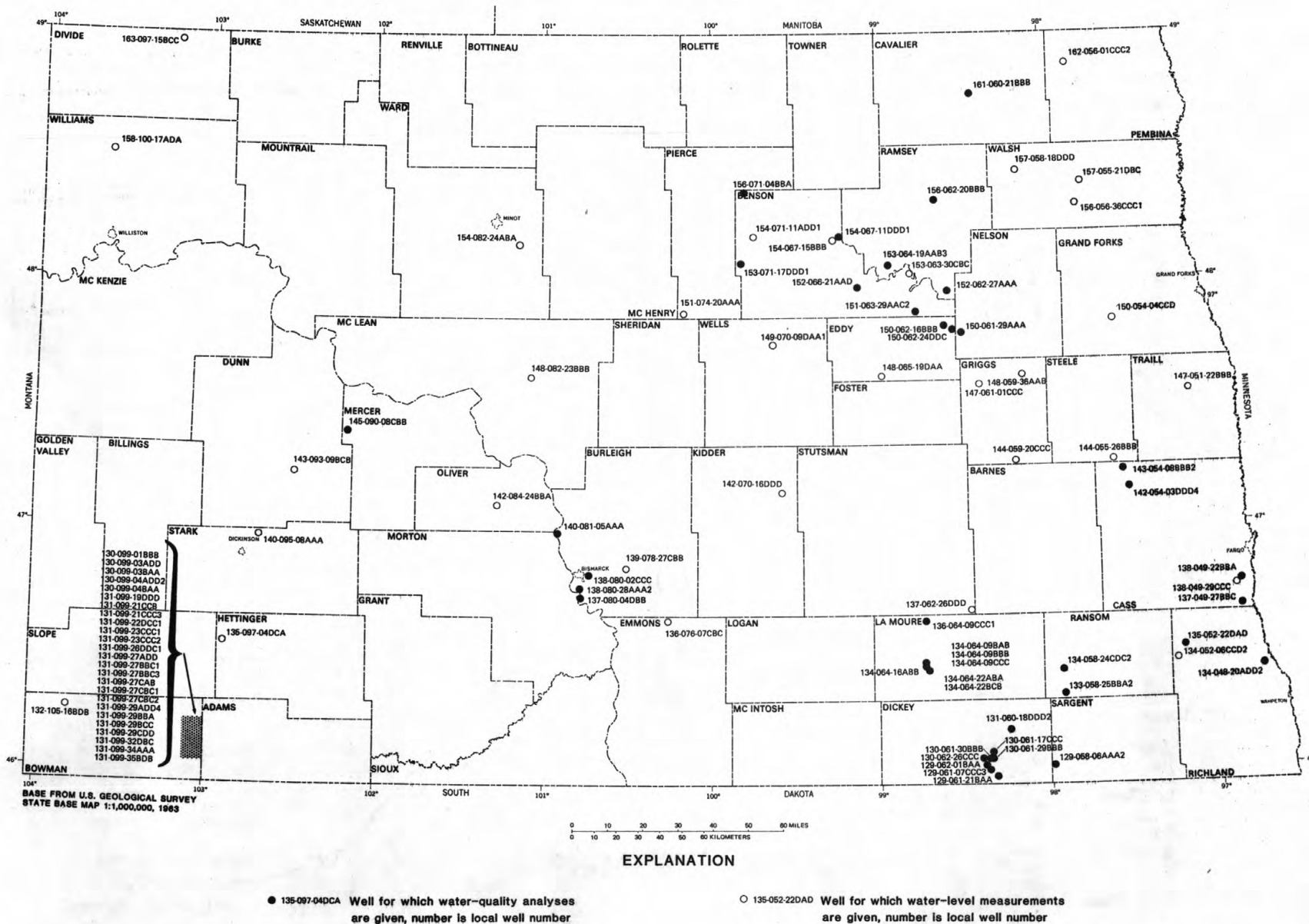


Figure 3.--Location of selected ground-water observation wells.



## SUMMARY OF HYDROLOGIC CONDITIONS

Climate

In North Dakota, the average annual precipitation ranges from about 15 inches in the western part of the State to about 20 inches in the eastern part of the State. Three-fourths of this precipitation generally occurs during April through September. Maximum normal monthly precipitation for the entire State occurs in June. Normal, as related to meteorological data in this report, is an average value of meteorological data for the reference period 1951 through 1980.

According to information from reports published by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service (1986), precipitation during water year 1986 ranged from about 2.5 inches greater than normal in the north-central part of the State to about 11 inches greater than normal in the southeast corner of the State.

National Weather Service data also indicate that average temperatures across the State were about normal, within about 3 °C (about 5 °F), except for 4 months during the water year. November and December temperatures were about 3 to 8 °C (about 5 to 15 °F) less than normal. January and March temperatures were 6 to 8 °C (about 10 to 15 °F) greater than normal. Although January temperatures were greater than normal, they remained below freezing, generally ranging from about -9 to -7 °C (about 15 to 20 °F). A warming trend started during the last week of February and continued through March. The average statewide temperature for March was greater than 0 °C (32 °F), except in the northeast corner of the State. During the warming trend, daily temperatures were characterized by maximums generally between 5 to 10 °C (about 40 to 50 °F) and minimums generally between -7 to 0 °C (about 20 to 32 °F).

A comparison of monthly precipitation for water year 1986 with the normal precipitation for the nine National Weather Service divisions in North Dakota is shown in figure 4. In all nine National Weather Service divisions, precipitation was greater than normal during October and November, but generally was less than normal from December through March. The southwest division was an exception. Precipitation in the southwest division continued to be greater than normal each month through February. In early February, the snowpack varied from about 17 inches (water equivalent of about 5 inches) in the southwest to only a trace of snow (water equivalent negligible) in the northwest corner of the State. Precipitation totals for March in the four National Weather Service divisions in the northeastern part of the State ranged from 0.05 to 0.10 inch, which is substantially less than normal.

April precipitation ranged from about 0.67 inch greater than normal in the northwest division to more than 5.5 inches greater than normal in the southeast division. Several National Weather Service reporting stations in the southeast division recorded new records for the month. At Wahpeton, for example, the previous record of 4.63 inches set in 1960 was exceeded by almost 3 inches. Wahpeton received a total of 7.52 inches of precipitation in April 1986 (National Weather Service, written commun., 1986). Precipitation data for Wahpeton are available for 1897 to present.

Although precipitation was greater than normal in the western part of the State during May, all National Weather Service divisions reported less than normal precipitation for June. Greater than normal precipitation occurred during July in all National Weather Service divisions. Precipitation ranged from about 1 inch greater than normal in the southwest division to more than 3 inches greater than normal in the northeast division. Less than normal precipitation occurred in August, except in the southeastern quarter of the State.

Precipitation during September was greater than normal statewide, with the southwest division recording the largest average of monthly total precipitation for reporting stations. The National Weather Service (written commun., 1986) reported that soil moisture conditions were " \* \* very wet to saturated \* \* " throughout most of the State at the end of September.

Streamflow

The greatest monthly mean discharge of rivers in North Dakota generally is coincident with snowmelt runoff. The hydrographs in figure 5 indicate that the snowmelt in water year 1986 was about 1 month earlier than usual. The monthly maximum discharges for the streams shown, except for the Wild Rice and Rush Rivers in the southeastern part of the State, were caused by this early snowmelt. The Wild Rice and Rush Rivers peaked in April due to the greater than normal rainfall in the southeast part of the State, rather than earlier as a result of snowmelt. The monthly maximum discharge of the other streams shown in figure 5 occurred in March.

The warming trend in late February rapidly melted the snowpack in the southwest corner of the State. According to the National Weather Service's Monthly Report of River and Flood Conditions for March (written commun., 1986), ice jams and flooding occurred on all major tributaries to the Missouri River except the Little Missouri River. The March report also stated, "In most cases the flooding was directly caused by ice jams. This was especially true at Mandan, ND, on the Heart River and on the Missouri River near Williston." A special report by the National Weather Service concerning April precipitation and flooding (written comm., 1986) indicated that the greater than normal precipitation in April resulted from five storm systems that crossed the State. Discharge in the rivers was decreasing prior to each succeeding storm. Major flooding did not occur.

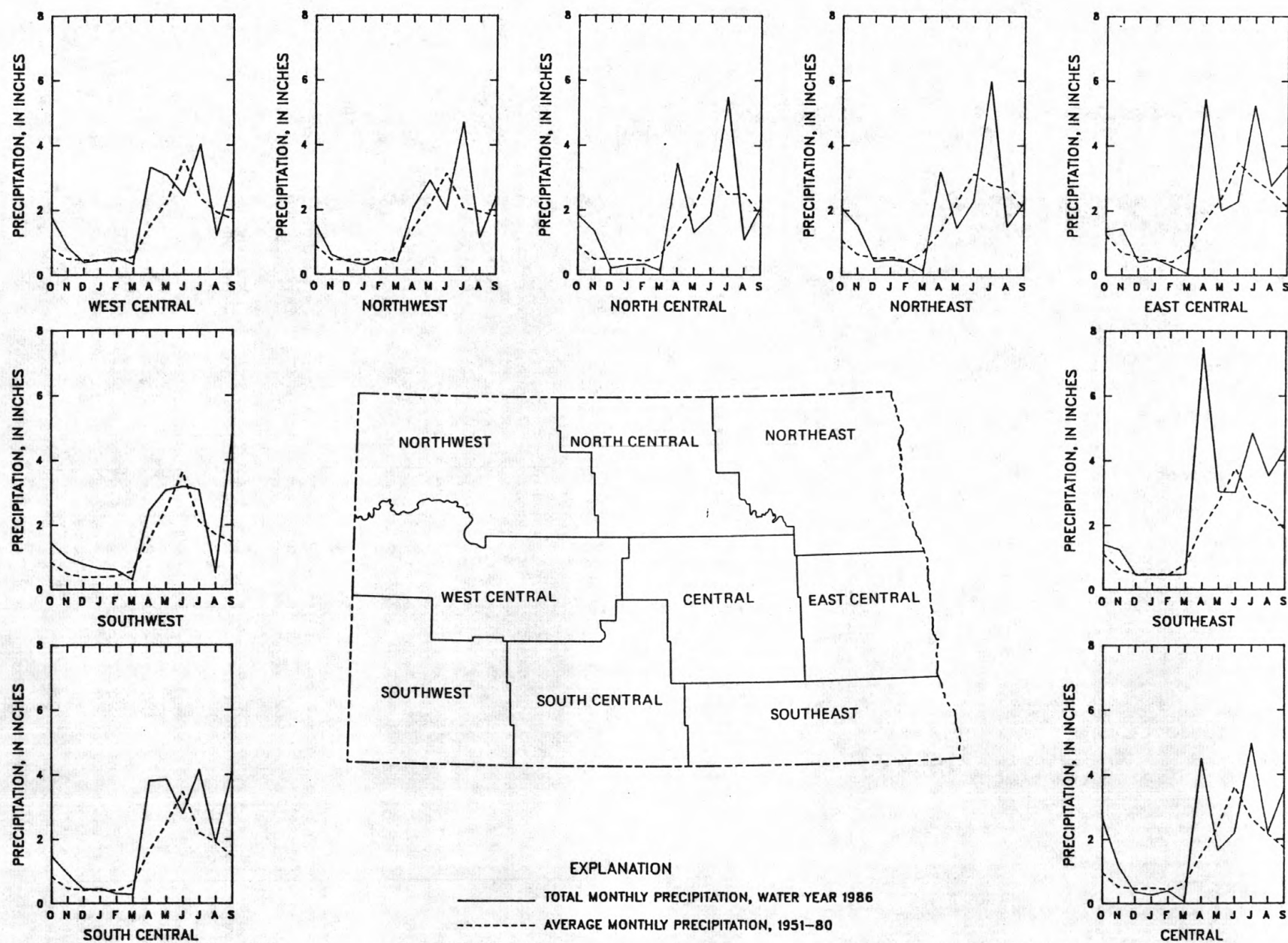


Figure 4.--Comparison of precipitation for water year 1986 to normal precipitation (1951-80 average).

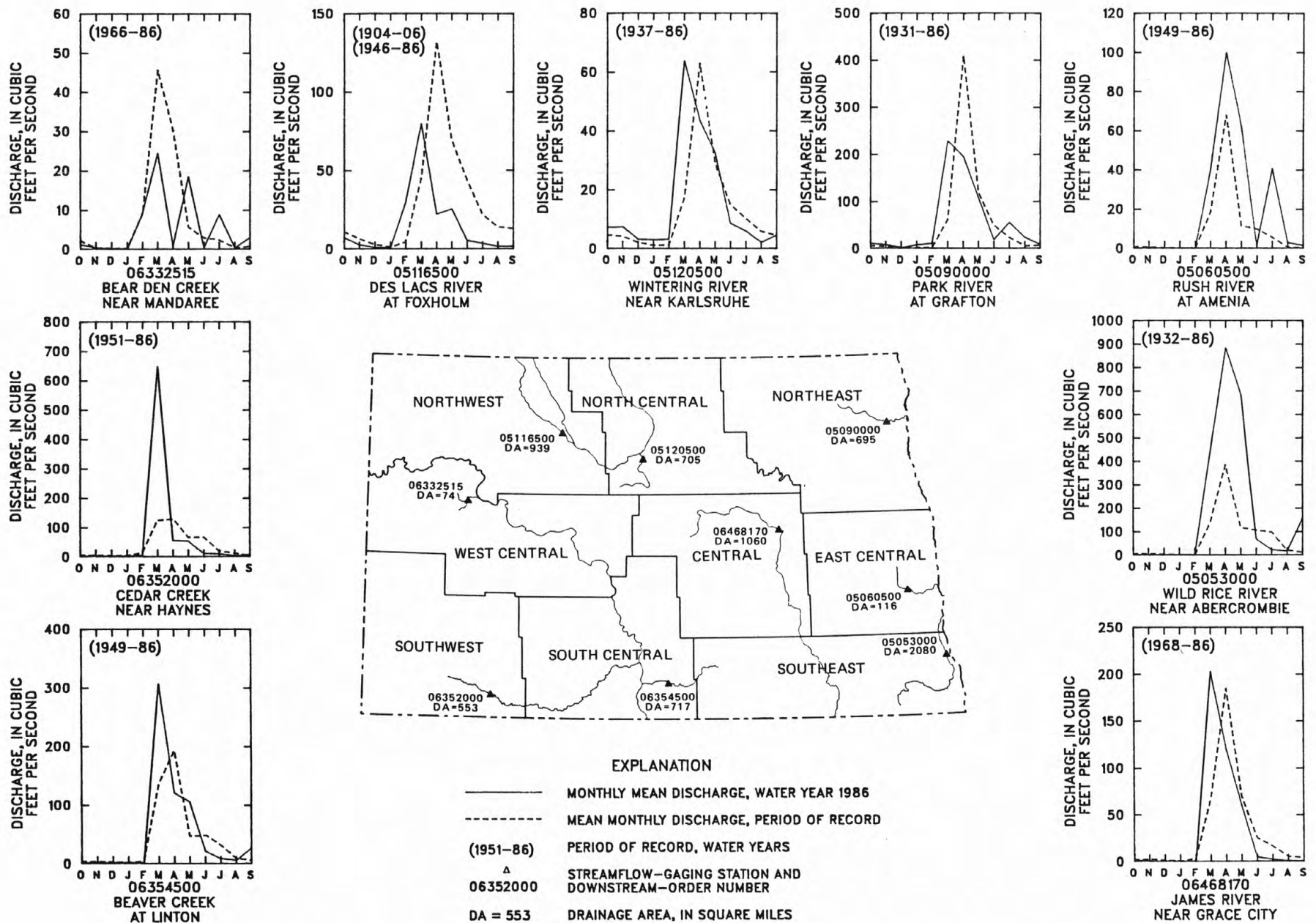


Figure 5.--Comparison of monthly mean discharge during water year 1986 to mean monthly discharge for the period of record.



The hydrograph for Cedar Creek (fig. 5) indicates the increase in runoff that resulted from the snowmelt in the southwest corner of the State in March. The hydrograph for the Wild Rice River near Abercrombie, in contrast, indicates that the monthly mean discharge for April was more than double the mean monthly discharge for the period of record and that the runoff from the rains in April was much greater than the snowmelt runoff that had occurred in March.

Monthly discharges for Bear Den Creek near Mandaree and the Des Lacs River at Foxholm (fig. 5) in the northwest part of the State were much less than the period-of-record mean monthly discharges for most months during water year 1986. The relatively mild, dry winter resulted in little accumulation of snow and allowed the melting snow to infiltrate the ground rather than run off into streams. The mean discharges for water year 1986 in these two streams were much less than the period-of-record mean annual discharges. The annual mean discharge for the Des Lacs River at Foxholm was less than one-half of the mean annual discharge for the period of record.

Two other streams, the Park River at Grafton and the James River near Grace City (fig. 5), had mean discharges for water year 1986 that were almost the same as the mean annual discharges for the period of record. Annual mean discharges at all other stations shown in figure 5 were substantially greater than the mean annual discharges for the respective periods of record.

Although it is possible to make many conclusions about the hydrologic conditions of the State by using the precipitation and streamflow data presented in figures 4 and 5, respectively, sound hydrologic judgment needs to be exercised. For example, one could infer that Bear Den Creek, which drains 74 square miles of the west-central division, would have high flow in April because precipitation averaged almost 2 inches greater than normal for that month. However, the data for this station presented in figure 5 indicate that the high flow actually occurred in March, probably due to snowmelt runoff. The variability of rainfall intensity and distribution needs to be considered when making conclusions of hydrologic response to rainfall on small basins. In the case of Bear Den Creek, it is possible that intense rainstorms did not occur over the basin. Discrepancies also may be caused by the different reporting period for the period-of-record mean values for data used in the two figures. The precipitation data uses a 30-year reference period from 1951 to 1980; but the mean monthly discharges are computed using data for the period of record at each streamflow-gaging station -- 21 years, water years 1966-86, in the case of Bear Den Creek near Mandaree.

#### Chemical Quality of Streamflow

Because streamflow quality at any particular site is dependent on many factors including the source of streamflow and the composition of the rocks over which it flows, water quality varies considerably across the State. During periods of low flow when the major part of flow is derived from ground-water inflow, the dissolved-solids concentrations are relatively large, reflecting the mineralized characteristics of the inflow. Specific conductance is a commonly available measure of the relative degree of mineralization or salinity of water. Maximum values of specific conductance generally are measured during the fall and winter months, when the flow is primarily from ground-water inflow. As streamflow increases from increased runoff, the concentration of constituents in solution decreases while other materials that tend to be transported in suspension, such as sediment, increase. The variability in water quality is the greatest during the spring, when there is a considerable quantity of overland runoff from snowmelt. Minimum specific-conductance values generally are measured during this period; the minimum value being dependent on the quantity of runoff that is available for dilution.

Values of specific-conductance measured at selected sites on major rivers and tributaries in the State during water year 1986 and mean, maximum, and minimum values by month for the period of record at those sites are listed in table 1. During water year 1986, record minimum specific-conductance values were measured in January at the Red River of the North at Grand Forks and in February at the Souris River near Sherwood. The period-of-record minimum monthly specific-conductance value for the Cannonball River at Breien was equalled in February. In general, small specific-conductance values were measured in these rivers and tributaries during February and March, about 1 month earlier than usual, due to contributions from early snowmelt and ice breakup.

The Red River of the North is the least mineralized major river in North Dakota. Minimum specific-conductance values generally are measured during the spring snowmelt period. Relatively greater specific-conductance values measured during other periods of the year reflect contributions from tributaries that receive inflow from more mineralized ground water and that contact glacial drift that contains more soluble minerals than the lacustrine sediments through which the Red River of the North flows. Specific-conductance values measured in water year 1986 indicate a medium salinity hazard for irrigation use existed throughout the year.

The dissolved-mineral content of the Souris River is derived mostly from leaching morainal deposits in Saskatchewan, Canada. Except for the record minimum specific-conductance value measured during February, the values measured during water year 1986 at the Souris River near Sherwood were well within the period-of-record range of measured values for each month. The salinity hazard for irrigation use was high during water year 1986 except during February and March.

Specific-conductance values for the Little Missouri River increase during peak flows because large concentrations of suspended sediment are eroded from the badlands. Because ground-water contributions to streamflow are limited, the river may be nearly dry at times. Greater than normal precipitation during water year 1986 maintained relatively high flows. Larger specific-conductance values at low flows principally reflect evaporative concentration. The salinity hazard for irrigation use was medium during March 1986 and high during the remainder of the water year.



Table 1.--Comparison of specific-conductance measurements made during water year 1986 with monthly and annual mean, maximum, and minimum values for the period of record

[Specific-conductance values are in microsiemens per centimeter at 25 °Celsius]

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Period of year record	Water 1986
<u>05082500 Red River of the North at Grand Forks (period of record, water years 1949, 1956-86)</u>														
Mean	507	581	604	570	548	483	454	554	544	494	497	485	515	507
Maximum	660	750	976	870	830	746	747	702	699	640	621	674	976	658
Minimum	399	440	468	275	400	305	200	325	348	280	360	340	200	275
Number of values	61	35	43	41	38	70	143	79	69	66	48	42	735	15
Measured values water year 1986	480	--	475	275	525	--	350 425 460 500 635 515 545	555 590 658	--	--	--	610	--	--
<u>05114000 Souris River near Sherwood (period of record, water years 1970, 1972-86)</u>														
Mean	1060	1240	1630	1730	1630	1270	621	751	1000	1030	968	1050	1120	1070
Maximum	1470	1880	2230	2770	2200	2180	1280	1160	1340	1420	1300	1240	2770	1760
Minimum	710	925	1250	1280	540	200	277	345	520	540	128	755	128	540
Number of values	24	21	14	20	20	27	36	18	22	20	25	15	262	9
Measured values water year 1986	1030	--	1490	1760	540	575	1090	--	925	1050	1130	--	--	--
<u>06337000 Little Missouri River near Watford City (period of record, water years 1972-86)</u>														
Mean	2010	1990	2960	2380	1220	938	1430	1790	1590	1880	1770	1750	1730	1190
Maximum	3100	2610	5000	3350	2030	1750	2700	3100	2710	3000	2520	2390	5000	1730
Minimum	720	740	1730	1500	640	400	515	850	800	1080	1000	900	400	540
Number of values	14	14	8	7	5	20	16	14	16	12	17	11	154	6
Measured values water year 1986	1730	--	--	--	--	540	--	850	1570	--	1240	1230	--	--
<u>06354000 Cannonball River at Breien (period of record, water years 1950, 1971-86)</u>														
Mean	1660	2200	2590	2400	1740	882	1090	1800	1630	1560	1480	1640	1630	1540
Maximum	2130	3070	3290	3800	3710	3100	2260	2930	3020	3000	2800	2300	3800	3000
Minimum	903	1600	284	680	190	190	300	481	610	570	575	730	190	190
Number of values	17	16	16	20	20	33	30	18	19	18	17	18	242	14
Measured values water year 1986	1920	2910	3000	2680	190	360 670 1380	--	1570	1880	930	--	1150 1530 1340	--	--
<u>06470500 James River at La Moure (period of record, water years 1957-86)</u>														
Mean	841	894	1170	1390	1320	659	524	789	796	774	750	870	852	917
Maximum	1130	1220	1550	1700	1720	1350	919	1210	1180	1280	1140	1210	1720	1550
Minimum	480	540	890	340	700	185	160	500	170	170	485	480	160	530
Number of values	27	16	10	24	12	27	35	21	25	17	18	27	259	9
Measured values water year 1986	760	1170	--	1550	1400	530	560	710	--	750	820	--	--	--

Ground-water contributions to the Cannonball River also are limited. Larger specific-conductance values principally reflect the effects of evaporation. The salinity hazard for irrigation use was high to very high during water year 1986, except during February and March, when snowmelt caused salinity hazards in the river to decrease to medium levels.

Specific-conductance values for the James River at LaMoure are stabilized slightly by regulation of flows from Jamestown Reservoir. Small releases from the reservoir maintain low flows downstream from the reservoir that have specific-conductance values similar to those measured in the reservoir. Upstream from the reservoir, the stream frequently goes dry and specific-conductance values increase because of evaporation. During water year 1986, the salinity hazard for irrigation use at LaMoure was medium during March, April, and May, but high during the remainder of the water year.

#### Ground-Water Levels

Water levels measured during water year 1986 and the average of monthly water levels for the period of record for well 134-052-06CCD2 in Richland County and well 140-095-08AAA in Stark County are shown in figures 6 and 7, respectively. Water-level fluctuations in both wells were typical; rises occurred during the wet spring months, and general declines occurred during the rest of the water year. Noted exceptions during water year 1986 occurred in well 134-052-06CCD2 (Richland County) in September, when the water level rose almost 2 feet from the level of the previous month in response to greater than normal precipitation, and in well 140-095-08AAA (Stark County) in July, when the water level rose about 0.5 foot in response to greater than normal precipitation. The water level of the well in Richland County also responded to the July precipitation; however, rather than the seasonal decline indicated by the average monthly water levels (fig.6), almost no decline in the water level occurred from June to July.

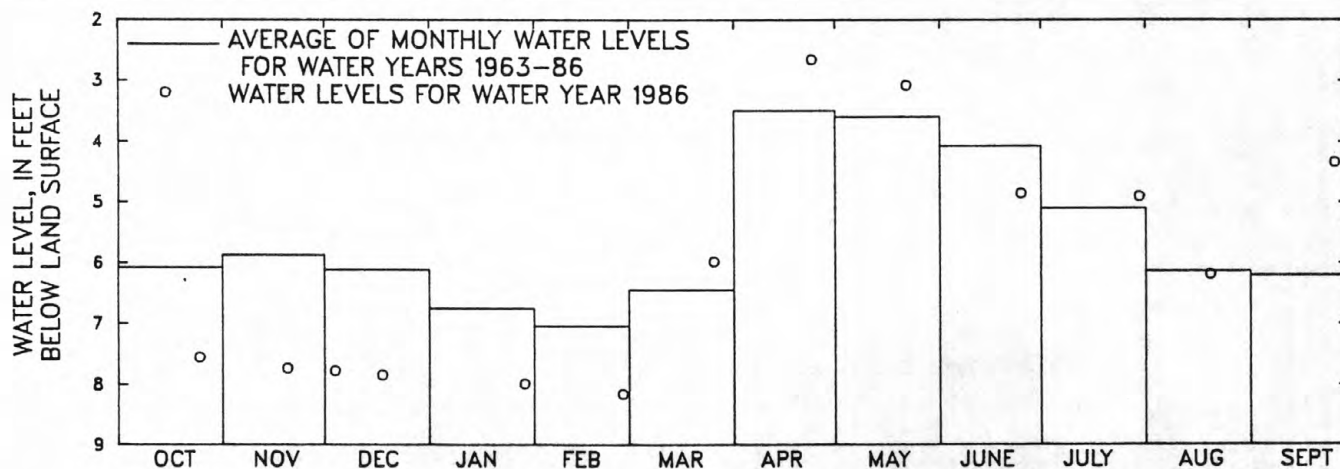


Figure 6.--Water levels in well 134-052-06CCD2 completed in Sheyenne Delta aquifer, Richland County, compared with period-of-record average (water years 1963-86) of monthly water levels. Location of well is shown in figure 3.

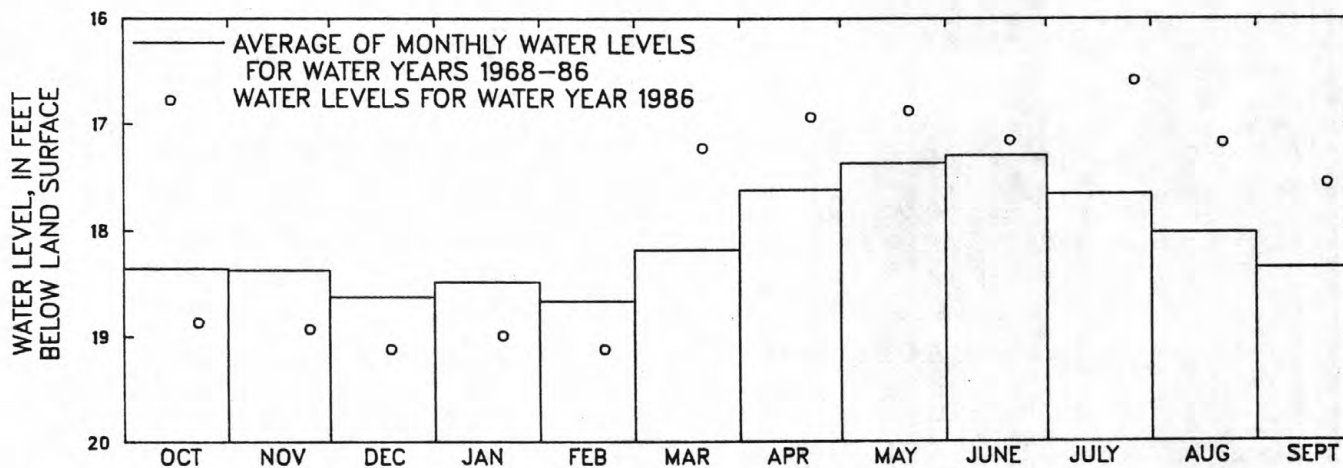


Figure 7.--Water levels in well 140-095-08AAA completed in Sentinel Butte aquifer, Stark County, compared with period-of-record average (water years 1968-86) of monthly water levels. Location of well is shown in figure 3.

## SPECIAL NETWORKS AND PROGRAMS

Hydrologic bench-mark network is a network of 57 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 the activities of man.

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 national or regional water-quality planning and management. The 500 or so sites in NASQAN generally are 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, (2) to aid in the description of the areal variability of water quality in the Nation's rivers, (3) to detect changes or trends with time in the pattern of occurrence of water-quality characteristics, and (4) to provide 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).

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.

## EXPLANATION OF THE RECORDS

The surface-water and ground-water records published in this report are for the 1986 water year that began October 1, 1985, and ended September 30, 1986. A calendar of the water year is provided on the inside of the front cover. The records contain streamflow data, stage and content data for lakes and reservoirs, water-quality data for surface- and ground-water, and ground-water-level data. The locations of the stations and wells where the data were collected are shown in figures 1, 2, and 3. The following sections of the introductory text are presented to provide users with a more detailed explanation of how the hydrologic data published in this report were collected, analyzed, computed, and arranged for presentation.

Station Identification Numbers

Each data station, whether stream site or well, in this report is assigned a unique identification number. This number is unique in that it applies specifically to a given station and to no other. The number usually is assigned when a station is first established and is retained for that station indefinitely. The systems used by the U.S. Geological Survey to assign identification numbers for surface-water stations and for ground-water well sites differ, but both are based on geographic location. The "downstream order" system is used for regular surface-water stations and the "latitude-longitude" system is used for wells and, in North Dakota, for water-quality stations where streamflow or water level are not collected on a regular basis.

## Downstream Order System

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 mainstream station are listed before that station. A station on a tributary that enters between two mainstream stations is listed between them. A similar order is followed in listing stations on first rank, second rank, and other ranks of tributaries. The rank of any tributary with respect to the stream to which it is immediately tributary is indicated by an indentation in the "List of Stations" in the front of this report. Each indentation represents one rank. This downstream order and system of indentation shows which stations are on tributaries between any two stations and the rank of the tributary on which each station is situated.

The station-identification number is assigned according to downstream order. In assigning station numbers, no distinction is made between partial-record stations and other stations; therefore, the station number for a partial-record station indicates downstream-order position in a list made up of both types of stations. Gaps are left in the series of numbers to allow for new stations that may be established; hence, the numbers are not consecutive. The complete eight-digit number for each station, such as 06342500, which appears just to the left of the station name, includes the two-digit part number "06" plus the six-digit downstream-order number "342500." The part number designates the major river basin; for example, Part "06" is the Missouri River basin.



### Latitude-Longitude System

The identification numbers for wells and miscellaneous surface-water sites are assigned according to the grid system of latitude and longitude. The number consists of 15 digits. The first six digits denote the degrees, minutes, and seconds of latitude, the next seven digits denote degrees, minutes, and seconds of longitude, and the last two digits (assigned sequentially) identify the wells or other sites within a 1-second grid. This site-identification number, once assigned, is a pure number and has no locational significance. In the rare instance where the initial determination of latitude and longitude are found to be in error, the station will retain its initial identification number; however, its true latitude and longitude will be listed in the LOCATION paragraph of the station description (see fig. 8).

### Local Well Numbers

In order to compare data for wells in other publications in North Dakota, such as the county ground-water studies, the wells in this report also are numbered according to a system based on the location in the public-land classification of the U.S. Bureau of Land Management. The system is illustrated in figure 9. The first number denotes the township north of a base line, the second number denotes the range west of the fifth principal meridian, and the third numeral denotes the section in which the well is located. The letters A, B, C, and D designate, respectively, the northeast, northwest, southwest, and southeast quarter section, quarter-quarter section, and quarter-quarter-quarter section (10-acre tract). For example, well 139-049-15ADC is in the SW $\frac{1}{4}$ SE $\frac{1}{4}$ NE $\frac{1}{4}$  sec. 15, T. 139 N., R. 049 W. Consecutive terminal numbers are added if more than one well is recorded within a 10-acre tract.

### Records of Stage and Water Discharge

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

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 "Crest-stage 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. Locations of all complete-record and crest-stage partial-record stations for which data are given in this report are shown in figure 1.

### 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.

Continuous records of stage are obtained with analog recorders that trace continuous graphs of stage or with digital recorders that punch stage values on paper tapes at selected time intervals. Measurements of discharge are made with current meters using methods adopted by the 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 the current-meter measurements, the curves are extended using: (1) logarithmic plotting; (2) velocity-area studies; (3) results of indirect measurements of peak discharge, such as slope-area or contracted-opening measurements, and computations of flow over dams or weirs; or (4) step-backwater techniques.



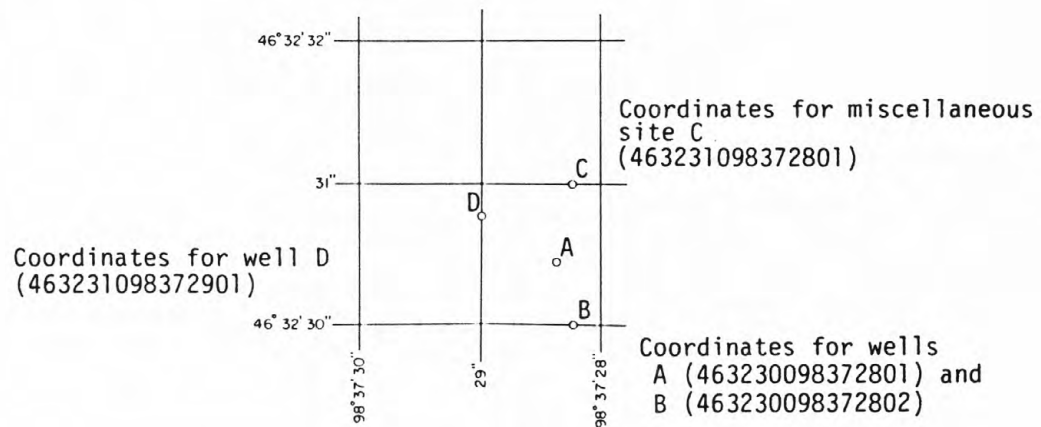


Figure 8.--System for numbering wells and miscellaneous sites (latitude and longitude).

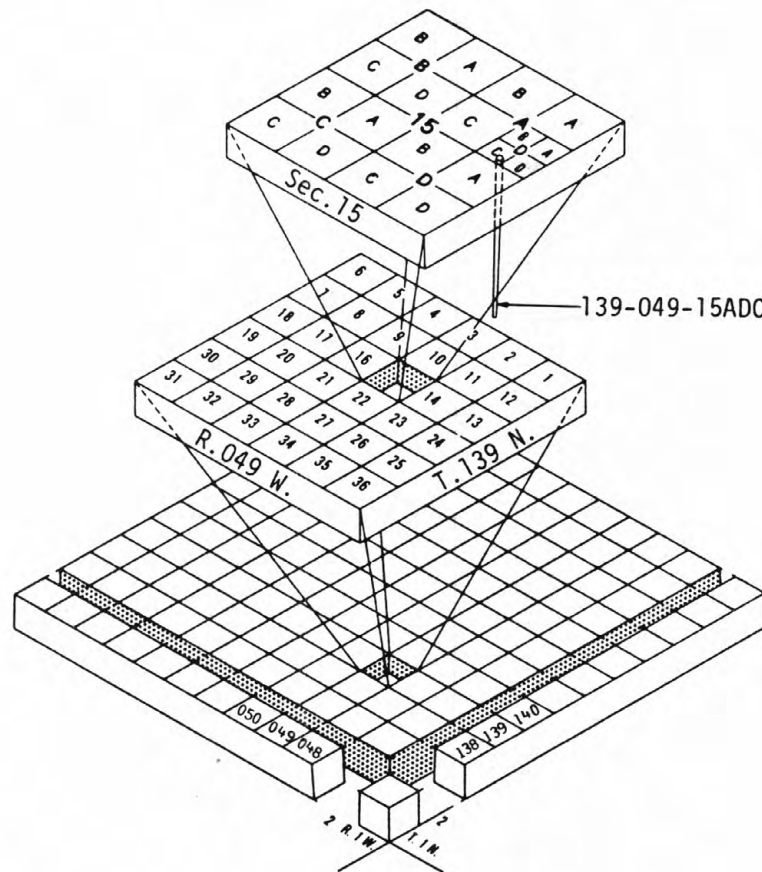


Figure 9.--System for numbering wells and miscellaneous sites (township and range).

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.

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 the lapsed time since the last survey increases. Discharges 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. This happens when the recorder stops or otherwise fails to operate properly, intakes are plugged, the float is frozen in the well, or for various other reasons. For 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

The records published for each gaging station consist of two parts, the manuscript or station description and the data table for the current water year. The manuscript provides, under various headings, descriptive information, such as station location; period of record; average discharge; historical extremes; 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 provided by the U.S. Army Corps of Engineers.

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

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

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

**GAGE.**--The type of gage in current use, the datum of the current gage referred to National Geodetic Vertical Datum of 1929 (see glossary), and a condensed history of the types, locations, and datums of previous gages are given under this heading.

**REMARKS.**--All periods of estimated daily-discharge record will either be identified by date in this paragraph of the station description for water-discharge stations or flagged in the daily-discharge table. (See next section, "Identifying Estimated Daily Discharge.") If a remarks 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.

AVERAGE DISCHARGE.--The discharge value given is the arithmetic mean of the water-year mean discharges. It is computed only for stations having at least 5 water years of complete record, and only water years of complete record are included in the computation. It is not computed for stations where diversions, storage, or other water-use practices cause the value to be meaningless. If water developments significantly altering flow at a station are put into use after the station has been in operation for a period of years, a new average is computed as soon as 5 water years of record have accumulated following the development. The median of yearly mean discharges also is given under this heading for stations having 10 or more water years of record, if the median differs from the average given by more than 10 percent.

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

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

EXTREMES FOR CURRENT YEAR.--Extremes given here are similar to those for the period of record, except the peak discharge listing may include secondary peaks. For stations meeting certain criteria, all peak discharges and stages occurring during the water year and greater than a selected base discharge are presented under this heading. The peaks greater than the base discharge, excluding the highest one, are referred to as secondary peaks. Peak discharges are not published for canals, ditches, drains, or streams for which the peaks are subject to substantial control by man. The time of occurrence for peaks is expressed in 24-hour local standard time. For example, 12:30 a.m. is 0030, and 1:30 p.m. is 1330. The minimum for the current water year appears below the table of peak data.

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 offices whose addresses are given on the back of the title page of this report to determine if the published records were ever revised after the station was discontinued. Of course, if the data 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.

The daily table for stream-gaging stations gives mean discharge for each day and is followed by monthly and yearly summaries. In the monthly summary below the daily table, the line headed "TOTAL" gives the sum of the daily figures. The line headed "MEAN" gives the average flow in cubic feet per second during the month. The lines headed "MAX" and "MIN" give the maximum and minimum daily discharges, respectively, for the month. Discharge for the month also is usually expressed in acre-feet (line headed "AC-FT"). In the yearly summary below the monthly summary, the figures shown are the appropriate discharges for the calendar and water years.

Data for crest-stage stations and measurements at miscellaneous sites are presented in one table following the information for continuous-record 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 their true values; "good," within 10 percent; and "fair," within 15 percent. Records that do not meet the criteria mentioned are rated "poor." Different accuracies may be attributed to different parts of a given record.

Daily mean discharges in this report are given to the nearest hundredth of a cubic foot per second for values less than 1 cubic foot per second; to the nearest tenth between 1.0 and 10 cubic feet per second; to whole numbers between 10 and 1,000 cubic feet per second; and to three significant figures for more than 1,000 cubic feet per second. 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.

#### Other Records Available

Information used in the preparation of the records in this publication, such as discharge-measurement notes, gage-height records, temperature measurements, and rating tables is on file in the North Dakota District Office. Also, most of the daily mean discharges are in computer-readable form and have been analyzed statistically. An example of a computer listing of annual peak discharges for the Knife River at Hazen, N. Dak., gaging station (06340500) is shown in figure 10. An example of the computer generated Log-Pearson Type III annual peak-flow frequency analysis for these data, following the U.S. Water Resources Council guidelines in Bulletin 17B, is shown in tabular form by figure 11 and shown graphically by figure 12.

Usually data users are interested in comparing current streamflow to long-term averages. Examples of statistics computed for monthly mean discharges for the Knife River at Hazen are shown in figures 13 and 14.

Current flow data at U.S. Geological Survey gaging stations are available upon request, usually within less than one month following retrieval of the recorded data from the field site. After primary analysis the data are available in a computer format that shows hourly water level fluctuations, adjustments required for accurate computation of daily flows, and other details of the record analysis (see fig. 15). In this "primary computation" form, the data are considered provisional and subject to revision until published.

Many other statistics and data formats are available upon request. The information generally is available on a timely basis at no charge to the user; however, large requests or those specifically tailored to individual data-user's needs may be provided at a nominal fee. Information on the availability of the unpublished information or on the results of statistical analyses of the published records may be obtained from the office whose address is given on the back of the title page of this report.

#### Records of Surface-Water Quality

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

#### Classification of Records

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

A careful distinction needs to be made between "continuing records", as used in this report, and "continuous recordings," which refers to a continuous graph or a series of discrete values punched at short intervals on a paper tape. Some records of water quality, such as temperature and specific conductance, may be obtained through continuous recordings; however, because of costs, most data 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 2.

#### 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.



STATION 06340500

KNIFE RIVER AT HAZEN, ND

AGENCY: USGS  
 STATE: 38  
 COUNTY: 057  
 DISTRICT: 38

STATION LOCATOR  
 LAT. LONG.  
 471706 1013726

DRAINAGE AREA: 2240.00 SQ MI  
 CONTRIBUTING  
 DRAINAGE AREA: 2240.00 SQ MI  
 GAGE DATUM: 1712.35 (NGVD)  
 BASE DISCHARGE: 1500.00 CFS

WATER YEAR	DATE	PEAK DISCHARGE (CFS)	DISC CODES	GAGE HEIGHT (FT)	GH CODES	MAX GAGE HEIGHT (FT)	DATE	GH CODES
1930	02/21/30	3070.00		23.20	1			
1931	09/22/31	1450.00		11.60				
1932	06/14/32	1300.00		11.10				
1933	03/17/33	2200.00		14.50				
1938	07/05/38	7540.00		23.00				
1939	03/24/39	9300.00		24.47				
1940	07/29/40	1150.00		10.92				
1941	06/09/41	4110.00		20.23				
1942	06/07/42	3120.00		17.10				
1943	03/26/43	26500.00		26.30				
1944	04/03/44	8010.00		23.39				
1945	03/15/45	8690.00		23.99				
1946	03/03/46	3500.00		19.30	1			
1947	06/25/47	6000.00		21.70	2	21.95	03/25/47	1
1948	03/24/48	7070.00		23.62	1			
1949	04/06/49	7760.00		23.30	2	24.10	04/03/49	1
1950	04/17/50	22700.00		25.93				
1951	03/30/51	9000.00		25.36	1			
1952	04/07/52	20200.00		25.83				
1953	06/14/53	3440.00		17.31				
1954	04/08/54	3880.00		18.06				
1955	03/13/55	1400.00	2	11.35				
1956	03/21/56	6630.00		23.76	1			
1957	03/01/57	1590.00		12.49	1			
1958	03/28/58	3500.00	2	19.82	1			
1959	03/24/59	4930.00		20.14				
1960	03/27/60	7230.00		23.13	1			
1961	03/03/61	488.00		9.62	12	9.72	03/02/61	1
1962	05/31/62	3860.00		17.48				
1963	06/10/63	1050.00		9.63				
1964	06/18/64	5170.00		20.17				
1965	04/15/65	3330.00		15.99				
1966	06/24/66	35300.00		27.01				
1967	03/25/67	7980.00		23.88				
1968	03/06/68	1800.00		18.37	1			
1969	04/07/69	11800.00		24.75				
1970	05/11/70	8180.00		23.83				
1971	03/17/71	4320.00		18.79	1			
1972	03/15/72	19000.00		26.17	1			
1973	03/02/73	3900.00		21.44	1			
1974	03/03/74	1350.00		14.28	1			
1975	05/01/75	6600.00		22.60	2	23.37	04/24/75	1
1976	03/19/76	3000.00		18.00	1			
1977	06/19/77	1200.00		9.75	2	11.69	03/11/77	1
1978	03/27/78	11000.00		25.10	1			
1979	04/18/79	5440.00		20.26				
1980	06/15/80	1620.00		10.58				
1981	02/18/81	900.00		9.92	1			
1982	03/31/82	10500.00		25.14	1			
1983	03/13/83	5300.00		23.00	1			
1984	03/21/84	2500.00		14.50	1			
1985	05/13/85	1540.00		10.10				
1986	03/04/86	8800.00		24.00				

Figure 10.--Example of computer printout of annual peak discharges for the period of record on the Knife River at Hazen.

PGM J407 VER 3.7  
(REV 11/5/81)

U. S. GEOLOGICAL SURVEY  
ANNUAL PEAK FLOW FREQUENCY ANALYSIS  
FOLLOWING WRC GUIDELINES BULL. 17-B.

RUN-DATE 4/ 7/87 AT 2125 SEQ 1.0001

18

OPTIONS IN EFFECT -- PLOT BCPU LGPT NODB PPOS NORS EXPR CLIM

STATION - 06340500 /USGS KNIFE RIVER AT HAZEN, ND 1930-1986 06340500 /USGS

I N P U T D A T A S U M M A R Y

-- YEARS OF RECORD -- SYSTEMATIC HISTORIC	HISTORIC PEAKS	GENERALIZED SKEW	STD. ERROR OF GENERAL. SKEW	SKEW OPTION	GAGE BASE DISCHARGE	USER-SET OUTLIER CRITERIA HIGH OUTLIER LOW OUTLIER
53 0	0	-0.400	--	WRC WEIGHTED	0.0	-- --

\*\*\*\*\* NOTICE -- PRELIMINARY MACHINE COMPUTATIONS. \*\*\*\*\*  
\*\*\*\*\* USER RESPONSIBLE FOR ASSESSMENT AND INTERPRETATION. \*\*\*\*\*

WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE. 0.0  
WCF195I-NO LOW OUTLIERS WERE DETECTED BELOW CRITERION. 318.3  
WCF163I-NO HIGH OUTLIERS OR HISTORIC PEAKS EXCEEDED HHBASE. 59767.9

ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

	FLOOD BASE DISCHARGE	FLOOD BASE EXCEEDANCE PROBABILITY	LOGARITHMIC MEAN	LOGARITHMIC STANDARD DEVIATION	LOGARITHMIC SKEW
SYSTEMATIC RECORD	0.0	1.0000	3.6397	0.4075	-0.020
W R C ESTIMATE	0.0	1.0000	3.6397	0.4075	-0.113

ANNUAL FREQUENCY CURVE ORDINATES -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL EXCEEDANCE PROBABILITY	W R C ESTIMATE	SYSTEMATIC RECORD	'EXPECTED PROBABILITY' ESTIMATE	95-PCT CONFIDENCE LIMITS FOR W R C ESTIMATES LOWER UPPER
0.9950	352.2	382.4	300.3	206.0 526.3
0.9900	454.9	485.1	404.2	278.1 659.5
0.9500	904.9	927.2	862.3	619.0 1216.1
0.9000	1296.6	1308.1	1251.0	935.3 1684.5
0.8000	1991.5	1982.2	1956.7	1517.3 2506.7
0.5000	4439.6	4375.3	4439.6	3582.9 5506.3
0.2000	9652.5	9615.6	9810.8	7663.9 12684.3
0.1000	14343.2	14486.7	14810.0	11061.7 19819.9
0.0400	21719.6	22398.1	22883.4	16107.1 31911.1
0.0200	28281.7	29658.4	30547.0	20395.3 43337.8
0.0100	35765.6	38161.0	39455.3	25123.3 56975.5
0.0050	44239.3	48043.1	50360.4	30317.8 73061.2
0.0020	57079.5	63475.8	65991.9	37943.6 98515.6

Figure 11.--Example of computer printout for annual peak flow frequency analysis on the Knife River at Hazen.

WATER RESOURCES DATA - NORTH DAKOTA, 1986

PGM J407 VER 3.7  
(REV 11/5/81)

U. S. GEOLOGICAL SURVEY  
ANNUAL PEAK FLOW FREQUENCY ANALYSIS  
FOLLOWING WRC GUIDELINES BULL. 17-B.

STATION - 06340500 /USGS KNIFE RIVER AT HAZEN, ND  
1930-1986 RUN-DATE 4/ 7/87 AT 2125 SEQ 1.0001 /USGS

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\*\*\*\*\* NOTICE \*\*\*\*\* NOTICE \*\*\*\*\*  
\* PRELIMINARY MACHINE COMPUTATION. \*  
\* USER IS RESPONSIBLE FOR ASSESS- \*  
\* MENT AND INTERPRETATION. \*  
\*\*\*\*\*

PLOT SYMBOL KEY  
\* WRC FINAL FREQUENCY CURVE  
O OBSERVED (SYSTEMATIC) PEAKS  
\$ HISTORICALLY ADJUSTED PEAKS  
# SYSTEMATIC-RECORD FREQ CURVE  
WHEN POINTS COINCIDE, ONLY THE  
TOPMOST SYMBOL SHOWS.

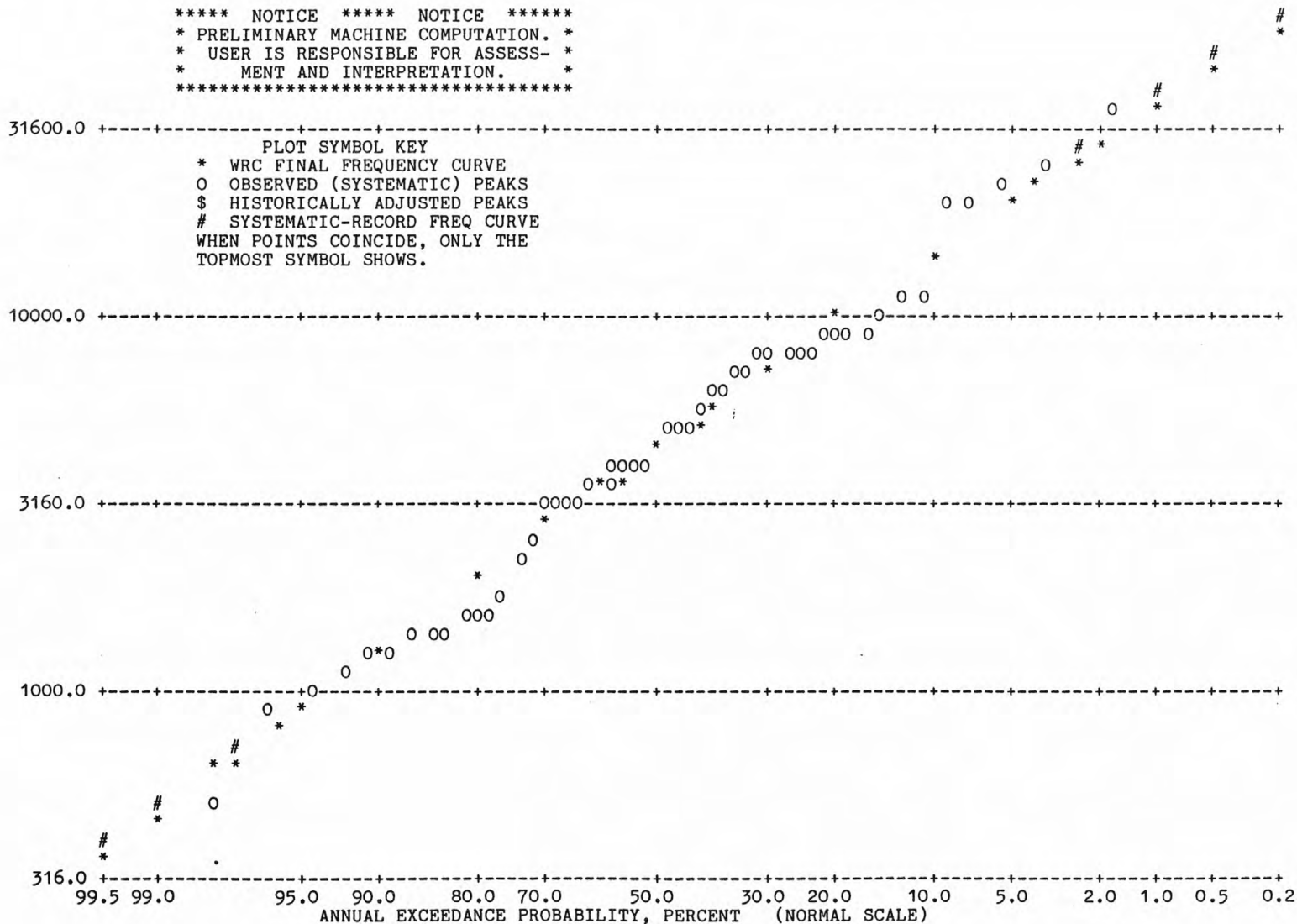


Figure 12.--Example of computer printout for peak flow frequency curve for the Knife River at Hazen.

STATION 06340500

KNIFE RIVER AT HAZEN, ND

DISCHARGE-(CFS)

STATISTICS ON NORMAL MONTHLY MEANS (ALL DAYS)

OCT	NOV	DEC	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT
BY ROWS (MEAN,VARIANCE,STANDARD DEVIATION,SKWEWNESS,COEFF. OF VARIATION,PERCENTAGE OF AVERAGE VALUE)											
36.10	30.80	20.70	20.00	92.40	717.00	592.00	179.00	261.00	116.00	48.00	36.30
2386.00	867.00	147.00	636.00	25600.00	571200.00	767100.00	63730.00	64410.00	23270.00	1790.00	943.00
48.80	29.40	12.10	25.20	160.00	756.00	876.00	252.00	254.00	153.00	42.30	30.70
6.10	5.54	2.63	3.44	3.24	1.62	2.45	3.56	1.42	3.93	2.00	1.99
1.35	0.96	0.58	1.26	1.73	1.05	1.48	1.41	0.97	1.31	0.88	0.85
1.68	1.43	0.96	0.93	4.30	33.30	27.50	8.35	12.10	5.41	2.23	1.69

Figure 13.--Example of computer printout for statistics computed on monthly mean discharges for the period of record on the Knife River at Hazen.

STATION 06340500

KNIFE RIVER AT HAZEN, ND

DISCHARGE-(CFS)

NORMAL MONTHLY MEANS(ALL DAYS)

OCT	NOV	DEC	JAN	FEB	MARCH
TWENTY FIFTH PERCENTILE					
17.50	18.89	12.60	7.48	9.12	170.00
FIFTIETH PERCENTILE					
26.20	25.60	19.19	12.80	21.19	418.00
SEVENTY FIFTH PERCENTILE					
39.80	34.40	27.20	19.40	129.00	1099.00
APRIL	MAY	JUNE	JULY	AUG	SEPT
TWENTY FIFTH PERCENTILE					
97.30	54.80	72.80	30.30	17.39	18.69
FIFTIETH PERCENTILE					
181.00	91.00	174.00	74.10	36.40	27.30
SEVENTY FIFTH PERCENTILE					
789.00	183.00	355.00	151.00	66.40	46.90

NOTE -- PERCENTILES BASED ON AVAILABLE DATA

Figure 14.--Example of computer printout for quartile percentages of monthly mean discharges for the period of record on the Knife River at Hazen.



86 WY UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY - WATER RESOURCES DIVISION STATE 38 DIST 38  
 06340500 PRIMARY COMPUTATIONS OF GAGE HEIGHT AND DISCHARGE  
 KNIFE RIVER AT HAZEN, ND DATE PROCESSED: 08-APR-87 14:33 REH  
 STORE PARM 00060, STAT 00003 USE RT 15.0 02/28/86 (0015)

PROVISIONAL DATA FOR WATER YEAR ENDING SEPT. 30, 1986

TEST DIFF: \*\*\*\* PUNCH INT: 15 MIN

DATE -----	MAX GH	MIN GH	MEAN GH	EQUIV GH	MEAN DISCH	SHIFT ADJ	DATUM COR	STAGE, IN HUNDRETHS OF FEET, AT INDICATED HOURS											
	/DISCH <TIME>	/DISCH <TIME>						0100 1300	0200 1400	0300 1500	0400 1600	0500 1700	0600 1800	0700 1900	0800 2000	0900 2100	1000 2200	1100 2300	1200 2400
7/20/86	4.17 327 <1430>	3.74 262 <0015>	4.02	4.03	304	-0.09		374 415	374 416	376 417	380 417	384 417	390 415	396 413	400 412	405 412	408 409	412 407	413 407
7/21/86	4.07 307 <0015>	3.95 282 <1400>	3.98	3.98	289	-0.13		406 396	405 395	403 395	402 395	401 395	401 395	399 395	399 395	398 395	396 395	396 395	396 395
7/22/86	3.95 282 <0015>	3.66 235 <2400>	3.78	3.79	254	-0.17		394 373	394 373	392 372	389 372	389 371	386 371	384 371	382 371	380 370	379 369	377 368	376 366
7/23/86	3.66 235 <0015>	3.49 212 <2230>	3.54	3.54	219	-0.16		365 352	363 351	361 351	359 351	358 351	356 351	354 351	354 351	352 350	352 350	352 349	352 349
7/24/86	3.49 212 <0015>	3.25 181 <2400>	3.40	3.41	201	-0.16		348 340	348 340	348 338	348 338	348 337	347 335	346 334	345 332	344 330	344 329	343 327	342 325
7/25/86	3.25 181 <0015>	2.89 135 <2330>	3.06	3.06	156	-0.15		323 303	321 303	320 301	318 299	316 298	314 296	313 295	311 293	310 292	307 291	307 290	305 289
7/26/86	2.88 134 <0015>	2.65 108 <2400>	2.76	2.76	121	-0.14		288 275	286 274	285 273	284 273	283 271	282 270	281 269	281 269	280 268	278 267	277 266	276 265
7/27/86	2.65 108 <0015>	2.49 91 <2300>	2.57	2.56	99	-0.14		265 256	264 256	263 255	262 254	262 253	261 253	260 252	259 252	259 251	258 250	257 249	257 249
7/28/86	2.49 92 <0015>	2.38 81 <2115>	2.45	2.45	88	-0.13		249 245	249 245	249 244	249 242	249 242	249 240	249 240	249 239	249 239	248 238	247 238	246 238
7/29/86	2.38 81 <0015>	2.31 74 <1615>	2.34	2.35	78	-0.13		237 235	237 234	237 233	237 232	237 231	237 231	237 231	237 231	236 231	236 231	235 231	235 231
7/30/86	2.33 77 <0715>	2.24 68 <1830>	2.29	2.29	73	-0.12		231 229	231 228	231 227	231 226	231 226	231 225	232 224	233 224	233 224	233 224	232 224	231 224
7/31/86	2.24 68 <0015>	2.14 60 <2145>	2.19	2.18	64	-0.11		224 219	224 218	224 218	223 217	223 216	222 216	222 216	222 215	222 215	222 214	220 214	220 214
END MONTH																			
PERIOD	4.17 327	2.14 60	3.03		162			( 7/20/86 - 7/31/86)											

WATER RESOURCES DATA - NORTH DAKOTA, 1986

Figure 15.--Example of "primary computation" computer printout for the Knife River at Hazen.

### On-Site Measurements and Sample Collection

In obtaining water-quality data, a major concern needs to be assuring that the data obtained represent the in situ quality of the water. To assure this, certain measurements, such as water temperature, pH, and dissolved oxygen, need to be made on-site 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 onsite 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 under "PUBLICATIONS ON TECHNIQUES OF WATER-RESOURCES INVESTIGATIONS" which appears at the end of the introductory text. Also, detailed information on collecting, treating, and shipping samples may be obtained from the U.S. Geological Survey North Dakota 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 North Dakota 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 published with the water-quality records for each surface-water station in this report.

### 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. 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 biochemical-oxygen demand (BOD) and samples for indicator bacteria are analyzed locally. Sediment samples are analyzed in the U.S. Geological Survey laboratory in Iowa City, Iowa. All other samples are analyzed in either the U.S. Geological Survey laboratory in Arvada, Colo., or the North Dakota State Water Commission laboratory in Bismarck, N. Dak. Methods used in analyzing sediment samples and computing sediment records are given in TWRI, Book 5, Chap. C1. Methods used by the U.S. Geological Survey laboratory 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, and dissolved oxygen then follow in sequence.

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

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

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

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

INSTRUMENTATION.--Information on instrumentation is given only if a water-quality monitor temperature 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>PRINTED OUTPUT</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)
ND	Not detected. No colonies were present on the least dilute sample prepared.

Records of Ground-Water Levels

Only water-level data from a network of selected observation wells are given in this report. These data are intended to provide a sampling and historical record of water-level changes in the most important aquifers. Locations of the observation wells in this selected network in North Dakota are shown in figure 3.



The complete statewide network included more than 800 wells during 1986. About one-half of these wells were measured annually and the others at a variety of frequencies. Forty wells were equipped with continuous water-level recorders.

#### 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 ensure that measurements at each well are of consistent accuracy and reliability.

Tables of water-level data are presented by counties arranged in alphabetical order. The 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. 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).

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

#### Data Presentation

Each well record consists of two parts, the station description and the data table of water levels measured during the water year. 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 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 measurement 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 top of casing, plug in pump base and so on), and in relation to land surface (such as 1.3 feet above land-surface datum). The elevation of the land-surface datum is described in feet above (or below) National Geodetic Vertical Datum of 1929 (NGVD of 1929); 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 also are water-quality observation wells, and may be used to acknowledge the assistance of local (non-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 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 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 levels are listed. For wells equipped with recorders, only abbreviated tables, every fifth day and at the end of the month (EOM) are published; taped measurements are not published for wells equipped with continuous recorders. 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.

#### Availability of Data

All water-level measurements and recorder data are stored in computer as well as office files and are available in a tabular listing similar to those published in this report. However, ground-water data usually are more easily analyzed when displayed graphically. Examples of computer-generated hydrographs for water levels in four wells published in this report are presented in figures 16a-18.

The hydrograph for well 139-078-27CBB in the McKenzie aquifer in Burleigh County is shown in figures 16a and 16b, and the reported water use for irrigation from the McKenzie aquifer is shown in table 2. Very little fluctuation in water level occurred from 1963 until about 1972 (fig. 16a), and water-use data for the McKenzie aquifer (table 2) indicate that irrigation was insignificant until about 1972. Only annual water-level measurements at the end of the year were made during 1972-74 and the effect of irrigation withdrawals on the aquifer during the irrigation season cannot be detected on the hydrograph. Beginning in 1975, the frequency of water-level measurements was increased, and the annual declines in water level during the irrigation season and the recovery during the winter and spring can be seen in figure 16b. The largest annual decline in the water level, more than 7 feet, during the period of record for this well occurred during 1977. This decline corresponds to the largest reported water use for irrigation from the McKenzie aquifer (table 2).

Due to above normal precipitation during the 1986 irrigation season (fig. 4), reported water use for irrigation from the McKenzie aquifer (table 2) was the lowest since 1969. The 1986 hydrograph for the Burleigh County well in figure 16b does not show the decline in water level, during the irrigation season, that has become typical in recent years of larger withdrawals.

Table 2.--Reported water use, by year, for irrigation from the McKenzie aquifer, in acre-feet

Year	Water use	Year	Water use	Year	Water use	Year	Water Use
1969	0	1974	400	1979	314	1984	624
1970	75	1975	182	1980	475	1985	477
1971	150	1976	338	1981	230	1986	20
1972	436	1977	781	1982	348		
1973	416	1978	183	1983	486		

The 1986 hydrograph of water levels in well 134-052-06CCD2 completed in the Sheyenne Delta aquifer in Richland County and equipped with a continuous recorder is shown in figure 17. The maximum and minimum recorded daily water levels and the periodic water-level measurements are shown. The periodic measurements were made with a steel tape. A dotted line was drawn between the periodic measurements to illustrate the definition of changes indicated by periodic taped measurements as compared to definition of changes in water level that is provided when continuous recorder data are available. Although the general trend in water-level changes is provided by the periodic measurements (fig. 17), the water level in this well may fluctuate more than 2 feet between measurements. Straight-line interpolation between measurements would have been in error by more than half a foot at this site at several times during the water year.

Ground-water data are recorded and stored as water levels in feet below land surface. Because the elevation of land surface is determined for all well sites, it is possible to relate water level below land surface to elevation above National Geodetic Vertical Datum of 1929. Both vertical scales are used on the hydrographs, water level below land surface on the right margin and water-level elevation above National Geodetic Vertical Datum of 1929 on the left margin (figs. 16a-18). Gage datum at lake and reservoir sites also can be directly related to National Geodetic Vertical Datum; therefore, both ground-water and surface-water elevation data can be plotted on one hydrograph to show the relationship that exists between the ground-water level, and the level of water in nearby lakes and reservoirs. The hydrographs for well 153-063-30CBC in Benson County and Devils Lake are shown in figure 18. Such comparison hydrographs are useful tools for analysis of ground-water/surface-water relationships.

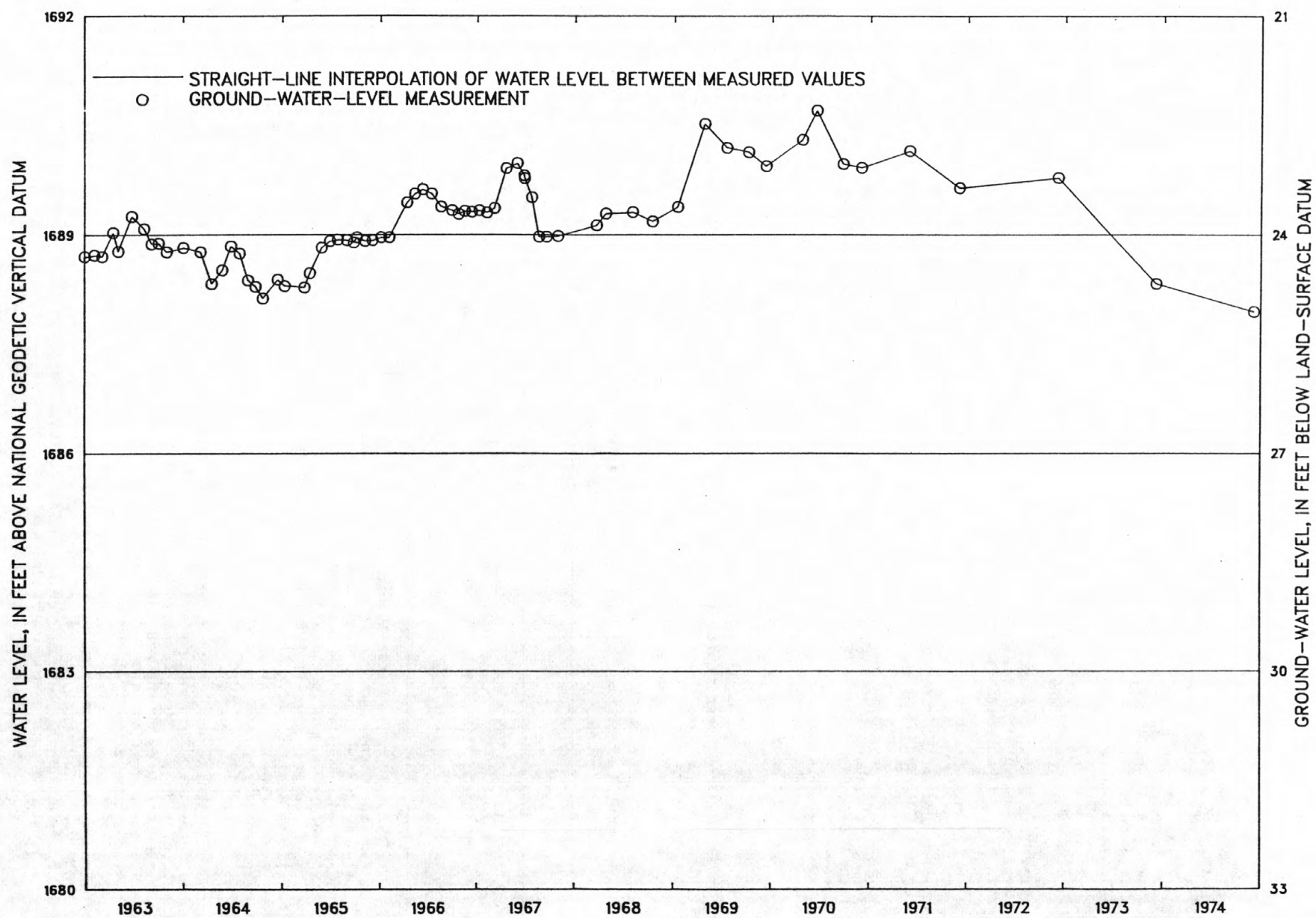
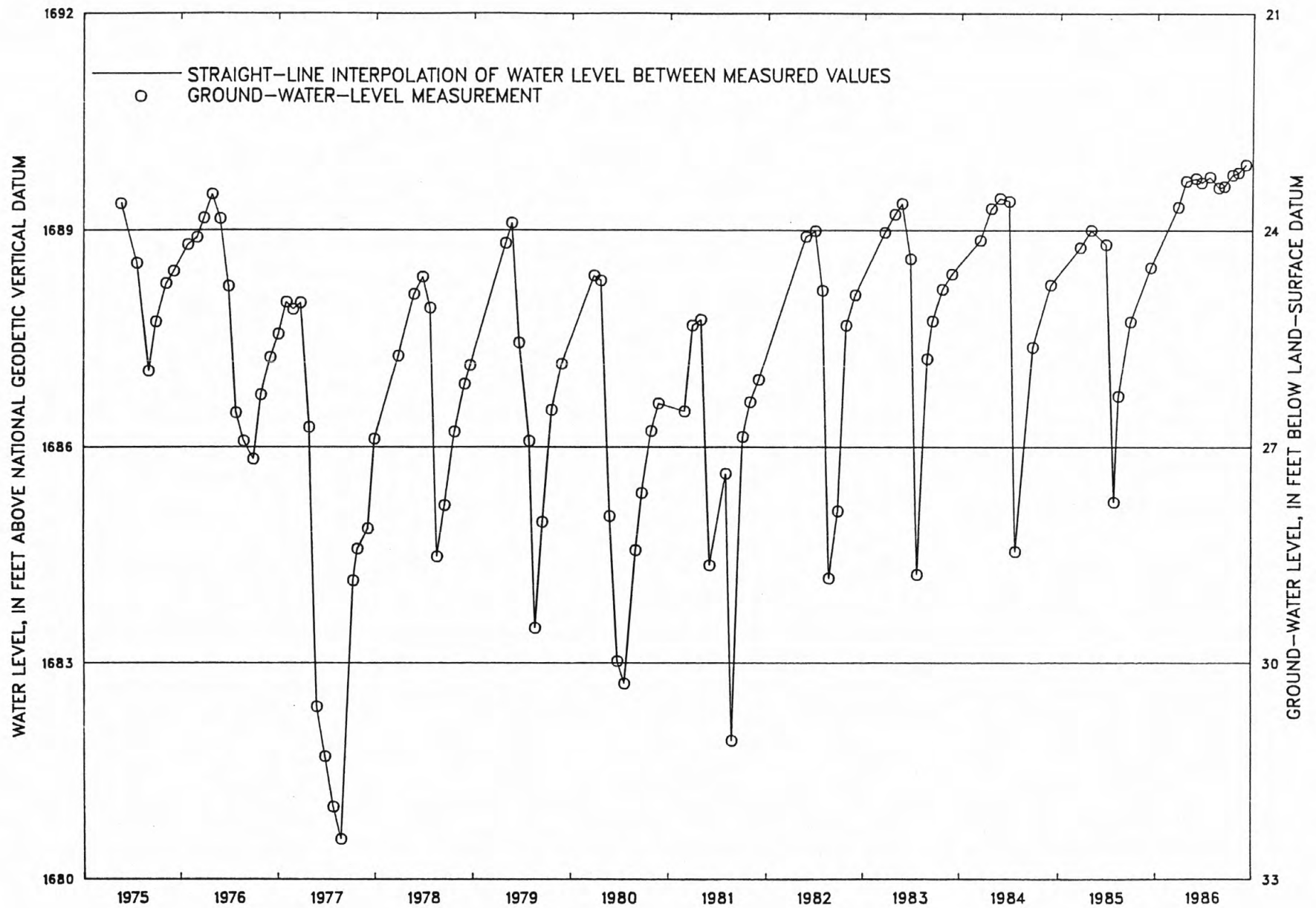


Figure 16a.--Water levels in well 139-078-27CBB completed in McKenzie aquifer, Burleigh County, 1963-74.



WATER RESOURCES DATA - NORTH DAKOTA, 1986

Figure 16b.--Water levels in well 139-078-27CBB completed in McKenzie aquifer, Burleigh County, 1975-86.

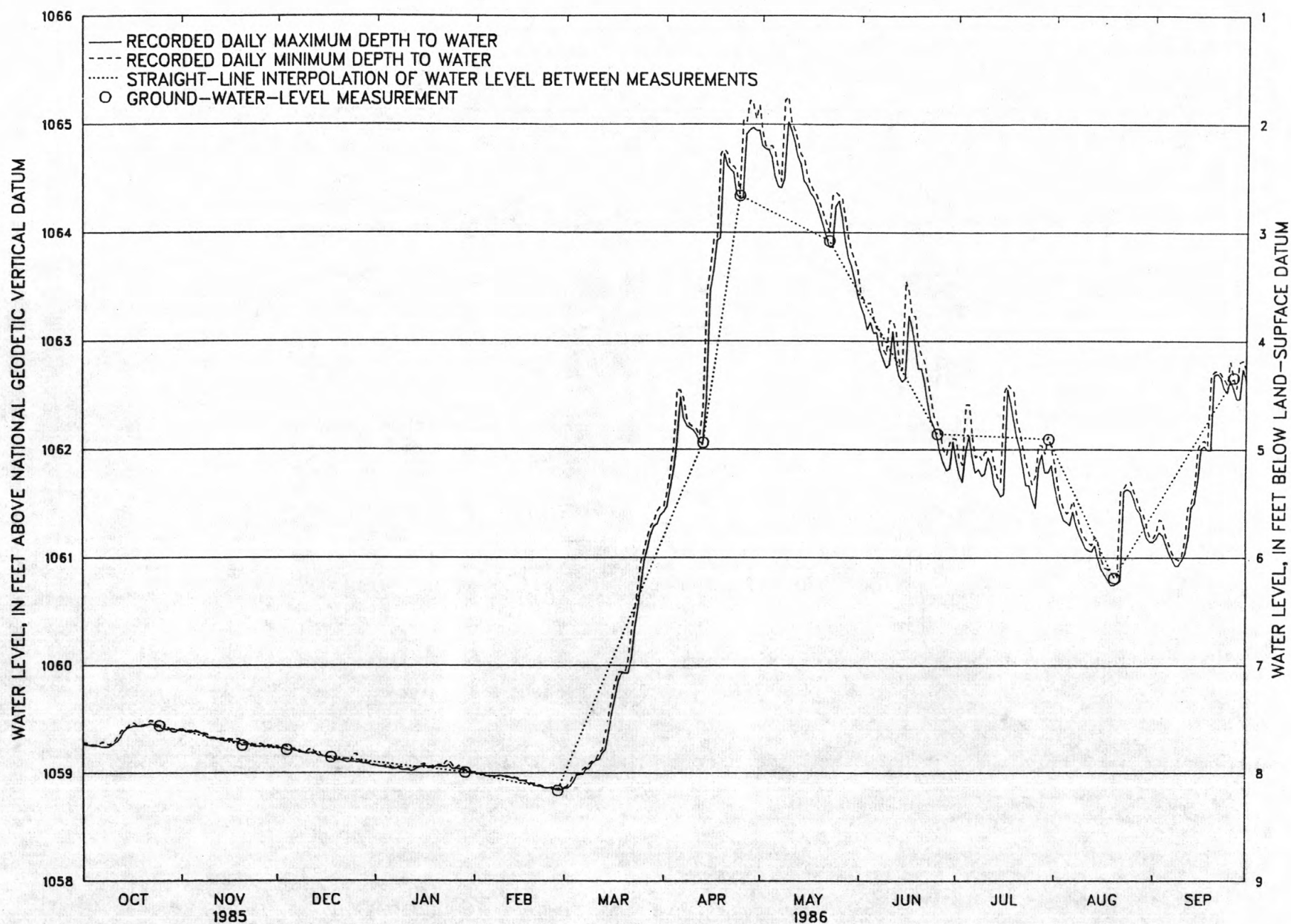


Figure 17.--Water levels in recorder well 134-052-06CCD2 completed in Sheyenne Delta aquifer, Richland County, water year 1986.



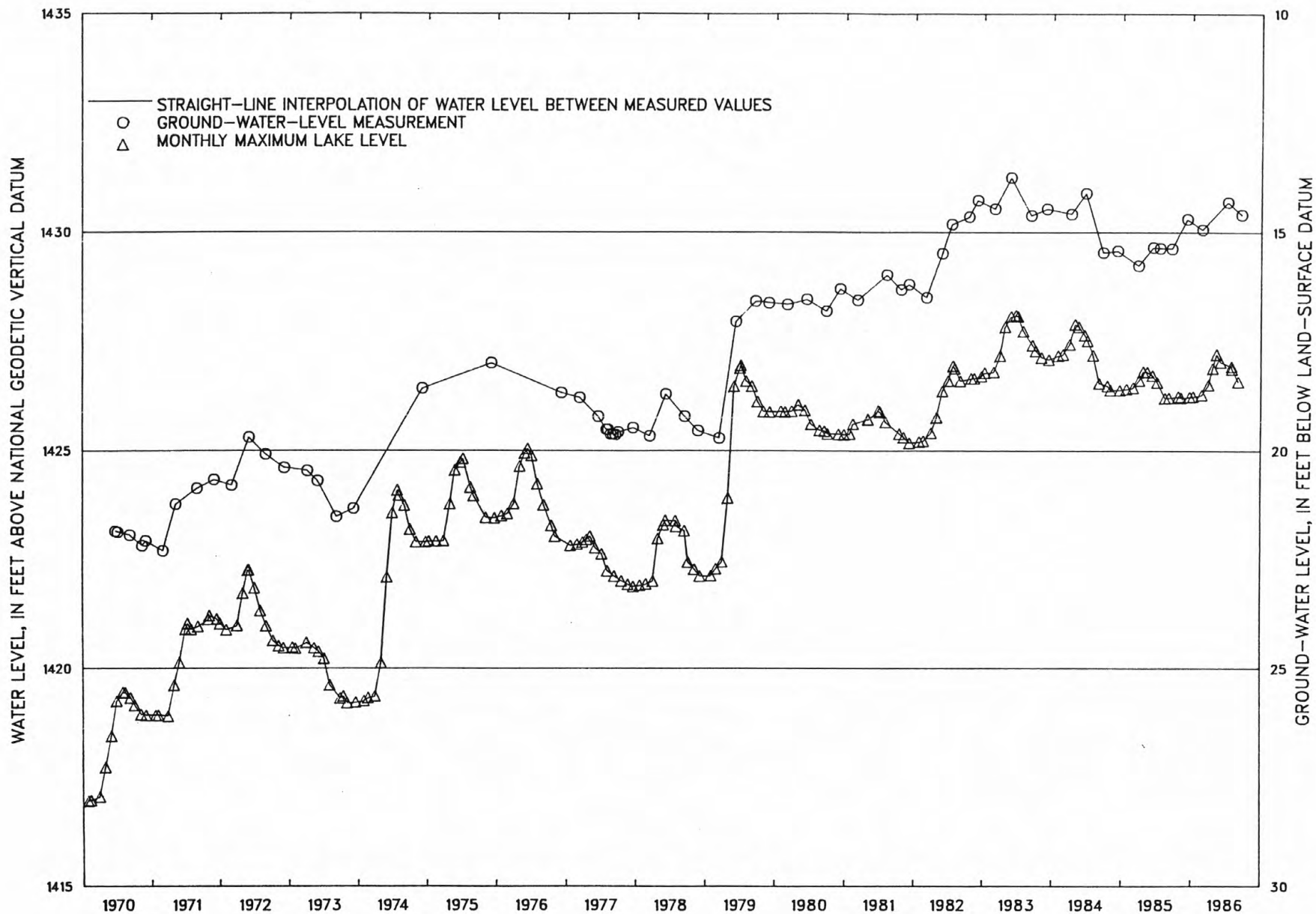


Figure 18.--Water levels in well 153-063-30CBC completed in Spiritwood aquifer, Benson County, and monthly maximum water levels in Devils Lake, 1970-86.

### 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 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 Investigations" manuals listed at the end of the introductory text. The values 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 casing.

### Data Presentation

The records of ground-water quality are published in a 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 are also applicable to ground-water-quality records.

### ACCESS TO WATSTORE DATA

The National Water Data Storage and Retrieval System (WATSTORE) was established for handling water data collected through the activities of the U.S. Geological Survey and to provide for more effective and efficient means of releasing the data to the public. The system is operated and maintained on the central computer facilities of the Survey at its National Center in Reston, Virginia.

WATSTORE can provide a variety of useful products ranging from simple data tables to complex statistical analyses. A minimal fee, plus the actual computer cost incurred in producing a desired product, is charged to the requester. Information about the availability of specific types of data, the acquisition of data or products, and user charges can be obtained locally from the office whose address is given on the back of the title page.

General inquiries about WATSTORE may be directed to:

Chief Hydrologist  
U.S. Geological Survey  
437 National Center  
Reston, Virginia 22092

## DEFINITION OF TERMS

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

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

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, while others perform an essential role in nature in the recycling of materials; for example, by decomposing organic matter into a form available for reuse by plants.

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 that produce blue colonies within 24 hours when incubated at 44.5°C plus or minus 0.2°C on M-FC medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

Fecal streptococcal bacteria are bacteria found also in the intestine of warm-blooded animals. Their presence in water is considered to verify fecal pollution. They are characterized as Gram-positive, cocci bacteria 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 plus or minus 1.0°C on KF-streptococcus medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

Bed material is the sediment mixture 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 micro-organisms, such as bacteria.

Bottom material: See Bed material.

Cells/volume refers to the number of cells of 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).

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.

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.

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

Crest-stage gage is a device for obtaining the elevation of the flood crest of a stream.

Cubic foot per second or cfs ( $\text{ft}^3/\text{s}$ ) is the rate of discharge representing a volume of 1 cubic foot passing a given point during 1 second and is equivalent to 7.48 gallons per second or 448.8 gallons per minute or 0.02832 cubic meters per second.

Cubic foot per second-day ( $\text{ft}^3/\text{s}$ ) 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, about 646,000 gallons, or 2,445 cubic meters.

Cubic foot per second per square mile [ $(\text{ft}^3/\text{s})/\text{mi}^2$ ] 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.

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.

Dissolved refers to that material in a representative water sample which passes through a 0.45  $\mu\text{m}$  membrane filter. This is a convenient operational definition used by Federal agencies that collect water data. Determinations of "dissolved" constituents are made on subsamples of the filtrate.

Dissolved-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.

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 stream above the specified point. Figures of drainage area given herein include all closed basins, or noncontributing areas, within the area unless otherwise specified.

Drainage basin is a part of the 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 computed as the sum of equivalents of polyvalent cations and is expressed as the equivalent concentration of calcium carbonate ( $\text{CaCO}_3$ ).

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 eight-digit number.

Micrograms per gram ( $\mu\text{g/g}$ ) is a unit expressing the concentration of a chemical constituent as the mass (micrograms) of the element per unit mass (gram) of material analyzed.

Micrograms per liter ( $\mu\text{g/L}$ ,  $\mu\text{g/L}$ ) 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 ( $\text{mg/L}$ ,  $\text{mg/L}$ ) is a unit for expressing the concentration of chemical constituents in solution. Milligrams per liter represents the mass of solute per unit volume (liter) of water. Concentration of suspended sediment also is expressed in  $\text{mg/L}$  and is based on the mass of dry sediment per liter of water-sediment mixture.

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

Normal as related to meteorological data published by the National Weather Service are computed as the average value of a meteorological element over a time period. Effective January 1, 1983, the averaging period is 1951 to 1980.

Parameter Code is a 5-digit number used in the U.S. Geological Survey computerized data system, WATSTORE, to uniquely identify a specific constituent. The codes used in WATSTORE are the same as those used in the U.S. Environmental Protection Agency data system, STORET. The Environmental Protection Agency assigns and approves all requests for new codes.

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 a particle determined by either sieve or sedimentation methods. Sedimentation methods (pipet, bottom-withdrawal tube, visual-accumulation tube) determine fall diameter of particles in either distilled water (chemically dispersed) or in native water (the river water at the time and point of sampling).

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

<u>Classification</u>	<u>Size (mm)</u>	<u>Method of analysis</u>
Clay.....	0.00024 - 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 matter is removed, and the sample is subjected to mechanical and chemical dispersion before analysis in distilled water. Chemical dispersion is not used for native-water analysis.

Percent composition 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.

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

pH indicates the degree of acidity or alkalinity of water and is expressed in terms of pH units. The pH value of a solution is the negative logarithm of the concentration of hydrogen ions, in moles per liter. A pH of 7.0 indicates that the water is neither acid nor alkaline. pH readings progressively less than 7.0 denote increasing acidity and those progressively greater than 7.0 denote increasing alkalinity. The pH of most natural surface waters ranges between 6 and 8.

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

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.

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 quantity and intensity of 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.

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).

Suspended-sediment discharge (tons/day) is the rate at which dry mass of sediment passes a section of a stream or is the quantity of sediment, as measured by dry mass or volume, that passes a section in a given time. It is calculated in units of tons per day as follows: concentration (mg/L) x discharge (ft<sup>3</sup>/s) x 0.0027.

Suspended-sediment load is a general term that refers to material in suspension. is not synonymous with either discharge or concentration.

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

Solute is any substance that is dissolved in water.

Specific conductance is a measure of the ability of a water to conduct an electrical current. It is expressed in microsiemens per centimeter at 25°C. Specific conductance is related to the type and concentration of ions in solution and can be used for approximating the dissolved-solids content of the water. Commonly, the concentration of dissolved solids (in milligrams per liter) is about 65 percent of the specific conductance (in microsiemens). This relation is not constant from stream to stream, and it may vary in the same source with changes in the composition of the water.

Stage is the height of a water surface above an established datum plane; also gage height.

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 streamflow may be applied to discharge whether or not it is affected by diversion or regulation.

Surface area of a lake is that area outlined on the latest U.S. Geological Survey 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.

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

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

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

Suspended, total is the total amount of a given constituent in the part of a representative 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.

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 of the constituent, in milligrams per liter, by 0.00136.

Tons per day (T/DAY) is the quantity of a substance in solution or suspension that passes a stream section during a 24-hour period.

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

Total discharge is the total quantity of any individual constituent, as measured by dry mass or volume, that passes through a stream cross-section per unit of time. This term needs to be qualified, such as "total sediment discharge," "total chloride discharge," and so on.

Total, recoverable is 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 present in the dissolved and suspended phases of the sample. To achieve comparability of analytical data, equivalent digestion procedures are required of all laboratories performing such analyses because different digestion procedures are likely to produce different analytical results.

Water year in U.S. Geological Survey reports dealing with surface-water supply is the 12-month period October 1 through September 30. The water year is designated by the calendar year in which it ends and which includes 9 of the 12 months. Thus, the year ending September 30, 1985, is called the "1985 water year."

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

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

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



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

The reports listed below are for sale by the U.S. Geological Survey, Books and Open-File Reports Section, Federal Center, Box 25425, 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-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.
- 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 and dispersion in streams by dye tracing*, by E. F. Hubbard, F. A. Kilpatrick, L. A. Martens, and J. F. Wilson, Jr.: USGS--TWRI Book 3, Chapter A9. 1982. 44 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-A13. *Computation of continuous records of streamflow*, by E. J. Kennedy: USGS--TWRI Book 3, Chapter A13. 1983. 53 pages.
- 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-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 programed 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-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. W. Skougstad and others, editors: USGS--TWRI Book 5, Chapter A1. 1979. 626 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.
- 5-A3. *Methods for analysis of organic substances in water*, by D. F. Goerlitz and Eugene Brown: USGS--TWRI Book 5, Chapter A3. 1972. 40 pages.
- 5-A4. *Methods for collection and analysis of aquatic biological and microbiological samples*, edited by P. E. Greenson, T. A. Ehlike, G. A. Irwin, B. W. Lium, and K. V. Slack: USGS--TWRI Book 5, Chapter A4. 1977. 332 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.
- 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.

## RED RIVER OF THE NORTH BASIN

05051500 RED RIVER OF THE NORTH AT WAHPETON, ND

LOCATION.--Lat 46°15'55", long 96°35'40", in NE1/4 sec.8, T.132 N., R.47 W., Richland County, Hydrologic Unit 09020104, on left bank in Wahpeton, 800 ft downstream from confluence of Bois de Sioux and Otter Tail Rivers, and at mile 548.6.

DRAINAGE AREA.--4,010 mi<sup>2</sup>, approximately.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--April 1942 to current year. Gage-height records collected in this vicinity since 1917 are contained in reports of the U.S. Weather Bureau.

GAGE.--Water-stage recorder and concrete and wooden dam. Datum of gage is 942.97 ft above National Geodetic Vertical Datum of 1929. Prior to Aug. 6, 1943, U.S. Weather Bureau nonrecording gage 800 ft upstream, converted to present datum. Aug. 6, 1943, to Oct. 27, 1950, nonrecording gage at present site and datum.

REMARKS.--Estimated daily discharges: Nov. 19 to Apr. 1. Records good except those for period with ice effect, Nov. 19 to Apr. 1, which are fair. Flow regulated by Orwell Reservoir, capacity, 14,100 acre-ft at elevation 1,070 ft above National Geodetic Vertical Datum of 1929, adjustment of 1912; Lake Traverse, capacity, 137,000 acre-ft, available for flood control; numerous other controlled lakes and ponds, and several powerplants.

AVERAGE DISCHARGE.--43 years (1943-86), 554 ft<sup>3</sup>/s, 401,400 acre-ft/yr; median of yearly mean discharges, 480 ft<sup>3</sup>/s, 348,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9,200 ft<sup>3</sup>/s, Apr. 10, 1969, gage height, 16.34 ft; minimum daily, 1.7 ft<sup>3</sup>/s, Aug. 28 to Sept. 5, 9, 10, 1976.

EXTREMES OUTSIDE PERIOD OF RECORD.--A stage of 17.0 ft, discharge, 10,500 ft<sup>3</sup>/s, occurred in the spring of 1897 and has not been exceeded since.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 6,140 ft<sup>3</sup>/s, Mar. 30, gage height, 14.31 ft; minimum daily, 597 ft<sup>3</sup>/s, Jan. 27.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	854	813	744	721	686	647	4500	3690	2550	2140	1000	757
2	840	813	693	722	686	655	4170	3000	2540	2050	951	739
3	832	810	642	714	687	663	3410	3320	2530	1960	869	761
4	827	809	726	707	683	687	2650	2610	2540	1930	846	856
5	826	808	802	692	682	726	2490	2430	2510	1900	838	1000
6	822	809	821	680	679	743	2720	2540	2490	1890	835	909
7	822	807	814	666	680	740	2510	2590	2500	1870	834	851
8	815	812	827	683	673	730	2240	2730	2500	1870	810	792
9	809	814	828	694	671	756	2180	3410	2500	1880	746	751
10	786	836	821	691	667	784	2220	4580	2530	1920	683	756
11	745	838	808	687	670	804	2170	5640	2770	1970	670	765
12	783	836	779	685	671	828	2100	5520	3160	2140	675	751
13	767	828	761	678	675	866	2070	4390	3140	2150	701	739
14	756	836	749	675	670	904	2480	3100	2920	2040	802	731
15	757	822	740	669	673	949	3640	2780	2760	1930	813	755
16	762	823	760	671	677	1040	4170	2810	2610	1810	787	739
17	764	810	753	673	669	1120	3630	2800	2550	1770	752	730
18	768	803	737	675	663	1160	2610	2780	2510	1740	740	746
19	779	750	732	679	662	1190	2990	2760	2370	1690	716	912
20	801	680	729	678	663	1220	3350	2730	2260	1620	668	1380
21	812	620	739	682	661	1230	3210	2710	2240	1570	639	1680
22	831	611	752	648	651	1330	2580	2650	2250	1540	706	2440
23	809	670	755	650	613	1450	2490	2610	2240	1500	758	3450
24	806	710	725	676	622	1570	2550	2600	2240	1270	851	3690
25	817	758	687	688	628	1740	2610	2590	2260	1070	883	3500
26	818	753	722	666	628	2470	2670	2580	2260	1080	868	3130
27	819	692	748	597	642	3580	2760	2570	2250	1080	830	2680
28	822	668	732	648	638	5060	3200	2560	2210	1060	794	2230
29	810	710	731	669	---	5680	3410	2590	2180	1050	757	1980
30	816	737	717	672	---	5820	3430	2600	2180	1060	738	1820
31	816	---	722	673	---	4910	---	2580	---	1050	706	---
TOTAL	24891	23086	23296	21009	18570	52052	87210	95650	74550	51600	24266	43020
MEAN	803	770	751	678	663	1679	2907	3085	2485	1665	783	1434
MAX	854	838	828	722	687	5820	4500	5640	3160	2150	1000	3690
MIN	745	611	642	597	613	647	2070	2430	2180	1050	639	730
AC-FT	49370	45790	46210	41670	36830	103200	173000	189700	147900	102300	48130	85330
CAL YR 1985	TOTAL	345348		MEAN	946	MAX	3450	MIN	216	AC-FT	685000	
WTR YR 1986	TOTAL	539200		MEAN	1477	MAX	5820	MIN	597	AC-FT	1070000	

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

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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 24...	1210	814	435	--	13.5	9.5	--	--	--	--	--	
JAN 30...	1130	674	505	--	-5.0	0.0	--	--	--	--	--	
MAR 29...	1015	5610	480	--	14.5	1.0	--	--	--	--	--	
APR 01...	1630	4520	559	7.80	15.5	8.5	250	130	59	26	14	
23...	1120	2530	610	--	19.0	10.0	--	--	--	--	--	
JUL 10...	1345	2000	740	--	21.5	24.0	--	--	--	--	--	
31...	1045	1090	658	--	20.5	24.0	--	--	--	--	--	
SEP 04...	1240	876	650	8.10	19.0	19.0	300	110	56	39	21	
DATE		PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
APR 01...	10	0.4	7.1	130	130	8.0	0.2	18	362	340	0.49	
SEP 04...	13	0.5	6.3	190	130	10	0.1	17	400	390	0.54	
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 01...	5	70	30	<1	24	30	0.1	2	<1	280		
SEP 04...	3	80	30	1	34	20	0.3	3	1	290		

## 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 mi<sup>2</sup>, 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 National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Nov. 2 to Mar. 30 and July 27-31. Records good except those for period with ice effect, Nov. 2 to Mar. 30, which are fair. Flow regulated by Orwell Reservoir, capacity, 14,100 acre-ft at elevation, 1,070 ft above National Geodetic Vertical Datum of 1929, adjustment of 1912; Lake Traverse, capacity, 137,000 acre-ft, available for flood control, numerous other controlled lakes and ponds, and several powerplants.

AVERAGE DISCHARGE.--11 years, 644 ft<sup>3</sup>/s, 466,600 acre-ft/yr; median of yearly mean discharges, 530 ft<sup>3</sup>/s, 334,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9,600 ft<sup>3</sup>/s, Apr. 18, 1979, gage height, 33.03 ft; no flow Oct. 26, 1976, to Jan. 9, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 6,720 ft<sup>3</sup>/s, Apr. 1, gage height, 27.27 ft; minimum daily, 550 ft<sup>3</sup>/s, Nov. 23.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	902	853	785	832	694	656	6630	3940	2570	2160	1080	796
2	893	849	807	841	696	661	6430	4000	2550	2130	1050	835
3	884	845	791	843	691	667	6010	4100	2530	2080	1020	866
4	880	845	758	824	691	675	5430	4120	2520	2030	950	892
5	876	849	757	817	690	687	4690	3830	2510	1950	915	1000
6	872	851	787	791	687	699	3950	3320	2510	1890	898	1110
7	870	844	802	786	685	702	3500	2930	2500	1860	891	1080
8	869	838	804	786	664	739	3200	2790	2480	1860	890	1000
9	862	841	808	788	654	780	2820	2870	2480	1850	873	936
10	850	846	818	790	664	799	2500	3290	2490	1870	840	880
11	844	843	825	785	663	806	2350	3870	2490	2000	778	851
12	836	840	824	777	637	825	2290	4660	2550	2190	736	843
13	829	840	826	746	657	834	2230	5200	2730	2310	731	840
14	830	830	828	728	663	852	2430	5330	2900	2300	765	827
15	822	820	826	720	677	877	3140	4990	2940	2220	809	826
16	813	820	829	731	661	898	3810	4270	2870	2120	846	831
17	818	810	821	739	675	951	4220	3580	2740	1990	845	840
18	824	800	837	737	699	1020	4400	3180	2620	1870	817	832
19	821	755	840	733	682	1070	4470	2960	2560	1810	788	859
20	822	680	833	727	696	1090	4350	2860	2490	1790	776	1080
21	834	692	843	730	699	1120	4270	2800	2390	1770	746	1630
22	842	624	866	704	710	1270	4180	2760	2290	1680	729	2000
23	859	550	855	693	713	1520	3810	2720	2260	1600	752	2260
24	862	610	820	709	689	1760	3310	2670	2240	1560	804	2710
25	851	791	819	717	689	2000	2950	2640	2240	1430	875	3110
26	851	840	812	700	696	2270	2830	2620	2240	1220	923	3310
27	855	810	798	692	685	2560	2910	2610	2240	1200	925	3330
28	855	786	819	665	662	3190	3240	2590	2240	1170	880	3190
29	855	760	824	661	---	4000	3570	2570	2210	1150	856	2860
30	850	749	825	680	---	5520	3820	2570	2170	1130	828	2450
31	850	---	827	680	---	6320	---	2580	---	1100	813	---
TOTAL	26381	23711	25314	23152	19069	47818	113740	105220	74550	55290	26429	44874
MEAN	851	790	817	747	681	1543	3791	3394	2485	1784	853	1496
MAX	902	853	866	843	713	6320	6630	5330	2940	2310	1080	3330
MIN	813	550	757	661	637	656	2230	2570	2170	1100	729	796
AC-FT	52330	47030	50210	45920	37820	94850	225600	208700	147900	109700	52420	89010
CAL YR 1985	TOTAL	354393		MEAN	971	MAX	3600	MIN	235	AC-FT	702900	
WTR YR 1986	TOTAL	585548		MEAN	1604	MAX	6630	MIN	550	AC-FT	1161000	



## RED RIVER OF THE NORTH BASIN

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

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	COLOR (PLAT- INUM- COBALT UNITS) (00080)	TUR- BID- ITY (NTU) (00076)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	
OCT	30...	1045	809	428	8.20	4.0	8.0	10	9.0	11.0	--
DEC	16...	1500	829	500	--	-23.0	0.0	--	--	--	--
FEB	12...	1630	630	510	8.10	-15.0	0.0	10	4.0	12.9	92
APR	02...	1020	6450	542	--	9.5	7.5	--	--	--	--
	11...	1330	2470	642	7.80	10.0	10.0	30	27	10.0	91
	23...	1750	3680	655	--	21.5	10.5	--	--	--	--
AUG	01...	1035	1140	660	8.00	20.0	24.5	10	88	5.5	69
SEP	05...	1040	1020	598	8.20	11.5	18.5	--	--	--	--
DATE		HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	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)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)
OCT	30...	210	19	39	28	10	9	0.3	4.2	194	2.4
FEB	12...	250	11	46	32	12	9	0.3	4.8	236	3.6
APR	11...	300	120	62	35	17	11	0.4	7.3	178	5.4
AUG	01...	320	110	59	41	20	12	0.5	7.1	204	3.9
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)	RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, DIS- SOLVED (MG/L AS N) (00615)	
OCT	30...	24	8.6	0.2	13	--	240	0.33	532	<0.01	
FEB	12...	21	9.7	0.1	18	298	290	0.41	507	<0.01	
APR	11...	130	10	0.2	16	430	380	0.58	2870	0.06	
AUG	01...	140	9.9	0.2	18	486	420	0.66	1500	<0.01	
DATE		NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00630)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)	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)	BORON, DIS- SOLVED (UG/L AS B) (01020)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C) (00681)	PHENOLS TOTAL (UG/L) (32730)	
OCT	30...	<0.10	<0.10	0.04	0.7	0.05	0.02	40	9.3	16	
FEB	12...	0.20	0.20	0.12	0.9	0.05	0.03	80	9.7	3	
APR	11...	1.30	1.30	0.07	1.1	0.21	0.13	60	11	3	
AUG	01...	0.10	0.10	0.06	<0.2	0.88	0.09	90	12	4	

## RED RIVER OF THE NORTH BASIN

05051600 WILD RICE RIVER NEAR RUTLAND, ND

LOCATION.--Lat 46°01'20", long 97°30'40", in SE1/4SE1/4 sec.36, T.130 N., R.55 W., Sargent County, Hydrologic Unit 09020105, on right bank 1,000 ft upstream from bridge on county highway, 2 mi south of Rutland, and 10 mi upstream from Lake Tewaukon.

DRAINAGE AREA.--546 mi<sup>2</sup>, of which about 250 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1959 to current year (seasonal records only since 1982).

REVISED RECORDS.--WSP 1728: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,197.73 ft above National Geodetic Vertical Datum of 1929. Prior to Dec. 11, 1960, nonrecording gage at same site and datum.

REMARKS.--Estimated daily discharges: Mar. 26-30, Apr. 14, 15, and Sept. 11-30. Records fair except those for periods of estimated daily discharges, which are poor.

AVERAGE DISCHARGE.--23 years (water years 1960-82), 8.08 ft<sup>3</sup>/s, 5,850 acre-ft/yr; median of yearly mean discharges, 4.7 ft<sup>3</sup>/s; 3,400 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,270 ft<sup>3</sup>/s, Apr. 8, 1969, gage height, 8.77 ft, backwater from ice; maximum gage height, 8.78 ft Apr. 8, 1969, backwater from ice; no flow for several months each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 361 ft<sup>3</sup>/s, Apr. 20, gage height, 5.51 ft, no flow for several months.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1						.00	17	219	11	17	49	6.9
2						.00	17	173	12	17	41	7.5
3						.00	17	141	12	16	35	8.0
4						.00	16	109	13	14	29	7.5
5						.00	15	82	12	13	24	7.0
6						.00	13	55	13	12	20	6.5
7						.00	12	43	15	9.9	16	5.7
8						.00	13	65	16	9.4	14	5.1
9						.00	16	130	16	8.5	12	4.6
10						.00	18	236	16	9.1	11	4.5
11						.00	17	201	15	13	9.2	4.4
12						.00	14	152	13	13	7.9	6.0
13						.00	14	89	12	14	7.1	5.5
14						.00	12	64	9.1	14	6.8	5.0
15						.00	10	48	6.2	12	6.0	5.3
16						.00	20	39	3.8	9.0	5.4	5.0
17						.00	20	35	2.5	11	4.9	6.0
18						.00	87	29	1.5	27	4.3	5.5
19						.00	233	25	.28	50	3.7	10
20						.00	356	26	.00	71	4.8	9.0
21						.00	307	22	3.8	92	4.5	10
22						.00	253	23	10	111	7.4	9.0
23						.00	211	23	15	115	8.5	8.5
24						.00	149	22	18	114	8.9	8.0
25						.00	93	19	18	106	9.3	8.5
26						.10	79	17	18	101	8.2	9.0
27						.50	102	15	18	96	7.2	8.5
28						1.0	155	13	16	86	6.3	9.0
29						5.0	227	12	16	75	5.8	8.5
30						10	257	11	17	72	6.0	8.0
31						13	---	11	---	59	6.2	---
TOTAL						29.60	2770	2149	349.18	1386.9	389.4	212.0
MEAN						.95	92.3	69.3	11.6	44.7	12.6	7.07
MAX						13	356	236	18	115	49	10
MIN						.00	10	11	.00	8.5	3.7	4.4
AC-FT						59	5490	4260	693	2750	772	421

## RED RIVER OF THE NORTH BASIN

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05051600 WILD RICE RIVER NEAR RUTLAND, ND--CONTINUED

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1971 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	OXYGEN, DIS- SOLVED (MG/L) (00300)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	
APR 01...	0900	17	430	7.28	--	6.5	--	160	64	36	18	
MAY 29...	0940	12	990	--	18.0	20.5	--	--	--	--	--	
JUL 08...	0830	9.7	1560	--	20.0	22.0	--	--	--	--	--	
AUG 20...	1330	5.2	1000	7.78	23.0	22.0	7.2	430	260	83	55	
DATE		SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)
APR 01...	18	18	0.6	12	100	110	11	0.1	15	309	280	
AUG 20...	46	18	1	17	170	340	18	0.1	11	699	670	
DATE		SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	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...	0.42	3	80	50	<1	25	20	0.7	1	<1	180	
AUG 20...	0.95	5	150	30	1	70	220	2.4	2	<1	450	

## 05053000 WILD RICE RIVER NEAR ABERCROMBIE, ND

LOCATION.--Lat 46°28'05", long 96°47'00", in NE1/4NE1/4 sec.36, T.135 N., R.49 W., Richland County, Hydrologic Unit 09020105, on right bank 420 ft upstream from bridge on county highway, 0.75 mi upstream from rubble masonry dam which serves as control, 3.2 mi northwest of Abercrombie, and 7 mi downstream from Antelope Creek.

DRAINAGE AREA.--2,080 mi<sup>2</sup>, of which about 590 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--April 1932 to current year. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WSP 1388: 1939, 1941(M). WSP 1728: Drainage area.

GAGE.--Water-stage recorder and masonry control. Datum of gage is 907.94 ft above National Geodetic Vertical Datum of 1929. Prior to Dec. 7, 1939, nonrecording gage at site 420 ft downstream at datum 5.0 ft lower. Dec. 7, 1939, to Nov. 24, 1952, nonrecording gage at site 0.75 mi downstream at present datum.

REMARKS.--Estimated daily discharges: Nov. 27 to Apr. 3. Records good, except those for period of ice effect, Nov. 27 to Apr. 3, which are fair. Some regulation by Fish and Wildlife Service reservoirs, of which Lake Tawaukon is the largest. Some small diversions for irrigation.

AVERAGE DISCHARGE.--54 years, 74.3 ft<sup>3</sup>/s, 53,830 acre-ft/yr; median of yearly mean discharges, 36 ft<sup>3</sup>/s, 26,100 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9,540 ft<sup>3</sup>/s, Apr. 11, 1969, gage height, 24.58 ft; no flow at times most years.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in spring of 1897 reached a stage of 27.5 ft, present site and datum, from floodmarks pointed out by local residents.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 300 ft<sup>3</sup>/s and maximum (\*):

Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)	Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)
Mar. 28	1415	*2210	a*14.07	Apr. 29	2030	1840	11.67
Apr. 6	1300	501	4.19	May 11	0600	1250	8.54
Apr. 20	1500	1820	11.58	Sept. 25	0345	460	3.93

No flow for several days.

a - Backwater from ice

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.42	.00	.80	1.9	1.3	1.1	1400	1720	163	25	14	35
2	.37	.00	1.1	1.9	1.3	1.1	814	1540	135	24	14	38
3	.34	.00	1.2	1.9	1.3	1.2	432	1330	118	23	12	67
4	.33	.00	1.5	1.9	1.3	1.3	375	1120	107	24	8.9	92
5	.31	.00	1.8	1.9	1.3	1.5	396	930	99	23	6.6	125
6	.27	.00	2.1	1.9	1.3	1.5	493	771	90	23	5.2	138
7	.23	.00	2.4	1.9	1.3	1.5	476	665	87	23	4.0	142
8	.24	.00	2.7	1.9	1.3	1.4	400	627	84	23	2.5	115
9	.19	.00	3.0	1.9	1.3	1.6	308	868	79	22	4.2	83
10	.16	.00	3.0	2.0	1.3	1.7	241	1180	80	23	38	62
11	.15	.00	3.0	2.0	1.3	1.5	188	1240	75	26	34	48
12	.32	.00	3.2	1.9	1.2	1.5	145	1160	71	24	26	41
13	.35	.00	3.3	1.9	1.1	1.5	117	1010	66	23	20	35
14	.36	.00	3.2	1.9	1.1	1.4	333	840	66	22	19	31
15	.33	.00	3.0	2.0	1.1	1.4	1270	691	72	22	15	31
16	.32	.00	3.0	2.0	1.1	2.0	1630	594	71	23	14	31
17	.30	.00	3.0	1.9	1.1	4.3	1590	525	64	23	15	36
18	.29	.00	2.9	2.0	1.0	13	1400	457	56	24	12	37
19	.28	.00	2.5	2.1	1.1	18	1610	404	52	30	9.1	46
20	.24	.00	2.1	2.2	1.1	33	1800	374	50	26	8.1	171
21	.22	.00	2.1	2.5	1.1	35	1690	352	46	22	8.5	321
22	.21	.00	2.1	2.5	1.1	50	1270	335	44	20	15	333
23	.21	.00	2.3	2.3	1.0	201	788	325	40	20	15	371
24	.19	.00	2.4	2.2	.98	284	514	313	36	21	18	433
25	.14	.00	2.4	2.1	.98	831	402	299	34	20	23	446
26	.10	.00	2.2	2.1	.99	1520	578	287	32	19	21	380
27	.06	.00	2.1	2.0	1.1	2010	801	279	30	18	17	320
28	.03	.20	2.1	1.9	1.1	2190	1450	266	29	17	14	285
29	.01	.30	2.1	1.9	---	2180	1790	242	27	17	13	261
30	.00	.50	2.1	1.6	---	2140	1820	217	26	16	25	227
31	.00	---	1.9	1.4	---	1890	---	192	---	15	32	---
TOTAL	6.97	1.00	72.60	61.5	32.55	13422.5	26521	21153	2029	681	483.1	4781
MEAN	.22	.03	2.34	1.98	1.16	433	884	682	67.6	22.0	15.6	159
MAX	.42	.50	3.3	2.5	1.3	2190	1820	1720	163	30	38	446
MIN	.00	.00	.80	1.4	.98	1.1	117	192	26	15	2.5	31
AC-FT	14	2.0	144	122	65	26620	52600	41960	4020	1350	958	9480
CAL YR 1985	TOTAL	14380.47		MEAN	39.4	MAX	1200	MIN	.00	AC-FT	28520	
WTR YR 1986	TOTAL	69245.22		MEAN	190	MAX	2190	MIN	.00	AC-FT	137300	



## RED RIVER OF THE NORTH BASIN

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05053000 WILD RICE RIVER NEAR ABERCROMBIE, ND--CONTINUED

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1967 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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 24...	1510	0.2	1430	--	13.5	10.5	--	--	--	--	--
DEC 12...	1510	3.2	--	--	-18.0	0.0	--	--	--	--	--
JAN 30...	1410	1.5	2330	--	-8.0	0.0	--	--	--	--	--
MAR 18...	1455	17	1740	--	-3.0	0.0	--	--	--	--	--
27...	1020	2020	278	--	3.0	0.5	--	--	--	--	--
APR 01...	1405	1360	462	7.70	7.0	6.0	190	75	45	18	18
04...	1025	383	728	--	4.0	6.5	--	--	--	--	--
12...	1540	139	--	--	-1.0	9.0	--	--	--	--	--
17...	1235	1560	580	--	10.0	5.0	--	--	--	--	--
18...	0855	1310	585	--	10.0	5.0	--	--	--	--	--
23...	1520	728	830	--	24.0	11.0	--	--	--	--	--
JUL 10...	1600	22	1420	--	8.0	25.0	--	--	--	--	--
31...	1405	15	1340	--	24.0	23.0	--	--	--	--	--
SEP 08...	1530	112	890	8.00	20.0	16.0	340	95	69	40	61
		SODIUM AD- SORP- TION RATIO (00932)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
APR 01...	16	0.6	9.6	110	91	9.5	0.2	11	298	270	0.41
SEP 08...	27	1	13	240	190	25	0.2	17	597	560	0.81
		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...	4	100	80	<1	27	50	0.4	1	<1	240	
SEP 08...	6	140	30	<1	60	<1	0.3	3	<1	390	

## 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 city waterplant on 4th St. S. in Fargo, 25 mi upstream from mouth of Sheyenne River, and at mile 453.0.

DRAINAGE AREA.--6,800 mi<sup>2</sup>, 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 National Geodetic Vertical Datum of 1929. 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.--Estimated daily discharges: Nov. 12 to Apr. 1. Records good except those for period with ice effect, Nov. 12 to Apr. 1, which are fair. Flow regulated by Orwell Reservoir, capacity, 14,100 acre-ft at elevation 1,070 ft above National Geodetic Vertical Datum of 1929, adjustment of 1912; Lake Traverse, capacity 137,000 acre-ft, available for flood control, other controlled lakes and ponds, and several powerplants. Some small diversions for municipal supply. Figures of daily discharge do not include diversions to cities of Fargo and Moorhead and from Sheyenne River.

AVERAGE DISCHARGE (UNADJUSTED).--85 years, 578 ft<sup>3</sup>/s, 418,800 acre-ft/yr; median of yearly mean discharges, 450 ft<sup>3</sup>/s, 326,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 25,300 ft<sup>3</sup>/s, Apr. 15, 1969, gage height, 37.34 ft; no flow for many days in each year for period 1932-41, Sept. 30, Oct. 1-2, 1970, Oct. 10-19, 1976.

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

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 8,640 ft<sup>3</sup>/s, Apr. 2, gage height, 27.19 ft; minimum daily, 470 ft<sup>3</sup>/s, Nov. 23.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	913	808	650	810	670	670	8410	6320	2710	2320	1270	856
2	894	801	670	810	670	680	8600	6430	2680	2320	1240	880
3	885	797	700	800	670	700	8420	6420	2640	2260	1120	938
4	879	799	740	800	670	730	7940	6380	2620	2250	1060	990
5	876	799	680	800	660	760	7330	6230	2590	2130	995	1110
6	865	796	690	800	660	730	6640	5780	2580	2080	975	1220
7	867	794	800	800	650	730	5870	5020	2600	2060	955	1280
8	862	784	800	790	650	740	5060	4260	2560	2030	939	1210
9	853	784	800	780	640	750	4250	3860	2550	2030	935	1150
10	845	791	800	780	640	760	3400	4080	2560	2090	895	1100
11	835	791	800	780	630	786	2780	4780	2550	2310	826	1020
12	852	790	800	770	610	780	2610	5540	2570	2420	747	981
13	814	746	790	760	620	780	2520	6180	2660	2490	728	954
14	805	790	780	740	630	800	2760	6600	2820	2480	806	930
15	804	790	780	730	640	790	3960	6720	2950	2430	832	936
16	785	790	780	730	650	790	5220	6500	2940	2340	887	911
17	783	790	770	720	660	820	6050	5900	2840	2250	908	925
18	783	780	800	720	670	900	6530	5090	3070	2170	885	932
19	783	630	820	720	680	980	6940	4310	2710	2090	847	971
20	787	540	830	720	680	1020	7210	3730	2630	2030	819	1090
21	797	550	840	720	690	1100	7160	3380	2510	2020	787	1700
22	805	560	830	710	700	1190	7000	3170	2400	1980	761	2210
23	817	470	840	700	700	1300	6710	3050	2320	1910	735	2470
24	826	490	840	700	680	1600	6090	2970	2290	1840	809	2760
25	813	570	830	690	680	2720	5240	2890	2290	1760	874	3220
26	807	740	820	690	680	3760	4490	2850	2360	1540	947	3750
27	813	746	820	680	680	4670	4300	2810	2360	1410	980	4000
28	812	710	820	670	670	5590	4890	2780	2360	1350	975	3990
29	804	690	810	670	---	6650	5620	2760	2350	1310	939	3690
30	805	630	810	670	---	7160	6070	2740	2330	1320	902	3040
31	802	---	810	670	---	7840	---	2730	---	1280	875	---
TOTAL	25671	21546	24350	22930	18530	59276	170070	142260	77400	62300	28253	51214
MEAN	828	718	785	740	662	1912	5669	4589	2580	2010	911	1707
MAX	913	808	840	810	700	7840	8600	6720	3070	2490	1270	4000
MIN	783	470	650	670	610	670	2520	2730	2290	1280	728	856
AC-FT	50920	42740	48300	45480	36750	117600	337300	282200	153500	123600	56040	101600
(+)	1245	1137	1150	1197	1088	1199	1151	1370	1541	1416	1382	1225
MEAN*	848	737	804	760	682	1932	5688	4611	2606	2033	934	1728
AC-FT*	52160	43880	49450	46680	37840	118800	338450	283510	155040	125020	57420	102820

OBSERVED										ADJUSTED				
CAL YR 1985	TOTAL	382922	MEAN	1049	MAX	4600	MIN	211	AC-FT	759500	MEAN	1066	AC-FT	774265
WTR YR 1986	TOTAL	703800	MEAN	1928	MAX	8600	MIN	470	AC-FT	1396000	MEAN	1947	AC-FT	1411131

+ - Diversions in acre-feet to cities of Fargo and Moorhead.

\* - Adjusted for diversions to cities of Fargo and Moorhead.

## RED RIVER OF THE NORTH BASIN

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

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	OXYGEN, DIS- SOLVED (MG/L) (00300)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	
OCT 29...	1330	804	450	--	10.5	8.5	--	--	--	--	--	
DEC 17...	1150	771	500	--	-23.5	0.0	--	--	--	--	--	
FEB 12...	1125	613	520	8.10	-14.0	0.0	13.3	--	--	--	--	
MAR 27...	1405	4680	362	--	7.0	0.5	--	--	--	--	--	
29...	1550	6890	470	--	--	--	--	--	--	--	--	
APR 02...	1410	9020	465	--	12.0	6.5	--	--	--	--	--	
10...	1645	3400	755	8.00	16.0	10.0	--	360	190	75	41	
MAY 02...	1115	6560	645	--	11.0	9.0	--	--	--	--	--	
JUL 02...	1820	2370	--	--	25.0	23.0	--	--	--	--	--	
AUG 07...	1625	952	--	--	23.0	24.0	--	--	--	--	--	
SEP 16...	1630	907	580	8.20	12.0	14.0	--	280	75	53	36	
DATE		SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L) (70301)
APR 10...	26	13	0.6	8.8	170	200	14	0.2	7.9	342	500	
SEP 16...	17	11	0.5	6.2	200	93	9.5	0.3	17	385	360	
DATE		SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	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 10...	0.47	5	50	20	<1	37	10	0.1	2	<1	340	
SEP 16...	0.52	3	50	10	<1	27	<1	0.3	2	<1	270	

## RED RIVER OF THE NORTH BASIN

05054020 RED RIVER OF THE NORTH BELOW FARGO, ND

LOCATION.--Lat 46°55'50", long 96°47'05', in SW1/4NE1/4 sec.19, T.140 N., R.48 W., Cass County, Hydrologic Unit 09020104, at bridge on county highway 2 mi north of North Dakota State University campus in Fargo, and 12 mi above mouth of Sheyenne River.

DRAINAGE AREA.--6,820 mi<sup>2</sup>, approximately.

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1969 to current year.

## WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	COLOR (PLAT- INUM- COBALT UNITS) (00080)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)
OCT 29...	1500	795	462	8.40	11.5	9.5	--	11.0	110
DEC 17...	1150	771	500	8.30	-23.5	0.0	7	9.5	67
FEB 12...	1125	613	520	8.10	-14.0	0.0	15	13.3	94
APR 11...	0840	2640	758	8.00	12.0	10.0	40	10.2	93
MAY 02...	1300	6560	645	8.20	11.0	9.0	50	9.2	96
JUL 03...	1300	2250	750	7.80	28.0	23.0	10	6.6	81
AUG 07...	1730	958	670	8.10	23.0	24.0	20	6.0	74
SEP 16...	1730	916	585	8.10	12.0	14.0	13	7.7	78

DATE	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	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)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)
OCT 29...	220	19	40	30	11	9	0.3	4.5	204	1.6
DEC 17...	260	32	48	33	12	9	0.3	4.9	224	2.2
FEB 12...	250	10	46	32	14	11	0.4	5.2	237	3.6
APR 11...	350	160	73	40	25	13	0.6	8.5	184	3.5
MAY 02...	260	110	56	30	20	14	0.6	8.3	155	1.9
JUL 03...	340	130	67	42	22	12	0.5	7.2	207	6.3
AUG 07...	340	110	63	44	28	15	0.7	16	224	3.4
SEP 16...	280	76	53	35	18	12	0.5	6.2	200	3.1



## RED RIVER OF THE NORTH BASIN

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05054020 RED RIVER OF THE NORTH BELOW FARGO, ND--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P) (00666)
OCT 29...	32	9.5	0.2	14	264	260	0.36	567	<0.10	0.05
DEC 17...	21	9.9	0.2	17	291	280	0.4	606	0.11	0.06
FEB 12...	23	10	0.2	18	308	290	0.42	510	0.21	0.08
APR 11...	200	13	0.3	19	519	490	0.71	3700	2.10	0.19
MAY 02...	160	10	0.1	14	425	390	0.58	7530	1.10	0.14
JUL 03...	170	14	0.2	14	487	460	0.66	2960	0.34	0.11
AUG 07...	150	16	0.2	17	470	470	0.64	1220	0.15	0.09
SEP 16...	97	11	0.2	18	400	360	0.54	989	0.31	0.07
DATE	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)	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)
OCT 29...	--	--	--	50	--	--	--	--	--	--
DEC 17...	--	--	--	70	--	--	--	--	--	--
FEB 12...	--	--	--	70	--	--	--	--	--	--
APR 11...	20	4	100	70	<1	<10	2	3	28	3
MAY 02...	--	--	--	60	--	--	--	--	--	--
JUL 03...	--	--	--	100	--	--	--	--	--	--
AUG 07...	20	6	90	100	1	<10	<1	2	19	<5
SEP 16...	--	--	--	80	--	--	--	--	--	--
DATE	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)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	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)	CYANIDE TOTAL (MG/L AS CN) (00720)
APR 11...	42	9	<0.1	2	1	1	290	3	9	0.04
AUG 07...	49	2	0.6	3	3	<1	260	3	25	0.06

## RED RIVER OF THE NORTH BASIN

05054500 SHEYENNE RIVER ABOVE HARVEY, ND

LOCATION.--Lat 47°42'10", long 99°56'55", in SW1/4SE1/4 sec.24, T.149 N., R.73 W., Wells County, Hydrologic Unit 09020202, on right bank just downstream from county road, and 4.5 mi south of Harvey.

DRAINAGE AREA.--424 mi<sup>2</sup>, of which about 270 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--September 1955 to current year.

REVISED RECORDS.--WSP 1728: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,547.30 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Nov. 8 to Mar. 20, Apr. 14-16, and July 12-28. Records good except those for periods of estimated daily discharges, which are fair.

AVERAGE DISCHARGE.--31 years, 8.40 ft<sup>3</sup>/s, acre-ft/yr; median of yearly mean discharges, 7.5 ft<sup>3</sup>/s, 5,400 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,000 ft<sup>3</sup>/s, Apr. 20, 1979, gage height, 9.45 ft; maximum gage height, 10.30 ft, Apr. 1, 1971, backwater from ice; no flow at times most years.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 25 ft<sup>3</sup>/s and maximum (\*):

Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)	Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)
Oct. 8	2045	30	5.89	Mar. 7	0845	150	a*9.40
Oct. 23	0545	47	6.65	Apr. 20	1445	82	7.74
Mar. 4	1300	*180	a9.16				

Minimum daily discharge, .10 ft<sup>3</sup>/s, Feb. 13, 14.

a - Backwater from ice

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.5	6.6	.80	.54	.45	100	38	44	10	2.9	2.2	2.1
2	3.6	6.6	.80	.54	.44	120	39	43	10	2.5	1.4	1.6
3	3.7	6.7	.78	.52	.43	145	46	42	12	2.2	1.1	1.2
4	4.0	6.4	.78	.52	.42	150	47	38	11	1.9	.97	1.1
5	3.7	6.9	.78	.50	.41	100	50	35	9.5	2.3	2.1	1.0
6	3.8	6.2	.78	.50	.40	115	48	33	8.3	1.8	2.3	1.1
7	5.2	6.1	.76	.50	.40	120	43	32	7.8	1.9	2.7	1.2
8	20	5.2	.76	.50	.35	110	40	33	7.3	2.1	2.0	1.3
9	24	4.5	.74	.50	.30	100	38	38	7.1	1.8	1.2	3.0
10	17	3.6	.74	.50	.25	98	35	36	7.0	2.9	.81	2.4
11	11	3.2	.72	.52	.20	90	33	33	6.7	2.5	1.1	1.5
12	14	2.5	.72	.54	.12	90	31	32	6.6	3.5	2.7	1.4
13	15	2.0	.70	.56	.10	85	30	29	6.4	4.0	1.3	1.4
14	14	1.9	.70	.58	.10	80	28	26	6.5	4.1	.92	1.4
15	14	1.9	.68	.60	.11	75	26	25	6.7	4.0	.80	1.5
16	13	1.8	.68	.62	.12	83	24	24	6.5	3.8	.82	1.9
17	14	1.5	.68	.64	.14	82	42	22	6.4	3.6	.81	2.3
18	13	1.4	.66	.68	.15	75	59	20	6.2	3.4	.82	2.1
19	11	1.3	.66	.70	.15	65	71	19	4.9	3.2	1.2	2.0
20	10	1.2	.66	.70	.15	70	80	17	4.7	3.0	1.6	2.2
21	8.8	1.1	.64	.70	.16	62	79	16	4.5	2.8	1.5	2.6
22	9.0	1.0	.62	.66	.17	66	70	14	3.9	2.6	1.7	2.4
23	31	.98	.62	.64	.18	63	59	14	3.8	2.4	1.1	2.1
24	14	.94	.60	.60	.20	61	49	14	3.1	2.2	1.3	2.2
25	12	.90	.60	.56	.25	56	46	14	2.7	2.0	1.5	4.1
26	11	.88	.60	.54	.50	50	45	14	2.6	3.5	2.1	4.9
27	9.6	.86	.60	.52	10	49	47	13	2.4	4.0	1.7	13
28	9.2	.84	.58	.50	80	44	44	13	2.4	3.4	1.4	4.6
29	8.5	.82	.58	.48	---	43	43	14	2.4	2.7	1.4	3.5
30	7.8	.80	.56	.48	---	39	46	14	2.6	2.0	6.7	2.9
31	7.4	---	.56	.46	---	38	---	11	---	2.2	4.3	---
TOTAL	345.8	86.62	21.14	17.40	96.65	2524	1376	772	182.0	87.2	53.55	76.0
MEAN	11.2	2.89	.68	.56	3.45	81.4	45.9	24.9	6.07	2.81	1.73	2.53
MAX	31	6.9	.80	.70	80	150	80	44	12	4.1	6.7	13
MIN	3.5	.80	.56	.46	.10	38	24	11	2.4	1.8	.80	1.0
AC-FT	686	172	42	35	192	5010	2730	1530	361	173	106	151
CAL YR 1985	TOTAL	3727.96		MEAN	10.2	MAX	169	MIN	.00	AC-FT	7390	
WTR YR 1986	TOTAL	5638.36		MEAN	15.4	MAX	150	MIN	.10	AC-FT	11180	

05054500 SHEYENNE RIVER ABOVE HARVEY, ND--CONTINUED

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	COLOR (PLAT- INUM- COBALT UNITS) (00080)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (MG/L) (00300)	HARD- NESS (MG/L AS CACO3) (00900)
NOV 04...	1300	6.5	1400	8.54	8.0	5.0	45	16.6	129	280
JAN 06...	1230	0.5	1550	7.85	-20.0	0.5	30	--	--	250
MAR 03...	1230	146	400	--	5.0	1.0	--	--	--	--
MAR 27...	1600	50	1010	8.58	22.0	8.0	40	13.8	116	260
APR 24...	1500	50	1210	--	12.0	14.0	50	13.8	133	350
JUN 03...	1130	13	1320	8.62	25.0	20.5	40	8.6	96	310
JUL 10...	1200	3.6	1100	8.68	23.0	20.0	60	7.0	77	160
AUG 18...	1130	0.85	1020	8.25	23.0	17.0	30	9.1	93	240
DATE	HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	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)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)
NOV 04...	0	52	37	210	61	6	8.7	--	0	240
JAN 06...	0	50	30	300	72	9	7.0	--	0	250
MAR 27...	0	38	40	130	50	4	14	306	1.5	230
APR 24...	0	54	53	140	45	3	12	370	--	300
JUN 03...	0	48	47	170	53	4	11	453	2.1	220
JUL 10...	0	36	17	200	72	7	5.1	453	1.8	140
AUG 18...	0	57	23	150	57	4	4.5	441	4.8	120
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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P) (00666)	ALUM- INUM, DIS- SOLVED (UG/L AS AL) (01106)
NOV 04...	16	0.2	21	886	--	1.2	16	<0.10	0.12	--
JAN 06...	15	0.4	46	1060	--	1.4	1.4	0.16	0.35	--
MAR 27...	14	0.2	14	656	660	0.89	89	<0.10	0.10	<10
APR 24...	13	0.2	9.2	834	800	1.1	112	<0.10	0.08	--
JUN 03...	12	0.2	12	851	790	1.2	29	<0.10	0.24	--
JUL 10...	10	0.3	30	731	710	0.99	7.1	<0.10	0.21	--
AUG 18...	10	0.2	30	670	660	0.91	1.5	0.35	0.08	30

## RED RIVER OF THE NORTH BASIN

05054500 SHEYENNE RIVER ABOVE HARVEY, ND--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BARIUM, DIS- SOLVED (UG/L AS BA) (01005)	BORON, DIS- SOLVED (UG/L AS B) (01020)	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)
NOV 04...	--	--	520	--	--	--	--	--	--	--
JAN 06...	--	--	710	--	--	--	--	--	--	--
MAR 27...	3	67	330	<1	<10	<1	1	45	3	80
APR 24...	--	--	330	--	--	--	--	--	--	--
JUN 03...	--	--	490	--	--	--	--	--	--	--
JUL 10...	--	--	530	--	--	--	--	--	--	--
AUG 18...	2	140	370	1	<10	<1	3	50	<5	62
DATE	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)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	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)	CYANIDE TOTAL (MG/L AS CN) (00720)	
MAR 27...	35	<0.1	<1	3	<1	240	3	10	<0.01	
AUG 18...	56	0.7	4	4	<1	190	2	8	<0.01	



## 05056000 SHEYENNE RIVER NEAR WARWICK, ND

LOCATION.--Lat 47°48'20", long 98°42'57", on south quarter of line between secs.15 and 16, T.150 N., R.63 W., Eddy County, Hydrologic Unit 09020203, on left bank on downstream side of county highway bridge, and 3.3 mi south of Warwick.

DRAINAGE AREA.--2,070 mi<sup>2</sup>, approximately, of which about 1,310 mi<sup>2</sup> is probably noncontributing - includes 227 mi<sup>2</sup> in closed basins.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1949 to current year. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WSP 1438: 1952(M). WSP 1728: Drainage area.

GAGE.--Water-stage recorder and rubble masonry control. Elevation of gage is 1,370 ft, by barometer.

REMARKS.--Estimated daily discharges: Oct. 8-10, Dec. 11 to Mar. 24, and July 4-7. Records good except those for periods with ice effect, Oct. 8-10 and Dec. 11 to Mar. 24, and period of no gage-height record, July 4-7, which are fair.

AVERAGE DISCHARGE.--37 years, 56.9 ft<sup>3</sup>/s, 41,220 acre-ft/yr; median of yearly mean discharges, 51 ft<sup>3</sup>/s, 34,100 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,660 ft<sup>3</sup>/s, Apr. 14, 1969, gage height, 7.51 ft; maximum gage height, 7.83 ft, Apr. 18, 1956; no flow Aug. 7 to Sept. 1, Sept. 3-9, 1961.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 200 ft<sup>3</sup>/s and maximum (\*):

Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)	Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)
Mar. 19	----	*1000	a*5.16	May 11	1445	203	2.97
Apr. 21	0245	505	3.61	Sept. 27	2115	295	3.23

Minimum daily discharge, 1.8 ft<sup>3</sup>/s, Sept. 4.  
a - Backwater from ice

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.1	70	15	9.8	7.9	8.0	212	269	22	12	119	2.4
2	7.3	59	15	9.8	7.9	9.0	197	259	20	14	130	2.8
3	7.6	56	15	9.8	7.9	10	170	224	17	15	100	1.9
4	9.2	46	15	9.6	7.9	9.5	163	203	16	20	69	1.8
5	8.6	38	14	9.6	7.9	9.0	176	197	16	25	45	1.9
6	10	35	14	9.4	7.9	8.5	170	182	14	17	31	3.2
7	17	35	14	9.2	7.8	8.0	170	195	15	12	26	6.0
8	18	35	14	9.0	7.8	8.0	167	175	14	9.5	23	7.3
9	18	26	14	9.0	7.8	60	161	163	17	21	20	7.9
10	18	26	14	9.0	7.8	285	151	173	18	47	18	9.2
11	20	22	14	9.0	7.8	405	146	195	16	45	13	11
12	31	20	14	8.5	7.8	410	138	187	14	55	16	7.7
13	38	20	14	8.2	7.8	420	132	190	13	43	15	5.9
14	51	19	13	7.9	7.8	465	121	198	13	19	15	5.8
15	64	19	13	7.9	7.8	530	67	175	16	17	18	6.2
16	63	21	13	7.9	7.8	660	76	157	16	17	32	7.5
17	55	21	13	7.9	7.8	840	106	142	14	16	41	8.0
18	47	20	12	7.9	7.8	935	177	127	12	15	40	5.2
19	47	20	12	7.9	7.7	950	334	103	11	13	35	4.5
20	49	18	11	7.9	7.7	885	469	87	15	13	23	5.4
21	48	18	11	7.9	7.7	775	492	75	15	14	19	9.1
22	50	18	11	7.9	7.7	760	471	63	12	13	18	13
23	53	18	11	7.9	7.7	745	464	54	10	13	17	10
24	55	17	11	7.9	7.7	744	446	49	12	13	18	18
25	71	17	11	7.9	7.7	666	424	50	15	13	18	46
26	85	16	11	7.9	7.7	619	382	52	15	20	18	144
27	84	16	11	7.9	7.7	544	379	46	14	29	17	243
28	85	16	11	7.9	7.7	439	362	40	13	26	16	147
29	79	16	10	7.9	---	350	316	33	11	26	14	76
30	77	16	10	7.9	---	297	283	29	10	29	9.2	31
31	77	---	10	7.9	---	270	---	26	---	50	6.7	---
TOTAL	1349.8	794	391	262.1	218.0	13124.0	7522	4118	436	691.5	999.9	848.7
MEAN	43.5	26.5	12.6	8.45	7.79	423	251	133	14.5	22.3	32.3	28.3
MAX	85	70	15	9.8	7.9	950	492	269	22	55	130	243
MIN	7.1	16	10	7.9	7.7	8.0	67	26	10	9.5	6.7	1.8
AC-FT	2680	1570	776	520	432	26030	14920	8170	865	1370	1980	1680
CAL YR 1985	TOTAL	17534.3		MEAN	48.0	MAX	560	MIN	1.3	AC-FT	34780	
WTR YR 1986	TOTAL	30755.0		MEAN	84.3	MAX	950	MIN	1.8	AC-FT	61000	

## RED RIVER OF THE NORTH BASIN

05056000 SHEYENNE RIVER NEAR WARWICK, ND--CONTINUED

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1951, 1953, 1958 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	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)	PERCENT SODIUM (00932)
OCT 30...	0825	77	1060	--	3.0	2.0	--	--	--	--	--
DEC 06...	1100	14	685	--	-7.0	0.5	--	--	--	--	--
JAN 14...	1325	7.9	1470	--	-7.0	0.5	--	--	--	--	--
FEB 24...	1300	7.7	530	--	-3.0	0.0	--	--	--	--	--
MAR 18...	1355	935	390	7.40	3.0	1.0	120	26	13	31	34
APR 01...	1235	205	480	--	7.0	3.5	--	--	--	--	--
MAY 20...	1030	87	530	--	16.0	15.0	--	--	--	--	--
JUL 08...	1310	9.0	1130	8.60	22.0	23.5	320	50	48	140	48
AUG 11...	1144	12	880	--	25.0	27.0	--	--	--	--	--
DATE		SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINIT- Y LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR 18...		1	10	130	47	3.5	0.1	13	226	220	0.31
JUL 08...		3	11	400	220	18	0.2	9.8	769	740	1.0
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)
MAR 18...		1	120	190	<1	20	100	0.2	1	<1	82
JUL 08...		8	330	10	1	100	10	<1	1	<1	280

## RED RIVER OF THE NORTH BASIN

55

05056100 MAUVAIS COULEE NEAR CANDO, ND

LOCATION.--Lat 48°26'53", long 99°06'08", in SE¼NE¼SE¼ sec.1, T.157 N., R.66 W., Towner County, Hydrologic Unit 09020201, on left bank 0.3 mi upstream from highway bridge, about 4 mi upstream from West Fork, 5.5 mi southeast of Cando, and 7 mi northeast of Maza.

DRAINAGE AREA.--387 mi<sup>2</sup>, of which about 10 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--May 1956 to current year (seasonal records only since 1982).

GAGE.--Water-stage recorder. Elevation of gage is 1,445 ft above National Geodetic Vertical Datum of 1929, from topographic map. Prior to July 2, 1957, nonrecording gage at present site and datum.

REMARKS.--Estimated daily discharges: Oct. 7-10, Mar. 1-28, and Apr. 12-16. Records good except those for periods of ice effect, Oct. 7-10, Mar. 1-28, and Apr. 12-16, which are fair.

AVERAGE DISCHARGE.--26 years (water years 1957-82), 19.2 ft<sup>3</sup>/s, 13,910 acre-ft/yr; median of yearly mean discharges, 13 ft<sup>3</sup>/s, 9,400 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,660 ft<sup>3</sup>/s, Apr. 25, 1979, gage height, 11.18 ft; no flow at times each year.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of June 16, 1954, reached a stage of 9.83 ft, and flood of Apr. 20, 1956, reached a stage of 10.71 ft, from floodmarks set by local resident.

EXTREMES FOR CURRENT YEAR.--Maximum discharge during period October and March to September, 170 ft<sup>3</sup>/s, Mar. 26, gage height, 5.57 ft, backwater from ice; no flow Oct. 1-2.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00					.40	66	28	9.4	1.4	11	7.8
2	.00					.75	61	26	8.3	2.1	12	7.3
3	.04					1.0	56	25	7.9	2.9	13	6.9
4	.08					.75	50	24	6.7	3.0	14	5.9
5	.08					.60	48	21	5.7	4.2	14	5.5
6	.08					.40	47	20	5.2	3.6	14	5.0
7	.12					.20	44	21	4.6	2.7	15	4.5
8	.10					.10	38	20	4.0	1.8	16	4.4
9	.10					.08	33	21	3.7	1.5	20	4.4
10	.10					.05	29	21	3.4	2.3	28	4.3
11	.42					.10	26	22	3.0	1.9	35	4.3
12	.40					.05	20	22	2.4	1.6	39	4.1
13	.43					.10	15	22	1.9	1.7	41	3.9
14	.61					.20	10	19	1.9	6.1	42	3.8
15	.65					.30	7.0	17	1.9	4.7	39	3.6
16	.65					.50	7.5	16	1.7	3.6	35	3.1
17	.65					.85	13	15	1.5	3.4	32	3.0
18	.65					1.5	17	14	1.4	3.8	29	3.0
19	.65					1.0	38	13	1.3	3.2	27	2.9
20	.65					.85	31	12	1.2	2.9	24	2.5
21	.65					2.0	28	11	1.1	3.3	22	2.3
22	.76					5.0	28	9.8	1.1	4.3	20	1.9
23	5.2					8.0	28	9.1	1.1	4.3	19	1.7
24	4.0					15	30	8.9	1.1	4.4	16	1.9
25	3.4					62	43	8.6	1.3	4.7	15	2.3
26	2.7					140	50	8.4	1.1	7.3	14	2.1
27	2.0					100	46	8.3	1.3	13	13	1.9
28	1.6					98	40	8.0	1.5	9.8	11	1.7
29	1.4					90	32	8.0	1.5	9.1	9.8	1.7
30	1.1					75	31	11	1.5	11	9.0	1.7
31	.90					68	---	12	---	10	8.3	---
TOTAL	30.17					672.78	1012.5	502.1	89.7	139.6	657.1	109.4
MEAN	.97					21.7	33.7	16.2	2.99	4.50	21.2	3.65
MAX	5.2					140	66	28	9.4	13	42	7.8
MIN	.00					.05	7.0	8.0	1.1	1.4	8.3	1.7
AC-FT	60					1330	2010	996	178	277	1300	217

## RED RIVER OF THE NORTH BASIN

05056100 MAUVAIS COULEE NEAR CANDO, ND--CONTINUED

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CAC03) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CAC03) (95902)	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 29...	1210	1.2	--	--	12.0	6.5	--	--	--	--	--
FEB 25...	1235	0.04	1380	--	4.0	0.0	--	--	--	--	--
MAR 27...	0950	106	345	7.10	6.0	1.0	140	33	32	15	13
APR 02...	1110	61	430	--	5.0	5.0	--	--	--	--	--
JUL 09...	1245	1.4	460	--	26.0	25.5	--	--	--	--	--
AUG 14...	1025	43	410	--	17.0	20.0	--	--	--	--	--
SEP 16...	1320	3.0	400	7.90	10.5	11.0	440	84	87	53	52
DATE	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CAC03) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR 27...	15	0.5	12	110	56	3.6	0.1	17	229	210	0.31
SEP 16...	20	1	16	350	150	34	0.2	16	652	620	0.89
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)	
MAR 27...	2	80	90	<1	14	120	0.1	2	<1	87	
SEP 16...	3	70	30	1	55	80	0.2	2	<1	330	



## RED RIVER OF THE NORTH BASIN

57

05056200 EDMORE COULEE NEAR EDMORE, ND

LOCATION.--Lat 48°20'14", long 98°39'33", in NW¼ sec.17, T.156 N., R.62 W., Ramsey County, Hydrologic Unit 09020201, on right bank 50 ft upstream from bridge on county highway, 11 mi southwest of Edmore, and about 13 mi upstream from Sweetwater Lake.

DRAINAGE AREA.--382 mi<sup>2</sup>, of which about 100 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--April to June 1956, June 1957 to current year (seasonal records only since 1982).

REVISED RECORDS.--WSP 1728: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,400.00 ft above National Geodetic Vertical Datum of 1929. June 26, 1957, to Sept. 30, 1985, water-stage recorder at same site at a datum of 1,479.79 ft above National Geodetic Vertical Datum of 1929. Prior to June 26, 1957, nonrecording gage at same site and datum.

REMARKS.--Estimated daily discharges: Oct. 7-11, Mar. 1-25, Apr. 12 to May 19, June 27 to July 10, July 12-16, Sept. 9-14, and Sept. 22-30. Records poor.

AVERAGE DISCHARGE.--25 years (1957-82), 13.7 ft<sup>3</sup>/s, 9,930 acre-ft/yr; median of yearly mean discharges, 9.2 ft<sup>3</sup>/s, 6,700 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,110 ft<sup>3</sup>/s, Apr. 25, 1979, gage height, 87.10 ft; no flow for several months each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 297 ft<sup>3</sup>/s, Mar. 27, gage height, 85.01 ft; maximum gage height, 85.43 ft, Mar. 23, backwater from ice; no flow for many days.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.6					.00	177	38	4.2	17	84	2.5
2	6.3					.00	164	36	3.6	16	74	2.4
3	6.0					.00	150	34	3.2	35	67	2.5
4	6.0					.00	137	32	2.9	50	60	2.4
5	6.0					.00	117	35	2.7	45	54	2.2
6	5.8					.00	97	40	2.4	40	49	2.3
7	5.8					.00	83	38	2.1	38	45	2.2
8	5.5					.00	68	38	1.8	34	40	2.2
9	5.5					.00	57	45	1.6	32	37	2.2
10	5.5					.00	45	40	1.5	50	33	2.1
11	7.0					.00	35	36	1.3	68	30	2.1
12	14					.00	24	32	.95	80	27	2.0
13	18					.10	20	30	.82	100	22	2.0
14	19					.50	15	28	.75	120	18	1.9
15	15					1.0	12	26	.62	140	15	1.9
16	12					3.0	10	24	.46	150	12	1.9
17	11					3.5	15	22	.33	167	10	1.8
18	11					4.0	30	20	.20	183	9.4	1.5
19	11					5.0	35	19	.15	190	9.0	1.3
20	11					5.0	40	17	.15	187	7.6	1.2
21	12					10	35	16	.19	187	6.2	1.1
22	15					20	25	14	.19	185	5.3	1.1
23	20					25	27	12	.19	182	5.3	1.0
24	20					125	25	11	.19	178	4.5	1.0
25	13					190	30	10	.19	172	3.9	.90
26	9.7					253	32	9.1	10	166	3.6	.95
27	7.6					289	33	7.8	20	160	3.4	.80
28	3.8					292	35	6.7	25	148	3.2	.75
29	2.8					249	32	6.1	20	133	3.1	.70
30	5.0					205	40	5.5	18	117	2.8	.65
31	6.7					196	---	4.8	---	99	2.6	---
TOTAL	303.6					1876.10	1645	733.0	125.68	3469	746.9	49.55
MEAN	9.79					60.5	54.8	23.6	4.19	112	24.1	1.65
MAX	20					292	177	45	25	190	84	2.5
MIN	2.8					.00	10	4.8	.15	16	2.6	.65
AC-FT	602					3720	3260	1450	249	6880	1480	98

## RED RIVER OF THE NORTH BASIN

05056200 EDMORE COULEE NEAR EDMORE, ND--CONTINUED

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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											
31...	0830	7.3	--	--	4.0	4.5	--	--	--	--	--
MAR											
26...	1525	238	488	7.60	6.0	2.5	140	18	33	14	40
APR											
04...	1200	138	570	--	7.5	5.0	--	--	--	--	--
MAY											
20...	1715	17	--	--	25.5	16.0	--	--	--	--	--
JUL											
11...	1440	68	610	--	19.5	20.0	--	--	--	--	--
17...	1425	166	590	--	21.0	22.0	--	--	--	--	--
18...	1305	186	615	--	26.5	22.0	--	--	--	--	--
AUG											
12...	1305	28	600	--	21.0	23.5	--	--	--	--	--
SEP											
15...	1055	1.9	1100	8.50	10.5	10.0	330	--	71	38	110
		SODIUM AD- SORP- TION RATIO (00932)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR											
26...	36	2	12	120	89	12	0.1	16	309	290	0.42
SEP											
15...	40	3	16	360	170	39	0.1	10	703	670	0.96
		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- DENIUM, 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											
26...		3	50	140	<1	18	160	0.1	2	<1	110
SEP											
15...		4	70	20	<1	53	80	0.2	3	<1	290

## RED RIVER OF THE NORTH BASIN

59

05056215 EDMORE COULEE TRIBUTARY NEAR WEBSTER, ND

LOCATION.--Lat 48°15'59", long 98°40'50", in NW1/4NW1/4 sec.7, T.155 N., R.62 W., Ramsey County, Hydrologic Unit 09020201, 9 mi east and 1.1 mi south of Webster.

DRAINAGE AREA.--Not determined.

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--October 1985 to September 1986.

REMARKS.--Records of stream discharge for water year 1986 will be published with the 1987 water year records.

## WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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)
MAR 27...	0945	55	430	7.50	--	1.0	150	35	38	14	22
APR 04...	1030	71	420	--	6.0	4.5	--	--	--	--	--
23...	1815	21	590	--	15.0	16.0	--	--	--	--	--
MAY 13...	1530	3.4	--	--	21.0	20.0	--	--	--	--	--
21...	1545	1.7	510	--	28.0	15.5	--	--	--	--	--
JUL 11...	1220	6.3	870	7.00	16.0	20.5	360	130	87	35	50
18...	1145	101	485	--	26.0	23.5	--	--	--	--	--
AUG 01...	1320	73	560	--	19.5	21.0	--	--	--	--	--
12...	0830	24	360	--	16.0	20.0	--	--	--	--	--
19...	1620	9.3	620	--	20.0	21.5	--	--	--	--	--

DATE	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINEITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR 27...	22	0.8	14	120	76	7.8	0.1	17	280	260	0.38
JUL 11...	22	1	15	230	210	22	0.2	33	625	590	0.85

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)
MAR 27...	4	50	20	<1	16	70	0.3	5	1	150
JUL 11...	6	170	40	<1	34	60	<0.1	2	<1	310

## RED RIVER OF THE NORTH BASIN

05056220 SWEETWATER LAKE AT SWEETWATER, ND

LOCATION.--Lat 48°12'39", long 98°52'15", in NE1/4SW1/4 sec.27, T.155 N., R.64 W., Ramsey County, Hydrologic Unit 09020201, at southwest arm of lake 6 mi north of Devils Lake.

DRAINAGE AREA.--670 mi<sup>2</sup> of which about 290 mi<sup>2</sup> is probably noncontributing.

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--1960, 1962 to current year.

REMARKS.--Periodic measurements of lake elevation are obtained at station 05056218, Sweetwater Lake near Webster, ND. These unpublished records are available in the files of the District office.

## WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	COLOR (PLAT- INUM- COBALT UNITS) (00080)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	
OCT 30...	1030	1100	8.80	7.0	4.0	--	12.8	102	310	67	34	54	
MAY 13...	1730	965	8.40	21.5	16.0	15	11.1	119	280	45	37	45	
		SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)
OCT 30...	120	43	3	30	241	0.7	290	46	0.2	16	799	740	
MAY 13...	93	40	2	25	233	1.8	230	33	0.2	11	633	610	
		SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P) (00666)	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)	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)
OCT 30...	1.1	0.0	<0.10	0.03	<10	4	140	120	<1	<10	<1	<1	
MAY 13...	0.86	0.0	<0.10	0.04	--	--	--	90	--	--	--	--	
		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)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	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)	CYANIDE TOTAL (MG/L AS CN) (00720)
OCT 30...	4	<1	73	7	<0.1	1	1	<1	230	4	11	<0.01	



## RED RIVER OF THE NORTH BASIN

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05056222 MORRISON LAKE NEAR WEBSTER, ND

LOCATION.--Lat 48°15'35", long 98°50'48", in NW¼ sec.11, T.155 N., R.64 W., Ramsey County, Hydrologic Unit 09020201, on northwest shoreline of Morrison Lake.

DRAINAGE AREA.--501 mi<sup>2</sup>, approximately.

## GAGE-HEIGHT RECORDS

PERIOD OF RECORD.--March 1985 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,400.00 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Records fair. Stage frequently affected by wind.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height recorded, 59.72 ft, Aug. 6, 1986; minimum recorded, 57.31 ft, Aug. 13, 1985.

EXTREMES FOR CURRENT YEAR.--Maximum gage height recorded, 59.72 ft, Aug. 6; minimum recorded, 57.41 ft, Oct. 31.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---		---	57.63	57.58	57.58	58.62	59.11	58.47	58.12	59.58	59.14
2	---		---	57.63	57.58	57.58	58.74	59.16	58.47	58.11	59.59	59.17
3	---		57.66	57.63	57.58	57.58	58.83	59.22	58.39	58.15	59.63	59.16
4	---		---	57.63	57.57	57.58	58.90	59.16	58.36	58.19	59.66	59.08
5	---		---	57.63	57.57	57.58	58.97	59.13	58.37	58.24	59.67	59.06
6	---		---	57.62	57.57	57.58	59.02	58.97	58.36	58.18	59.69	59.06
7	---		---	57.62	57.57	57.58	59.02	59.01	58.28	58.20	59.62	59.05
8	---		---	57.62	57.57	57.58	59.03	59.02	58.29	58.27	59.61	59.05
9	---		---	57.62	57.57	57.58	59.09	59.10	58.31	58.25	59.61	59.06
10	---		---	57.62	57.57	57.58	59.12	59.03	58.25	58.32	59.59	59.04
11	---		---	57.62	57.57	57.58	59.09	59.02	58.22	58.30	59.60	59.03
12	---		57.68	57.62	57.57	57.58	58.97	58.97	58.17	58.36	59.61	58.97
13	---		57.68	57.62	57.57	57.58	58.99	58.96	58.17	58.36	59.58	58.95
14	---		57.67	57.63	57.57	57.58	58.90	58.94	58.18	58.52	59.56	58.97
15	---		57.66	57.61	57.57	57.58	58.97	58.89	58.17	58.53	59.55	58.96
16	---		57.65	57.60	57.57	57.58	59.09	58.80	58.14	58.59	59.50	59.01
17	---		57.65	57.60	57.57	57.58	59.17	58.78	58.19	58.68	59.47	58.97
18	---		57.65	57.61	57.57	57.58	59.17	58.81	58.16	58.74	59.49	58.97
19	---		57.65	57.61	57.57	57.58	59.11	58.81	58.14	58.79	59.47	58.99
20	---		57.65	57.60	57.57	57.58	59.09	58.79	58.21	58.84	59.34	58.96
21	---		57.64	57.60	57.57	57.58	59.13	58.77	58.26	58.93	59.36	58.95
22	---		57.64	57.60	57.56	57.59	59.21	58.72	58.19	59.00	59.36	58.98
23	---		57.64	57.60	57.56	57.61	59.20	58.65	58.17	59.12	59.35	58.97
24	---		57.64	57.60	57.57	57.61	59.14	58.61	58.21	59.14	59.40	58.96
25	---		57.64	57.60	57.58	57.63	59.19	58.57	58.21	59.20	59.29	59.09
26	---		57.64	57.60	57.58	57.67	59.18	58.56	58.17	59.28	59.26	59.00
27	---		57.64	57.60	57.58	57.79	59.17	58.55	58.18	59.36	59.25	58.89
28	---		57.64	57.60	57.58	57.96	59.16	58.54	58.16	59.44	59.24	58.91
29	---		57.63	57.60	---	58.14	59.19	58.52	58.14	59.51	59.25	58.90
30	57.63		57.63	57.59	---	58.31	59.18	58.50	58.14	59.55	59.22	58.86
31	57.56		57.63	57.58	---	58.48	---	58.45	---	59.57	59.19	---
MEAN	---		---	57.61	57.57	57.68	59.05	58.84	58.24	58.70	59.47	59.01
MAX	---		---	57.63	57.58	58.48	59.21	59.22	58.47	59.57	59.69	59.17
MIN	---		---	57.58	57.56	57.58	58.62	58.45	58.14	58.11	59.19	58.86

05056239 STARKWEATHER COULEE NEAR WEBSTER, ND

LOCATION.--Lat 48°19'13", long 98°56'23", in NW¼SW¼NW¼ sec.19, T.156 N., R.64 W., Ramsey County, Hydrologic Unit 09020201, on right bank 3.8 mi northwest of Webster.

DRAINAGE AREA.--About 310 mi<sup>2</sup>, of which about 100 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

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

GAGE.--Water-stage recorder. Elevation of gage is 1,448.00 ft above National Geodetic Vertical Datum of 1929, from topographic map. Prior to July 23, 1986, nonrecording gage 100 ft downstream at same datum.

REMARKS.--Estimated daily discharges: Oct. 1 to Mar. 26, Apr. 12-18, June 14-16, and June 18 to July 5. Records poor.

AVERAGE DISCHARGE.--7 years, 9.16 ft<sup>3</sup>/s, 6,636 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge observed, 279 ft<sup>3</sup>/s, Apr. 1, 1986, gage height, 6.87 ft; maximum gage height observed, 7.24 ft, Apr. 14, 1982; no flow for many months each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge observed, 279 ft<sup>3</sup>/s, Apr. 1, gage height, 6.87 ft; no flow for several months.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.05	.00	.00	.00	.00	279	19	2.7	.00	24	2.0
2	.00	.04	.00	.00	.00	.00	208	19	1.0	.00	20	2.0
3	.00	.04	.00	.00	.00	.00	211	18	.93	.00	17	2.0
4	.00	.03	.00	.00	.00	.00	166	16	.74	.00	14	1.9
5	.00	.02	.00	.00	.00	.00	144	21	.53	.00	12	1.8
6	.00	.01	.00	.00	.00	.00	118	44	.31	.29	13	1.7
7	.00	.00	.00	.00	.00	.00	108	45	.21	.45	11	1.7
8	.00	.00	.00	.00	.00	.00	91	46	.17	.86	8.1	1.6
9	.00	.00	.00	.00	.00	.00	70	74	.14	.93	7.7	1.5
10	.00	.00	.00	.00	.00	.00	47	66	.11	.93	7.3	1.4
11	.10	.00	.00	.00	.00	.00	35	71	.04	11	5.4	1.3
12	.20	.00	.00	.00	.00	.00	20	79	.02	31	4.1	1.3
13	.30	.00	.00	.00	.00	.00	10	83	.01	39	3.8	1.2
14	.40	.00	.00	.00	.00	.00	8.0	83	.00	44	3.8	.83
15	.50	.00	.00	.00	.00	.00	7.0	73	.00	51	3.2	.67
16	.50	.00	.00	.00	.00	.00	6.0	59	.00	58	2.7	.58
17	1.0	.00	.00	.00	.00	.00	5.0	45	.00	71	2.7	.58
18	2.0	.00	.00	.00	.00	.00	15	32	.00	76	2.7	.58
19	4.0	.00	.00	.00	.00	.00	60	25	.00	89	3.1	.58
20	6.0	.00	.00	.00	.00	.00	96	21	.00	97	3.4	.57
21	8.0	.00	.00	.00	.00	5.0	75	17	.00	96	3.1	.49
22	10	.00	.00	.00	.00	25	42	15	.00	92	3.5	.39
23	8.0	.00	.00	.00	.00	65	41	15	.00	87	3.5	.34
24	6.0	.00	.00	.00	.00	100	34	14	.00	81	2.9	.24
25	4.0	.00	.00	.00	.00	120	36	14	.00	65	2.7	.24
26	2.0	.00	.00	.00	.00	180	33	13	.00	53	2.7	.24
27	1.0	.00	.00	.00	.00	237	28	11	.00	45	2.6	.24
28	.50	.00	.00	.00	.00	221	23	8.9	.00	40	2.4	.21
29	.20	.00	.00	.00	---	202	18	6.7	.00	35	2.3	.21
30	.10	.00	.00	.00	---	192	20	4.7	.00	35	2.3	.20
31	.05	---	.00	.00	---	232	---	3.7	---	32	2.2	---
TOTAL	54.85	.19	.00	.00	.00	1579.00	2054.0	1062.0	6.91	1231.46	199.2	28.59
MEAN	1.77	.01	.00	.00	.00	50.9	68.5	34.3	.23	39.7	6.43	.95
MAX	10	.05	.00	.00	.00	237	279	83	2.7	97	24	2.0
MIN	.00	.00	.00	.00	.00	.00	5.0	3.7	.00	.00	2.2	.20
AC-FT	109	.4	.00	.00	.00	3130	4070	2110	14	2440	395	57
CAL YR 1985	TOTAL	3128.91		MEAN	8.57	MAX	203	MIN	.00	AC-FT	6210	
WTR YR 1986	TOTAL	6216.20		MEAN	17.0	MAX	279	MIN	.00	AC-FT	12330	

05056239 STARKWEATHER COULEE NEAR WEBSTER, ND--CONTINUED

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1980 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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)
DATE	TIME										
MAR											
26...	1145	138	352	7.40	-2.0	0.5	140	14	35	13	11
26...	1730	211	365	--	6.0	3.5	--	--	--	--	--
APR											
02...	1525	181	460	--	4.5	3.0	--	--	--	--	--
MAY											
13...	1610	86	890	--	19.5	17.0	--	--	--	--	--
JUL											
08...	1700	1.4	--	8.10	22.0	26.0	160	26	44	13	10
17...	1650	76	620	--	27.0	24.5	--	--	--	--	--
AUG											
11...	1750	4.9	--	--	27.5	26.0	--	--	--	--	--
SEP											
15...	1435	0.6	495	--	12.0	11.5	--	--	--	--	--
		SODIUM AD- SORP- TION (MG/L AS K) RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
DATE	PERCENT SODIUM (00932)										
MAR											
26...	13	0.4	15	130	37	4.9	0.1	21	220	210	0.3
JUL											
08...	11	0.4	12	140	47	4.5	0.1	19	242	230	0.33
		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)
DATE											
MAR											
26...	7	40	130	<1	13	10	0.1	2	<1	110	
JUL											
08...	5	70	20	1	14	10	<0.1	2	<1	160	

## RED RIVER OF THE NORTH BASIN

05056241 DRY LAKE NEAR PENN, ND

LOCATION.--Lat 48°13'52", long 98°58'59", in NW1/4NW1/4SW1/4 sec.23, T.155 N., R.65 W., Ramsey County, Hydrologic Unit 09020201, on west shoreline of Dry Lake, 6 mi east of Penn.

DRAINAGE AREA.--920 mi<sup>2</sup>, approximately.

## GAGE-HEIGHT RECORDS

PERIOD OF RECORD.--October 1983 to present (gage heights only).

GAGE.--Water-stage recorder. Datum of gage is 1,400.00 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Records fair. Stage affected by wind.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height recorded, 47.46 ft, Apr. 14, 1986, affected by wind; minimum recorded, 44.94 ft, July 3, 1986, affected by wind.

EXTREMES FOR CURRENT YEAR.--Maximum gage height recorded, 47.46 ft, Apr. 14, affected by wind; minimum recorded, 44.94 ft, July 3.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	45.43	45.51	45.55			---	46.52	46.92	45.97	45.43	46.18	46.45
2	45.35	45.46	45.57			---	46.48	46.84	45.70	45.42	46.18	46.46
3	45.42	45.47	45.59			---	46.40	46.73	45.90	45.27	46.19	46.46
4	45.42	45.42	---			---	46.36	46.88	45.88	45.42	46.21	46.48
5	45.47	45.41	---			---	46.31	46.64	45.78	45.33	46.21	46.47
6	45.45	45.44	---			---	46.34	46.89	45.76	45.36	46.20	46.46
7	45.51	45.51	---			---	46.47	46.93	45.82	45.39	46.28	46.45
8	45.63	45.45	---			---	46.50	46.87	45.76	45.39	46.27	46.44
9	45.57	45.45	---			---	46.45	46.43	45.71	45.36	46.33	46.44
10	45.57	45.44	---			---	46.44	46.46	45.80	45.37	46.33	46.45
11	45.54	45.42	---			---	46.50	46.45	45.74	45.42	46.33	46.44
12	45.58	45.42	---			---	46.46	46.57	45.72	45.48	46.32	46.46
13	45.53	45.41	---			45.68	46.50	46.56	45.69	45.48	46.35	46.45
14	45.52	45.41	---			45.85	46.95	46.45	45.65	45.53	46.39	46.44
15	45.58	45.41	---			45.99	46.50	46.33	45.67	45.58	46.36	46.44
16	45.55	45.40	---			46.07	46.44	46.38	45.64	45.61	46.40	46.35
17	45.55	45.40	---			46.12	46.45	46.39	45.51	45.68	46.39	46.46
18	45.53	45.40	---			46.12	46.61	46.33	45.57	45.70	46.33	46.47
19	45.55	45.45	---			46.08	46.85	46.29	45.57	45.75	46.32	46.47
20	45.47	45.46	---			46.02	46.93	46.25	45.58	45.75	46.44	46.46
21	45.52	45.46	---			46.03	46.86	46.20	45.57	45.78	46.31	46.48
22	45.36	45.48	---			45.99	46.74	46.19	45.53	45.81	46.39	46.44
23	45.52	45.49	---			45.89	46.87	46.24	45.54	45.81	46.38	46.46
24	45.54	45.49	---			45.95	46.94	46.26	45.37	45.93	46.21	46.45
25	45.55	45.52	---			46.05	46.96	46.24	45.41	45.90	46.42	46.19
26	45.59	45.54	---			46.12	46.95	46.21	45.46	45.96	46.43	46.50
27	45.53	45.55	---			46.19	46.93	46.17	45.51	46.03	46.42	46.50
28	45.49	45.55	---			46.28	46.89	46.14	45.50	46.05	46.39	46.47
29	45.56	45.55	---			46.36	46.83	46.10	45.44	46.04	46.38	46.50
30	45.36	45.55	---			46.42	46.91	46.07	45.42	46.13	46.40	46.50
31	45.48	---	---			46.47	---	46.06	---	46.13	46.43	---
MEAN	45.51	45.46	---			---	46.64	46.43	45.64	45.65	46.33	46.45
MAX	45.63	45.55	---			---	46.96	46.93	45.97	46.13	46.44	46.50
MIN	45.35	45.40	---			---	46.31	46.06	45.37	45.27	46.18	46.19



## 05056250 LAKE ALICE NEAR CHURCHS FERRY, 1986

LOCATION.--Lat 48°07'21", long 99°05'42", in SE $\frac{1}{4}$ NE $\frac{1}{4}$ NE $\frac{1}{4}$  sec.11, T.156 N., R.66 W., Ramsey County, Hydrologic Unit 09020201, at northwest corner of lake 7.5 mi northwest of Churchs Ferry.

DRAINAGE AREA.--2,100 mi<sup>2</sup>, approximately, of which about 500 mi<sup>2</sup> is probably noncontributing.

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--1960, 1962-64, 1966 to current year.

## WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	COLOR (PLAT- INUM- COBALT UNITS) (00080)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (MG/L) (00300)	HARD- NESS (PER- CENT SATUR- ATION) (00301)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)
OCT 31...	1300	2090	7.30	10.0	4.0	--	13.6	107	760	610	150	94	
MAY 13...	1500	780	7.50	20.0	18.0	60	7.0	79	270	51	54	32	
DATE		SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)
OCT 31...	120	24	2	40	152	15	800	74	0.2	5.1	1460	1400	
MAY 13...	49	27	1	22	216	13	140	25	0.2	8.5	504	460	
DATE		SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P) (00666)	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)	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)
OCT 31...	2.0	0.0	1.00	0.04	10	2	73	110	<1	<10	<1	2	
MAY 13...	0.69	0.0	<0.10	0.23	--	--	--	80	--	--	--	--	
DATE		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)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	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)	CYANIDE TOTAL (MG/L AS CN) (00720)
OCT 31...	7	<1	120	38	0.2	5	3	<1	530	5	16	<0.01	

## RED RIVER OF THE NORTH BASIN

05056255 LAKE ALICE-IRVINE CHANNEL NEAR CHURCHS FERRY, ND

LOCATION.--Lat 48°19'26", long 99°56'07", in NW¼NE¼ sec.21, T.156 N., R.66 W., Ramsey County, Hydrologic Unit 09020201, on downstream side of control structure between Lake Alice and Lake Irvine, 5 mi northwest of the city of Churchs Ferry.

DRAINAGE AREA.--999 mi<sup>2</sup>, approximately.

## GAGE-HEIGHT RECORDS

PERIOD OF RECORD.--March 1985 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,400.00 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Elevation at gage frequently affected by wind. Records poor.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height recorded, 41.96 ft, May 4, 1986; minimum recorded, 39.51 ft, Oct. 7, 1985.

EXTREMES FOR CURRENT YEAR.--Maximum gage height recorded, 41.96 ft, May 4; minimum recorded, 39.51 ft, Oct. 7.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	39.67					---	40.93	41.77		---	40.78	40.64
2	39.65					---	40.99	41.77		---	40.76	40.63
3	39.63					---	41.04	41.76		---	40.74	40.63
4	39.65					---	41.04	41.77		---	40.74	40.64
5	39.67					---	41.04	41.85		---	40.72	40.64
6	39.64					---	41.08	41.85		---	40.72	40.61
7	39.69					---	41.24	41.88		---	40.71	40.60
8	39.95					---	41.30	41.85		40.83	40.69	40.60
9	39.80					---	41.30	41.81		---	40.68	40.59
10	39.80					---	41.30	41.84		---	40.67	40.57
11	39.79					---	41.31	41.91		---	40.66	40.55
12	39.81					---	41.35	41.87		---	40.64	40.57
13	39.85					---	41.34	41.87		---	40.67	40.55
14	39.80					---	41.34	41.85		---	40.71	40.55
15	39.74					---	41.33	41.83		40.88	40.71	40.53
16	39.74					---	41.33	---		40.88	40.70	40.51
17	39.78					40.75	41.34	---		40.88	40.69	40.52
18	39.75					40.91	41.39	---		40.90	40.68	40.53
19	39.75					---	41.60	---		40.88	40.68	40.53
20	39.79					---	41.77	---		40.86	40.69	40.50
21	39.75					---	41.76	---		40.85	40.65	40.50
22	39.86					---	41.75	41.77		40.83	40.67	40.50
23	39.89					---	41.75	---		40.82	40.66	40.52
24	39.89					---	41.88	---		40.82	40.65	40.52
25	39.83					---	41.87	---		40.79	40.69	40.58
26	39.84					40.49	41.86	---		40.79	40.67	40.52
27	39.83					40.60	41.86	---		40.82	40.66	40.52
28	39.83					40.68	41.86	---		40.82	40.64	40.51
29	39.82					40.84	41.86	---		40.82	40.65	40.51
30	---					40.91	41.86	---		40.81	40.64	40.52
31	---					40.92	---	---		40.80	40.65	---
MEAN	---					---	41.46	---		---	40.69	40.56
MAX	---					---	41.88	---		---	40.78	40.64
MIN	---					---	40.93	---		---	40.64	40.50

## RED RIVER OF THE NORTH BASIN

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05056260 LAKE IRVINE NEAR CHURCHS FERRY, ND

LOCATION.--Lat 48°16'57", long 99°10'25", in SE1/4SW1/4SW1/4 sec.32, T.156 N., R.66 W., Ramsey County Hydrologic Unit 09020201, at south end of lake 1 1/4 mi northwest of Churchs Ferry.

DRAINAGE AREA.--2,120 mi<sup>2</sup>, approximately, of which about 500 mi<sup>2</sup> is probably noncontributing.

## WATER-QUALITY RECORDS

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

## WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	COLOR (PLAT- INUM- COBALT UNITS) (00080)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	
OCT 28...	1245	1590	7.80	12.0	7.0	--	12.2	103	510	260	100	64	
MAY 13...	1330	890	7.90	17.0	16.0	150	9.7	104	300	120	55	40	
DATE	TIME	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)
OCT 28...	130	34	3	26	251	7.7	480	64	0.2	15	1100	1000	
MAY 13...	58	28	1	20	184	4.5	220	31	0.2	15	586	550	
DATE		SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P) (00666)	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)	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)
OCT 28...	1.5	0.0	<0.10	0.23	<10	3	74	150	<1	<10	<1	1	
MAY 13...	0.8	0.0	<0.10	0.17	--	--	--	90	--	--	--	--	
DATE		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)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	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)	CYANIDE TOTAL (MG/L AS CN) (00720)
OCT 28...	17	<1	90	330	<0.1	1	3	<1	400	5	20	<0.01	

## RED RIVER OF THE NORTH BASIN

05056390 LITTLE COULEE NEAR BRINSMADE, ND

LOCATION.--Lat 48°11'15", long 99°14'34", in SW¼ sec.2, T.154 N., R.67 W., Benson County, Hydrologic Unit 09020201, on right bank 100 ft downstream from bridge on township road, 0.5 mi downstream from Silver Lake, and 4 mi east of Brinsmade.

DRAINAGE AREA.--350 mi<sup>2</sup>, of which about 160 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1975 to current year (seasonal records only since 1983).

GAGE.--Water-stage recorder. Elevation of gage is 1,435 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Mar. 1-24, Apr. 12-19, June 20, June 22 to July 9, and July 11-14. Records fair except those for periods with ice effect, Mar. 1-24 and Apr. 12-16, and periods of missing record, Apr. 12-19, June 20, June 22 to July 9, and July 11-14, which are poor.

AVERAGE DISCHARGE.--7 years (water years 1976-82), 7.02 ft<sup>3</sup>/s, 5,090 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 425 ft<sup>3</sup>/s, May 1, 1979, gage height, 10.43 ft; no flow for several months each year.

EXTREMES FOR CURRENT YEAR.--Maximum recorded discharge during period March to September, 30.0 ft<sup>3</sup>/s, Mar. 26, gage height, 7.73 ft; maximum recorded gage height during period March to September, 8.15 ft, Mar. 14, backwater from ice; no flow for several months.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1						.00	8.6	17	.63	.00	.07	.00
2						.00	6.4	14	.54	.00	.04	.00
3						.00	7.1	14	.35	.00	.01	.00
4						.00	7.3	13	.29	.00	.00	.00
5						.00	8.0	14	.23	.00	.00	.00
6						.00	7.8	13	.16	.00	.00	.00
7						.00	6.6	11	.13	.00	.00	.00
8						.00	2.8	10	.09	.00	.00	.00
9						.00	.89	12	.06	.00	.00	.00
10						.00	.63	11	.06	.00	.00	.00
11						.00	.60	11	.04	.00	.00	.00
12						.00	.50	9.9	.02	.00	.00	.00
13						.00	.45	9.0	.00	.00	.00	.00
14						.12	.40	8.0	.00	.00	.00	.00
15						.33	.35	7.5	.00	.00	.00	.00
16						.52	.30	7.0	.00	.00	.00	.00
17						.84	1.0	6.4	.00	.02	.00	.00
18						.60	5.0	5.8	.00	.02	.00	.00
19						.40	7.0	5.1	.00	.00	.00	.00
20						.40	11	4.5	.00	.00	.00	.00
21						1.0	11	3.9	.00	.00	.00	.00
22						4.0	13	3.1	.00	.00	.00	.00
23						5.1	20	2.5	.00	.00	.00	.00
24						8.0	17	2.4	.00	.00	.00	.00
25						25	14	2.4	.00	.00	.00	.00
26						25	19	2.0	.00	1.6	.00	.00
27						20	25	1.7	.00	.96	.00	.00
28						15	21	1.4	.00	.30	.00	.00
29						12	17	1.2	.00	.13	.00	.00
30						12	17	.99	.00	.13	.00	.00
31						12	---	.77	---	.13	.00	---
TOTAL						142.31	256.72	225.56	2.60	3.29	.12	.00
MEAN						4.59	8.56	7.28	.09	.11	.00	.00
MAX						25	25	17	.63	1.6	.07	.00
MIN						.00	.30	.77	.00	.00	.00	.00
AC-FT						282	509	447	5.2	6.5	.2	.00



## RED RIVER OF THE NORTH BASIN

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05056390 LITTLE COULEE NEAR BRINSMADE, ND--CONTINUED

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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 28...	1000	0.04	1500	--	10.0	7.0	--	--	--	--	--
MAR 27...	1430	19	520	7.60	13.0	5.0	180	33	38	20	33
APR 03...	1030	7.0	520	--	6.0	3.5	--	--	--	--	--
MAY 16...	1015	7.0	885	--	8.0	10.0	--	--	--	--	--
		SODIUM AD- SORP- TION (MG/L AS K) (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
DATE	PERCENT SODIUM RATIO (00932)	(00931)	(00935)	(90410)	(00945)	(00940)	(00950)	(00955)	(70300)	(70301)	(70303)
MAR 27...	27	1	13	140	86	13	0.1	19	327	310	0.44
		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 27...	3	110	80	<1	30	110	0.1	1	1	130	

## RED RIVER OF THE NORTH BASIN

05056400 BIG COULEE NEAR CHURCHS FERRY, ND

LOCATION.--Lat 48°10'40", long 99°13'15", in NW¼NW¼ sec.12, T.154 N., R.67 W., Benson County, Hydrologic Unit 09020201, on right bank on downstream side of bridge on U.S. Highway 281, 1 mi downstream from Little Coulee, and 6 mi south of Churchs Ferry.

DRAINAGE AREA.--1,620 mi<sup>2</sup>, approximately, of which about 158 mi<sup>2</sup> is probably noncontributing (revised).  
Drainage area reduced from approximately 2,510 mi<sup>2</sup> with the completion of Channel A in March 1979.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--March 1950 to current year. Prior to October 1960, published as Mauvais Coulee near Churchs Ferry.

GAGE.--Water-stage recorder. Datum of gage is 1,432.65 ft above National Geodetic Vertical Datum of 1929. Prior to June 21, 1950, reference marks, and June 21, 1950, to July 17, 1956, nonrecording gage at former bridge on U.S. Highway 281, 0.1 mi upstream at datum 0.70 ft higher.

REMARKS.--Estimated daily discharges: Oct. 8-11, Nov. 12 to Mar. 28, Apr. 12-17, June 25-27, 29, 30, July 1-4, 6-9, 30-31. Records fair except those for periods of estimated daily discharges, which are poor.

AVERAGE DISCHARGE.--28 years prior to construction of Channel A (water years 1951-78), 37.3 ft<sup>3</sup>/s, 27,000 acre-ft/yr; median of yearly mean discharges (1951-78), 7.8 ft<sup>3</sup>/s, 5,700 acre-ft/yr. Eight years since construction of Channel A (water years 1979-86), 46.9 ft<sup>3</sup>/s, 34,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,420 ft<sup>3</sup>/s, May 6, 1979, gage height, 7.59 ft; no flow at times each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 135 ft<sup>3</sup>/s, July 27, gage height, 3.43 ft; no flow for many days.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.16	1.2	.14	.00	.00	.00	17	86	50	18	21	16
2	.17	1.0	.12	.00	.00	.00	28	82	47	17	19	20
3	.22	1.0	.10	.00	.00	.00	27	75	35	16	18	21
4	.33	.95	.08	.00	.00	.00	23	65	39	15	17	19
5	.35	.82	.06	.00	.00	.00	25	78	40	14	16	18
6	.31	.68	.06	.00	.00	.00	26	72	35	14	14	19
7	.40	.63	.06	.00	.00	.00	26	75	34	14	13	18
8	.40	.60	.05	.00	.00	.00	26	79	35	15	13	17
9	.40	.56	.05	.00	.00	.00	23	89	34	17	14	17
10	.40	.51	.04	.00	.00	.00	21	73	32	20	14	17
11	.75	.46	.04	.00	.00	.00	21	72	36	19	13	17
12	7.2	.46	.03	.00	.00	.00	20	68	33	23	13	16
13	4.4	.46	.03	.00	.00	.00	19	67	31	24	11	16
14	2.9	.46	.02	.00	.00	.50	18	67	29	40	11	16
15	2.2	.46	.02	.00	.00	.75	17	65	26	32	11	15
16	1.8	.48	.01	.00	.00	1.0	16	62	25	28	11	14
17	1.6	.48	.01	.00	.00	1.5	20	61	24	28	11	15
18	1.6	.46	.00	.00	.00	1.0	37	64	19	31	11	14
19	1.6	.44	.00	.00	.00	.75	48	63	18	29	11	13
20	1.8	.40	.00	.00	.00	.50	49	59	19	27	9.6	13
21	2.0	.35	.00	.00	.00	2.0	61	57	20	26	9.4	13
22	2.3	.32	.00	.00	.00	20	57	55	17	25	12	13
23	31	.30	.00	.00	.00	34	51	54	15	25	13	12
24	16	.28	.00	.00	.00	30	56	57	15	24	13	11
25	8.0	.26	.00	.00	.00	48	60	59	16	23	12	15
26	5.0	.24	.00	.00	.00	63	77	59	17	48	12	12
27	3.6	.22	.00	.00	.00	48	86	59	18	114	16	11
28	2.7	.20	.00	.00	.00	36	80	57	19	60	18	14
29	1.8	.18	.00	.00	---	26	76	54	20	34	18	14
30	1.4	.16	.00	.00	---	20	77	50	19	30	17	13
31	1.3	---	.00	.00	---	18	---	47	---	25	16	---
TOTAL	104.09	15.02	.92	.00	.00	351.00	1188	2030	817	875	428.0	459
MEAN	3.36	.50	.03	.00	.00	11.3	39.6	65.5	27.2	28.2	13.8	15.3
MAX	31	1.2	.14	.00	.00	63	86	89	50	114	21	21
MIN	.16	.16	.00	.00	.00	.00	16	47	15	14	9.4	11
AC-FT	206	30	1.8	.00	.00	696	2360	4030	1620	1740	849	910
CAL YR 1985	TOTAL	1979.74		MEAN	5.42	MAX	38	MIN	.00	AC-FT	3930	
WTR YR 1986	TOTAL	6268.03		MEAN	17.2	MAX	114	MIN	.00	AC-FT	12430	

05056400 BIG COULEE NEAR CHURCHS FERRY, ND--CONTINUED

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1958, 1961 to current year.

PERIOD OF DAILY RECORDS.--

WATER TEMPERATURE: October 1983 to current year.

SPECIFIC CONDUCTANCE: October 1983 to current year.

INSTRUMENTATION.--Water-quality monitor since October 1983.

REMARKS.--Records poor. Interruptions in record due to malfunction of recording instruments. No flow Dec. 18 to Mar. 13.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum, 30.5°C, June 20, minimum, 0.0°C on several days during most winters.

SPECIFIC CONDUCTANCE: Maximum, 2,840 microsiemens, Oct. 19, 1984; minimum, 380 microsiemens, Mar. 24, 1986.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURE: Maximum recorded, 30.5°C, June 20; minimum, 0.0°C on several days during winter months.

SPECIFIC CONDUCTANCE: Maximum recorded, 2,420 microsiemens, Oct. 10; minimum recorded, 380 microsiemens, Mar. 24.

## WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	OXYGEN, DIS- SOLVED (MG/L) (00300)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	
OCT 28...	1055	2.7	1600	7.70	12.0	6.5	12.3	--	--	--	--	
DEC 05...	0900	0.06	1110	--	-6.0	0.0	--	--	--	--	--	
MAR 23...	1210	35	--	--	--	0.5	--	--	--	--	--	
MAR 27...	1700	48	500	--	0.5	10.0	--	--	--	--	--	
APR 03...	1430	24	900	7.70	8.0	7.0	10.4	280	90	60	32	
APR 17...	1215	22	1020	--	6.0	2.5	--	--	--	--	--	
MAY 13...	1235	69	1020	7.50	11.5	14.5	9.2	--	--	--	--	
JUL 10...	1315	20	900	7.50	18.0	20.5	10.0	--	--	--	--	
AUG 13...	0800	12	810	8.00	19.0	20.5	9.1	--	--	--	--	
SEP 17...	1235	15	1340	8.10	12.0	10.5	7.9	490	190	86	66	
DATE		SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L) (70301)
APR 03...	80	37	2	15	190	210	32	0.1	20	651	560	
SEP 17...	99	29	2	32	300	370	49	0.2	8.9	909	890	
DATE		SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	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 03...	0.89	5	120	80	<1	52	260	0.3	3	<1	260	
SEP 17...	1.2	4	120	50	1	86	90	0.2	6	<1	380	

## RED RIVER OF THE NORTH BASIN

05056400 BIG COULÉE NEAR CHURCHS FERRY, ND--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCTOBER			NOVEMBER			DECEMBER			JANUARY		
1	7.0	.0	4.0									
2	9.0	3.0	5.5									
3	7.0	5.5	6.0									
4	6.5	3.5	5.0									
5	8.5	3.5	5.5									
6	6.5	3.5	5.0									
7	5.0	.0	1.5									
8	.0	.0	.0									
9	.0	.0	.0									
10	.0	.0	.0									
11	.0	.0	.0									
12	.0	.0	.0									
13	.0	.0	.0									
14	1.0	.0	.0									
15	.5	.0	.0									
16	.5	.0	.0									
17	2.5	.0	1.0									
18	4.5	.5	2.5									
19	5.5	1.5	3.5									
20	7.5	2.5	5.0									
21	8.5	4.5	6.5									
22	11.5	8.0	9.5									
23	8.5	6.0	7.5									
24	7.0	4.0	5.5									
25	8.0	3.5	5.5									
26	7.0	4.5	5.5									
27	6.0	3.0	4.5									
28	4.5	2.5	3.5									
29	---	---	---									
30	---	---	---									
31	---	---	---									
MONTH	11.5	.0	3.5									

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	FEBRUARY			MARCH			APRIL			MAY		
1				---	---	---	---	---	---	10.5	6.5	8.5
2				---	---	---	6.0	2.5	3.5	12.5	7.5	10.5
3				---	---	---	8.5	.0	5.0	16.0	9.0	13.0
4				---	---	---	8.5	5.0	7.0	19.5	13.5	17.0
5				---	---	---	8.0	6.5	7.0	17.0	12.0	15.0
6				---	---	---	12.0	6.0	8.5	11.5	9.0	10.0
7				---	---	---	12.0	7.5	9.5	12.0	8.5	10.5
8				---	---	---	12.5	7.0	9.5	10.0	8.5	9.5
9				---	---	---	13.5	7.5	10.5	13.0	8.0	10.5
10				---	---	---	15.0	9.0	12.0	17.0	10.0	14.0
11				---	---	---	12.5	6.5	10.5	18.5	13.5	16.5
12				---	---	---	---	---	---	18.0	15.0	16.5
13				---	---	---	---	---	---	19.5	14.5	17.0
14				---	---	---	.5	.5	.5	17.0	15.0	16.0
15				.0	.0	.0	.5	.5	.5	15.5	12.5	14.0
16				.0	.0	.0	1.0	.5	1.0	14.0	11.0	12.5
17				.0	.0	.0	3.0	1.0	2.5	16.0	10.5	13.0
18				.0	.0	.0	4.0	3.0	3.5	15.5	12.0	13.5
19				.0	.0	.0	8.5	2.5	6.0	17.0	12.5	14.5
20				.0	.0	.0	6.0	3.0	4.5	19.0	13.5	16.0
21				---	---	---	9.0	2.5	6.0	18.5	14.0	16.0
22				.0	.0	.0	12.5	5.0	9.5	17.5	13.0	15.5
23				.0	.0	.0	15.5	10.5	13.0	15.5	14.0	14.5
24				.0	.0	.0	13.5	10.0	12.0	16.5	13.0	14.5
25				.0	.0	.0	10.5	6.5	8.5	18.5	13.5	16.0
26				.0	.0	.0	8.5	6.0	7.0	22.5	15.5	18.5
27				1.0	.0	.5	7.5	5.5	6.5	24.5	18.5	21.5
28				---	---	---	11.5	5.0	8.5	26.5	20.5	23.5
29				---	---	---	13.0	8.0	11.0	27.5	21.5	24.5
30				---	---	---	13.0	8.0	11.0	28.0	22.5	25.0
31				---	---	---	---	---	---	27.0	23.0	25.0
MONTH				1.0	.0	.0	16.0	.5	7.0	28.0	6.5	15.5







05056405 BIG COULEE AT GRAHAM IS INLET NEAR FORT TOTTEN, ND

LOCATION.--Lat 48°02'25", long 99°02'50", in SW¼ sec.29, T.153 N., R.65 W., Ramsey County, Hydrologic Unit 09020201, at bridge on county highway, 5 mi northwest of Ft. Totten.

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	COLOR (PLAT- INUM- COBALT UNITS) (00080)	OXYGEN, DIS- SOLVED (MG/L) (00300)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	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 29...	0715	3350	9.10	3.0	6.5	100	10.8	750	310	70	140	550
MAY 16...	0815	3150	8.60	6.0	8.0	40	10.0	590	170	70	100	490
DATE	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
OCT 29...	59	9	73	438	0.6	1100	270	0.2	20	2450	2500	3.3
MAY 16...	62	9	61	418	2.0	990	220	0.2	19	2270	2200	3.1
DATE	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P) (00666)	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)	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)
OCT 29...	0.0	<0.10	0.32	20	16	200	480	<1	<10	<1	1	40
MAY 16...	0.0	<0.10	0.22	--	--	--	420	--	--	--	--	--
DATE	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)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	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)	CYANIDE TOTAL (MG/L AS CN) (00720)	
OCT 29...	<1	230	10	<0.1	1	<1	<1	430	9	20	<0.01	

## RED RIVER OF THE NORTH BASIN

05056410 CHANNEL A NEAR PENN, ND

LOCATION.--Lat 48°10'00", long 98°58'47", in SE1/4SW1/4 sec.11, T.154 N., R.65 W., Ramsey County, Hydrologic Unit 09020201, on west bank of Channel A between Highway 2 and the Railroad bridge and 6.8 mi southeast of Penn on Highway 2, or 8.9 mi northwest of Devils Lake on Highway 2.

DRAINAGE AREA.--930 mi<sup>2</sup>, approximately.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1983 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,400.00 ft above National Geodetic Vertical Datum of 1929. Prior to Oct. 1, 1985, water-stage recorder at same site at datum of 1,437.31 ft.

REMARKS.--Estimated daily discharges: Oct. 8-10, Nov. 13 to Mar. 24, July 1-3, 20-21, Aug. 3, 12, 13, 20-22, 27-29, Sept. 3-5, 9, 11, and 19. Flow variable due to wind effect on Dry Lake (station 05056241). Flow regulated by gate control on Dry Lake 3.0 mi upstream.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 195 ft<sup>3</sup>/s, Apr. 29, 1985, gage height, 39.59 ft; no flow at times each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 180 ft<sup>3</sup>/s, Apr. 11, gage height, 39.53 ft; no flow for several days.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.01	19	.50	.01	.00	.00	79	151	93	1.9	1.9	.85
2	.01	16	.40	.01	.00	.00	74	108	32	2.1	1.8	.69
3	.05	9.9	.22	.01	.00	.00	96	71	13	1.9	1.5	.45
4	.08	9.6	.15	.01	.00	.00	93	105	12	1.9	1.6	.47
5	.10	6.0	.10	.01	.00	.00	97	106	9.4	3.9	1.6	.48
6	.14	23	.08	.01	.00	.00	102	147	8.7	1.1	1.4	.50
7	.23	14	.06	.01	.00	.00	121	117	9.8	1.3	1.2	.55
8	.20	14	.05	.01	.00	.00	119	119	9.3	1.4	1.2	.50
9	.20	12	.04	.01	.00	.00	106	77	8.3	1.5	1.6	.80
10	.20	12	.03	.01	.00	.00	104	104	9.3	2.6	1.1	.70
11	.39	11	.02	.01	.00	.00	121	100	8.8	1.9	.93	.74
12	.65	11	.02	.01	.00	.00	152	151	7.6	2.4	1.1	.53
13	.81	11	.01	.01	.00	.00	110	126	7.1	1.6	1.0	.50
14	.85	10	.01	.01	.00	.50	87	126	6.4	12	.93	.59
15	.67	10	.01	.01	.00	5.0	105	117	6.3	2.4	.75	.70
16	.34	11	.01	.01	.00	7.0	102	136	6.4	2.0	.70	.83
17	.57	11	.01	.01	.00	5.0	83	133	4.9	6.2	.70	.84
18	.70	10	.01	.01	.00	2.0	122	109	4.6	3.2	.69	.53
19	.66	9.0	.01	.01	.00	.05	144	100	5.0	2.0	.50	.48
20	.74	6.0	.01	.01	.00	.01	145	89	5.3	1.9	.47	.50
21	.61	5.5	.01	.01	.00	.50	123	81	5.2	1.8	.43	.50
22	.39	5.0	.01	.01	.00	5.0	87	80	4.7	1.7	.48	.35
23	.69	4.5	.01	.01	.00	4.0	120	99	5.0	1.9	.68	.34
24	10	4.0	.01	.01	.00	2.0	138	110	3.8	1.5	.60	.34
25	13	3.5	.01	.01	.00	18	127	113	2.2	1.8	.45	.33
26	18	3.0	.01	.00	.00	19	145	104	3.4	5.5	.70	.25
27	18	2.5	.01	.00	.00	31	138	99	3.6	6.0	.90	.34
28	8.2	2.0	.01	.00	.00	44	140	95	2.7	4.2	.60	.50
29	21	1.5	.01	.00	---	63	114	87	2.6	2.6	.66	.39
30	15	1.0	.01	.00	---	63	135	86	2.3	3.3	.70	.34
31	7.2	---	.01	.00	---	76	---	93	---	2.1	.95	---
TOTAL	119.69	268.0	1.86	.25	.00	345.06	3429	3339	302.7	87.6	29.82	15.91
MEAN	3.86	8.93	.06	.01	.00	11.1	114	108	10.1	2.83	.96	.53
MAX	21	23	.50	.01	.00	76	152	151	93	12	1.9	.85
MIN	.01	1.0	.01	.00	.00	.00	74	71	2.2	1.1	.43	.25
AC-FT	237	532	3.7	.5	.00	684	6800	6620	600	174	59	32
CAL YR 1985	TOTAL	3896.78	MEAN	10.7	MAX	124	MIN	.00	AC-FT	7730		
WTR YR 1986	TOTAL	7938.89	MEAN	21.8	MAX	152	MIN	.00	AC-FT	15750		



05056410 CHANNEL A NEAR PENN, ND--CONTINUED

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1984 to current year.

PERIOD OF DAILY RECORDS.--

WATER TEMPERATURE: October 1983 to current year.

SPECIFIC CONDUCTANCE: October 1983 to current year.

INSTRUMENTATION.--Water-quality monitor since October 1983.

REMARKS.--Records good. Interruptions in record due to malfunction of recording instruments. No flow Jan. 26 to Mar. 13.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum, 31.0°C, June 19, 1986; minimum, 0.0°C on many days most winters.

SPECIFIC CONDUCTANCE: Maximum, 2,880 microsiemens, June 9, 1984; minimum, 230 microsiemens, Apr. 16, 1984.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURE: Maximum, 31.0°C, June 19; minimum, 0.0°C on several days during Nov. and Dec.

SPECIFIC CONDUCTANCE: Maximum, 2,800 microsiemens, Oct. 14; minimum, 400 microsiemens, Mar. 15, 23.

## WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	OXYGEN, DIS- SOLVED (MG/L) (00300)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	
DATE	TIME											
OCT 29...	1520	33	1040	8.30	8.5	7.0	11.0	--	--	--	--	
DEC 03...	1125	0.22	1030	--	-14.0	0.0	--	--	--	--	--	
JAN 15...	1300	0.01	1210	--	-2.5	0.0	--	--	--	--	--	
MAR 24...	1110	7.0	780	--	--	4.0	--	--	--	--	--	
28...	0825	42	630	--	8.0	2.5	--	--	--	--	--	
APR 03...	1635	104	1030	8.50	6.5	5.5	11.4	370	62	70	47	
16...	1240	101	770	--	5.0	3.5	--	--	--	--	--	
MAY 14...	0840	114	690	8.00	13.0	14.0	8.0	--	--	--	--	
JUL 10...	1020	4.2	1080	8.00	15.0	20.5	7.9	370	120	69	49	
AUG 14...	1200	1.0	1000	7.70	21.0	22.5	8.5	--	--	--	--	
SEP 17...	0840	0.99	1430	7.90	9.0	10.5	8.1	--	--	--	--	
		SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTITU- ENTS, DIS- SOLVED (MG/L) (70301)
APR 03...	88	32	2	25	310	220	31	0.1	25	705	690	
JUL 10...	100	35	2	24	260	300	33	0.2	25	788	760	
DATE		SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	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 03...	0.96	11	120	40	1	60	20	0.3	4	<1	330	
JUL 10...	1.1	16	200	30	<1	63	140	<0.1	5	<1	330	

## RED RIVER OF THE NORTH BASIN

05056410 CHANNEL A NEAR PENN, ND--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCTOBER			NOVEMBER			DECEMBER			JANUARY		
1	9.5	2.5	6.0	4.0	2.0	3.0						
2	9.5	4.5	7.0	4.0	1.5	2.5						
3	7.5	6.0	7.0	3.5	2.0	2.5						
4	8.0	4.5	6.5	5.0	1.0	3.0						
5	10.5	5.0	7.5	5.0	3.0	4.0						
6	8.5	5.0	6.5	3.5	.5	2.0						
7	5.5	.0	2.0	---	---	---						
8	.5	.0	.0	---	---	---						
9	1.0	.0	.5	---	---	---						
10	1.5	.0	.5	---	---	---						
11	2.0	.0	.5	---	---	---						
12	3.0	.0	1.0	---	---	---						
13	6.5	1.5	3.5	---	---	---						
14	5.5	2.0	3.5	---	---	---						
15	4.0	1.0	2.5	---	---	---						
16	4.0	1.0	2.0	---	---	---						
17	7.0	1.0	3.5	---	---	---						
18	9.0	2.0	5.0	---	---	---						
19	9.0	2.5	5.5	---	---	---						
20	10.5	4.5	7.0	---	---	---						
21	11.5	6.0	8.5	---	---	---						
22	13.0	9.0	11.0	---	---	---						
23	11.5	7.5	9.5	---	---	---						
24	8.5	5.0	6.5	---	---	---						
25	8.5	4.5	6.5	---	---	---						
26	8.5	6.0	7.0	---	---	---						
27	7.0	5.0	6.0	---	---	---						
28	9.5	3.0	6.0	---	---	---						
29	7.5	4.0	6.0	---	---	---						
30	5.0	2.5	3.5	---	---	---						
31	4.0	.5	2.5	---	---	---						
MONTH	13.0	.0	5.0	5.0	.5	3.0						

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	FEBRUARY			MARCH			APRIL			MAY		
1				---	---	---	8.0	3.5	6.0	8.5	5.5	7.0
2				---	---	---	7.0	4.0	5.0	11.5	5.5	8.5
3				---	---	---	6.0	3.0	4.5	15.5	8.0	12.0
4				---	---	---	6.5	4.0	5.5	19.5	13.0	16.0
5				---	---	---	6.5	5.0	5.5	17.0	13.5	15.0
6				---	---	---	9.5	5.0	7.0	12.5	7.5	9.5
7				---	---	---	10.0	6.5	8.0	10.5	7.0	8.5
8				---	---	---	9.5	5.0	7.5	9.0	7.0	8.0
9				---	---	---	11.5	6.5	9.0	12.5	6.5	9.0
10				---	---	---	13.0	8.0	10.5	16.0	9.5	13.0
11				---	---	---	11.5	6.0	9.5	18.0	13.0	15.5
12				---	---	---	5.5	1.5	3.0	17.0	13.5	15.0
13				---	---	---	1.5	.0	.0	18.5	13.0	15.5
14				---	---	---	.0	.0	.0	16.5	14.0	15.0
15				---	---	---	.0	.0	.0	14.0	11.5	13.0
16				---	---	---	5.0	.0	2.5	12.5	9.5	11.0
17				---	---	---	2.0	1.0	1.5	15.0	9.0	12.0
18				---	---	---	4.0	2.0	3.0	14.5	11.0	13.0
19				---	---	---	7.5	2.0	5.0	17.0	11.5	14.0
20				---	---	---	5.5	3.5	4.5	18.5	13.0	15.5
21				---	---	---	7.5	1.5	4.5	18.0	12.5	15.5
22				---	---	---	12.0	4.0	8.0	17.0	12.0	14.5
23				---	---	---	15.0	9.5	12.0	14.5	12.0	13.0
24				3.5	.0	1.5	12.5	9.5	11.0	15.5	11.5	13.0
25				6.0	.0	2.5	10.5	5.5	8.0	17.5	13.0	15.5
26				5.0	.0	1.5	6.5	4.5	5.5	24.5	14.5	19.0
27				6.0	.0	3.0	6.5	5.0	5.5	25.5	19.0	22.0
28				7.5	2.0	5.0	8.5	4.0	6.0	27.5	20.5	23.5
29				7.5	2.5	5.5	11.5	6.5	9.0	27.0	21.0	24.0
30				7.5	4.0	5.5	11.5	9.0	10.5	27.0	21.5	24.0
31				8.0	5.0	6.5				26.5	22.0	24.0
MONTH				8.0	.0	4.0	15.0	.0	6.0	27.5	5.5	14.5

## 05056410 CHANNEL A NEAR PENN, ND--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	JUNE			JULY			AUGUST			SEPTEMBER		
1	21.5	16.5	19.0	23.5	17.0	20.5	22.5	19.0	20.5	17.0	14.5	15.5
2	23.0	15.5	19.5	27.0	18.0	22.5	23.0	17.0	20.0	16.5	14.0	15.0
3	24.0	19.5	22.0	27.5	19.5	23.5	26.0	18.0	21.5	19.0	15.0	16.5
4	23.0	16.0	19.5	28.5	21.0	24.5	28.0	20.0	23.5	15.5	13.0	14.5
5	22.5	15.0	19.0	24.0	20.0	22.0	28.5	21.5	24.5	14.0	12.0	13.0
6	21.5	17.0	19.5	24.0	16.5	20.5	24.0	21.0	22.5	13.0	9.0	11.5
7	24.0	16.0	20.0	26.0	18.0	21.5	24.0	19.0	21.5	15.5	9.0	12.0
8	21.0	15.0	18.5	28.5	19.0	24.0	25.5	18.5	22.0	19.5	10.0	14.0
9	19.0	15.5	17.5	29.0	21.5	25.0	22.5	19.5	21.0	15.0	11.5	13.0
10	22.5	17.0	19.5	24.5	19.0	22.5	22.0	17.0	19.0	16.0	12.0	13.5
11	22.5	15.5	18.5	24.5	19.5	21.5	24.0	16.0	19.5	19.5	13.0	15.5
12	21.5	16.5	19.0	20.5	17.0	18.5	24.0	17.0	20.5	15.5	12.0	14.0
13	19.5	14.0	17.5	25.5	16.0	20.0	22.5	19.5	20.5	15.0	9.0	12.0
14	23.5	14.0	19.0	25.5	16.0	21.0	24.5	19.0	21.5	14.5	10.0	11.5
15	22.0	17.0	19.5	28.5	19.5	23.5	25.5	19.0	22.0	15.0	9.5	11.5
16	24.0	13.5	18.5	27.0	22.0	24.5	22.0	19.5	20.5	10.5	10.0	10.0
17	23.5	16.5	20.5	27.0	22.0	24.5	22.5	16.0	19.0	13.0	10.0	11.5
18	29.0	18.5	23.5	26.5	21.0	24.0	22.5	17.0	19.5	14.5	10.5	12.0
19	31.0	22.5	27.0	26.5	20.5	23.5	25.5	19.0	22.5	13.0	10.0	11.5
20	27.0	21.5	24.5	24.5	19.0	22.0	23.5	18.5	20.0	12.0	11.0	11.5
21	28.5	21.5	25.0	26.0	19.0	22.5	18.0	15.0	16.5	14.5	12.0	13.0
22	25.0	20.0	22.5	27.5	20.5	24.0	16.5	14.5	15.5	16.0	10.5	13.0
23	23.0	19.0	21.0	29.5	22.0	25.5	20.0	13.5	17.0	18.5	10.5	14.0
24	24.5	16.5	20.5	27.0	23.0	25.0	21.5	16.0	18.5	16.0	12.0	14.0
25	30.5	19.0	25.0	26.5	20.0	23.0	22.5	17.0	19.5	15.5	13.5	14.5
26	30.0	23.0	26.0	27.0	20.0	22.5	18.0	15.0	16.5	19.5	12.5	15.5
27	27.0	20.0	23.5	25.0	19.0	21.5	16.5	13.0	14.5	20.0	13.5	16.0
28	28.0	21.0	24.0	27.5	19.5	23.5	17.5	11.0	14.5	14.5	12.5	13.5
29	23.0	18.5	20.0	27.0	22.0	24.5	21.5	13.0	17.0	16.5	12.0	13.5
30	21.0	17.0	19.0	25.0	20.0	22.5	22.5	15.5	19.5	18.0	9.5	13.0
31				24.5	17.5	21.0	19.0	17.5	18.5			
MONTH	31.0	13.5	21.0	29.5	16.0	22.5	28.5	11.0	19.5	20.0	9.0	13.5
YEAR	31.0	.0	14.0									

SPECIFIC CONDUCTANCE (MICROSIEMENS/CM) at 25 DEG. C), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCTOBER			NOVEMBER			DECEMBER			JANUARY		
1	1600	1280	1400	1220	1000	1060						
2	1720	1000	1240	1080	1000	1030						
3	1700	1400	1500	1120	1000	1080						
4	2020	1300	1560	1120	1000	1040						
5	2200	1820	1970	1220	1080	1170						
6	2220	1820	2020	1220	1000	1060						
7	2280	2000	2100	1120	1000	1070						
8	2420	2000	2210	1220	1080	1150						
9	2380	2200	2290	1400	1220	1320						
10	2200	2020	2090	1520	1400	1470						
11	2200	2000	2100	1700	1480	1640						
12	2600	2020	2250	1620	1600	1620						
13	2420	2200	2300	1780	1620	1700						
14	2800	2400	2470	1820	1680	1800						
15	2420	2080	2240	1820	1680	1770						
16	2280	2080	2160	1780	1620	1690						
17	2720	2220	2430	1680	1600	1630						
18	2720	2080	2450	---	---	---						
19	2620	2200	2410	---	---	---						
20	2620	2420	2550	---	---	---						
21	2480	2220	2320	---	---	---						
22	2400	2120	2360	---	---	---						
23	2420	2200	2330	---	---	---						
24	2420	1000	1640	---	---	---						
25	1080	1000	1020	---	---	---						
26	1080	1000	1030	---	---	---						
27	1080	1000	1020	---	---	---						
28	1120	1000	1080	---	---	---						
29	1200	1000	1060	---	---	---						
30	1080	1000	1030	---	---	---						
31	1220	1000	1100									
MONTH	2800	1000	1860	1820	1000	1370						





## 05056500 DEVILS LAKE NEAR DEVILS LAKE, ND

LOCATION.--Lat 48°04'00", long 98°56'07", in SW¼ sec.18, T.153 N., R.64 W., Ramsey County, Hydrologic Unit 09020201, at Lakewood, on east bank of Creel Bay, 4.5 mi southwest of city of Devils Lake. Creel Bay, which is 0.5 mi wide, is an arm of Devils Lake and extends 2 mi to the north of the lake.

DRAINAGE AREA.--3,130 mi<sup>2</sup>, approximately, of which about 1,000 mi<sup>2</sup> is probably noncontributing.

## GAGE-HEIGHT RECORDS

PERIOD OF RECORD.--1867, 1879, 1883, 1887, 1890, 1896 (one gage height for each year), 1901-63 (fragmentary), 1964 to current year.

REVISED RECORDS.--WSP 1913: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,400.00 ft above National Geodetic Vertical Datum of 1929; gage readings have been reduced to elevations NGVD. June 23, 1950, to June 6, 1963, nonrecording gage at present site and datum. See WSP 1913 for history of changes prior to June 23, 1950. Prior to October 1979 only monthend elevations were published.

REMARKS.--Elevation at gage frequently affected by wind.

EXTREMES FOR PERIOD OF RECORD.--Maximum elevation observed, 1,438.40 ft in 1867, present datum; minimum observed, 1,400.87 ft, Oct. 24, 1940.

EXTREMES OUTSIDE PERIOD OF RECORD.--The lake level was at an elevation of about 1,441 ft around 1830 and lower thereafter. Reference is Geological Survey monograph, volume XXV, the Glacial History of Lake Agassiz by Warren Upham.

EXTREMES FOR CURRENT YEAR.--Maximum elevation, 1,427.34 ft, May 12; minimum, 1,425.85 ft, Oct. 3.

## MONTHEND ELEVATION, IN FEET, AT 2400, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

Oct. 31.....	1,426.14	Jan. 31.....	1,426.22	Apr. 30.....	-----	July 31.....	1,426.87
Nov. 30.....	1,426.15	Feb. 28.....	1,426.26	May 31.....	1,426.91	Aug. 31.....	1,426.52
Dec. 31.....	1,426.20	Mar. 31.....	1,426.49	June 30.....	1,426.71	Sept.30.....	1,426.49

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	25.90	26.13	26.15	26.20	26.23	26.27	26.49	26.91	26.98	26.74	26.87	26.51
2	25.90	26.08	26.16	26.21	26.23	26.27	26.46	26.92	27.03	26.75	26.84	26.56
3	25.90	26.08	26.17	26.22	26.24	26.27	26.53	26.96	26.98	26.76	26.85	26.58
4	25.99	26.10	26.19	26.21	26.23	26.26	26.53	27.00	26.93	26.74	26.84	26.57
5	25.97	26.21	26.19	26.21	26.23	26.25	26.56	26.98	26.93	26.90	26.84	26.49
6	25.94	26.12	26.20	26.19	26.22	26.23	26.59	27.11	26.94	26.81	26.82	26.48
7	25.89	26.10	26.20	26.20	26.23	26.23	26.60	26.94	26.94	26.71	26.81	26.49
8	26.12	26.03	26.20	26.23	26.22	26.26	26.58	26.91	26.90	26.72	26.78	26.45
9	26.09	26.03	26.21	26.24	26.21	26.26	26.59	27.01	26.87	26.70	26.78	26.43
10	26.11	26.05	26.20	26.23	26.21	26.26	26.60	27.15	26.77	26.77	26.76	26.45
11	26.08	26.05	26.18	26.24	26.21	26.26	26.61	27.12	26.76	26.79	26.75	26.46
12	26.10	26.06	26.18	26.22	26.21	26.26	26.57	27.21	26.82	26.81	26.73	26.44
13	26.13	26.05	26.17	26.21	26.21	26.27	26.53	27.15	26.74	26.82	26.73	26.41
14	26.13	26.05	26.19	26.21	26.21	26.27	26.61	27.13	26.74	26.83	26.76	26.38
15	26.07	26.06	26.19	26.22	26.23	26.29	26.67	27.15	26.74	26.86	26.76	26.38
16	26.05	26.07	26.18	26.23	26.23	26.30	26.68	27.15	26.74	26.87	26.73	26.38
17	26.12	26.06	26.18	26.23	26.23	26.31	26.68	27.05	26.70	26.89	26.71	26.46
18	26.10	26.04	26.18	26.23	26.23	26.33	26.76	27.04	26.72	26.88	26.69	26.44
19	26.08	26.09	26.20	26.23	26.23	26.32	26.83	27.05	26.74	26.89	26.71	26.42
20	26.16	26.10	26.19	26.23	26.23	26.33	26.78	27.03	26.80	26.85	26.71	26.42
21	26.11	26.10	26.22	26.21	26.26	26.35	26.81	27.01	26.85	26.85	26.63	26.47
22	26.15	26.12	26.23	26.21	26.26	26.38	26.89	26.98	26.84	26.83	26.63	26.53
23	26.24	26.12	26.21	26.21	26.27	26.38	---	26.98	26.78	26.84	26.63	26.48
24	26.20	26.12	26.18	26.22	26.28	26.41	---	27.02	26.77	26.85	26.66	26.45
25	26.19	26.14	26.19	26.22	26.27	26.43	26.80	27.03	26.81	26.81	26.60	26.52
26	26.19	26.16	26.22	26.19	26.27	26.43	---	27.04	26.80	26.83	26.59	26.56
27	26.12	26.16	26.20	26.19	26.25	26.45	---	27.05	26.81	26.89	26.58	26.57
28	26.20	26.17	26.20	26.21	26.26	26.47	---	27.05	26.77	26.90	26.57	26.50
29	26.16	26.16	26.20	26.21	---	26.48	---	27.05	26.73	26.90	26.58	26.52
30	26.16	26.16	26.20	26.22	---	26.49	---	27.05	26.74	26.93	26.56	26.51
31	26.16	---	26.20	26.21	---	26.51	---	27.03	---	26.89	26.54	---
MEAN	26.09	26.10	26.19	26.22	26.24	26.33	---	27.04	26.82	26.83	26.71	26.48
MAX	26.24	26.21	26.23	26.24	26.28	26.51	---	27.21	27.03	26.93	26.87	26.58
MIN	25.89	26.03	26.15	26.19	26.21	26.23	---	26.91	26.70	26.70	26.54	26.38

## RED RIVER OF THE NORTH BASIN

05057000 SHEYENNE RIVER NEAR COOPERSTOWN, ND

LOCATION.--Lat 47°25'58", long 98°01'38", in NW¼NW¼SW¼ sec.26, T.146 N., R.58 W., Griggs County, Hydrologic Unit 09020203, on right bank 150 ft upstream from county bridge, and 5 mi east of Cooperstown.

DRAINAGE AREA.--6,470 mi<sup>2</sup>, approximately, of which about 5,200 mi<sup>2</sup> is probably noncontributing, includes 3,800 mi<sup>2</sup> in closed basins.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1944 to current year. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WSP 1728: Drainage area. WRD ND-80-1: Gage datum.

GAGE.--Water-stage recorder. Datum of gage is 1,271.76 ft above National Geodetic Vertical Datum of 1929, Coast and Geodetic Survey benchmark. Prior to Oct. 22, 1985, gage located on right bank 300 ft downstream of present site. Datum of gage was 1,271.76 ft. Prior to Aug. 3, 1950, nonrecording gage at site 150 ft downstream of present site at same datum.

REMARKS.--Estimated daily discharges: Nov. 19 to Mar. 25. Records good except those for period with ice effect, Nov. 19 to Mar. 25, which are fair.

AVERAGE DISCHARGE.--42 years, 107 ft<sup>3</sup>/s, 77,520 acre-ft/yr; median of yearly mean discharges, 86 ft<sup>3</sup>/s, 62,300 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,830, ft<sup>3</sup>/s, Apr. 17, 1950, gage height, 18.69 ft; no flow at times.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 200 ft<sup>3</sup>/s and maximum (\*):

Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)	Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)
Mar. 25	----	*1760	8*15.56	May 12	0830	480	11.11
Apr. 28	1000	644	11.52				

Minimum daily discharge, 5.3 ft<sup>3</sup>/s, Sept. 15.

a - Backwater from ice

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	29	93	30	20	9.0	16	787	592	93	31	43	10
2	23	106	29	20	9.0	16	662	574	86	30	41	17
3	21	116	29	19	9.5	16	554	549	82	29	40	18
4	21	123	28	19	10	17	475	517	76	32	38	25
5	20	127	28	18	10	19	424	476	71	30	38	35
6	20	125	27	17	10	19	390	431	66	31	38	35
7	23	119	27	17	10	18	360	397	60	33	42	30
8	24	103	27	21	10	18	330	364	57	36	54	23
9	27	86	26	22	10	20	310	346	53	39	69	23
10	29	91	26	23	9.0	25	298	333	52	44	78	17
11	31	87	26	24	8.0	26	285	326	47	45	79	11
12	37	84	25	24	9.0	23	271	446	45	45	77	8.9
13	41	80	24	23	10	25	260	398	44	52	72	7.8
14	50	76	23	23	10	29	256	348	42	68	70	5.4
15	62	70	22	26	10	34	247	309	42	106	69	5.3
16	65	62	21	30	10	50	233	281	40	142	62	11
17	64	59	19	33	10	120	231	260	42	179	57	9.0
18	62	52	19	32	10	300	276	249	40	185	47	15
19	63	51	20	30	10	435	333	239	41	170	40	28
20	67	51	21	28	10	535	352	223	44	144	35	25
21	74	50	23	26	10	700	367	205	41	117	29	29
22	80	48	26	22	10	950	403	187	37	93	27	35
23	86	42	24	20	10	1240	449	173	35	80	26	31
24	85	37	24	18	12	1530	489	161	33	72	24	35
25	83	35	26	16	15	1590	525	149	34	63	18	39
26	82	33	24	10	16	1700	566	141	35	57	16	40
27	82	32	23	9.0	17	1570	619	133	34	54	15	42
28	81	31	20	9.0	16	1370	638	125	33	55	16	38
29	82	30	20	9.0	---	1180	630	116	33	57	17	39
30	81	30	20	9.0	---	1040	613	111	31	54	15	42
31	84	---	20	9.0	---	896	---	102	---	47	12	---
TOTAL	1679	2129	747	626.0	299.5	15527	12633	9261	1469	2220	1304	729.4
MEAN	54.2	71.0	24.1	20.2	10.7	501	421	299	49.0	71.6	42.1	24.3
MAX	86	127	30	33	17	1700	787	592	93	185	79	42
MIN	20	30	19	9.0	8.0	16	231	102	31	29	12	5.3
AC-FT	3330	4220	1480	1240	594	30800	25060	18370	2910	4400	2590	1450
CAL YR 1985	TOTAL	26491.3		MEAN	72.6	MAX	740	MIN	2.0	AC-FT	52550	
WTR YR 1986	TOTAL	48623.9		MEAN	133	MAX	1700	MIN	5.3	AC-FT	96450	

## RED RIVER OF THE NORTH BASIN

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05057000 SHEYENNE RIVER NEAR COOPERSTOWN, ND--CONTINUED

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1960 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	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)	PERCENT SODIUM (00932)
OCT 17...	1250	64	605	--	9.5	4.5	--	--	--	--	--
DEC 10...	1211	26	--	--	-10.0	0.0	--	--	--	--	--
JAN 08...	1300	20	1340	--	-4.5	0.0	--	--	--	--	--
FEB 19...	1535	10	975	--	-12.5	0.0	--	--	--	--	--
MAR 25...	0930	1400	442	7.90	7.0	2.5	130	29	14	37	36
28...	1235	1370	570	--	15.0	3.5	--	--	--	--	--
31...	1540	1070	490	--	13.5	8.5	--	--	--	--	--
APR 01...	0955	784	520	--	8.0	7.5	--	--	--	--	--
09...	1025	312	530	--	10.5	6.5	--	--	--	--	--
MAY 01...	1315	588	685	--	7.5	9.0	--	--	--	--	--
28...	1225	124	582	--	31.0	19.5	--	--	--	--	--
JUN 26...	0950	35	745	--	--	20.5	--	--	--	--	--
AUG 07...	1155	40	875	8.30	20.0	21.0	330	68	39	83	35

DATE	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR 25...	1	10	140	65	5.2	0.1	15	275	260	0.37
AUG 07...	2	9.9	330	150	14	0.2	25	599	590	0.81

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)
MAR 25...	2	110	170	1	26	250	0.3	2	<1	150
AUG 07...	6	260	40	<1	70	290	0.2	2	<1	320

## RED RIVER OF THE NORTH BASIN

05057200 BALDHILL CREEK NEAR DAZEY, ND

LOCATION.--Lat 47°13'45", long 98°07'28", in NW1/4SE1/4SW1/4 sec.2, T.143 N., R.59 W., Barnes County, Hydrologic Unit 09020203, on left bank 500 ft upstream from bridge on county highway, 4.5 mi northeast of Dazez, and 14 mi upstream from mouth.

DRAINAGE AREA.--691 mi<sup>2</sup>, of which about 340 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

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

REVISED RECORDS.--WSP 1728: Drainage area.

GAGE.--Water-stage recorder. Prior to Nov. 9, 1956, nonrecording gage 500 ft downstream at same datum.

REMARKS.--Estimated daily discharges: Oct. 1 to Mar. 29 and June 24 to Sept. 25. Records poor.

AVERAGE DISCHARGE.--30 years, 15.2 ft<sup>3</sup>/s, 11,010 acre-ft/yr; median of yearly mean discharges, 12 ft<sup>3</sup>/s, 8,700 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, about 9,000 ft<sup>3</sup>/s, Apr. 19, 1979, on basis of contracted opening measurement of peak flow at site 4.5 mi downstream, gage height, 17.78 ft, from floodmark; no flow at times.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 60 ft<sup>3</sup>/s and maximum (\*):

Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)	Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)
Mar. 20	0200	a*210	*6.51	May 12	0545	127	5.80

Minimum daily discharge, 1.0 ft<sup>3</sup>/s, Aug. 30 and Sept. 5.

a - Backwater from ice

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.7	4.2	2.0	2.0	1.9	3.2	29	40	11	1.9	6.2	1.1
2	3.6	4.1	2.0	2.0	1.9	4.2	27	38	11	1.8	6.2	1.3
3	3.8	4.1	1.9	2.0	1.9	6.5	27	35	9.2	1.8	6.1	7.0
4	4.1	3.9	1.9	2.0	1.9	12	24	33	8.6	2.8	6.1	3.5
5	4.1	3.9	1.9	2.0	1.9	25	24	30	8.3	3.4	6.1	1.0
6	4.1	3.8	1.9	2.0	1.9	18	23	29	7.7	4.0	5.8	1.1
7	4.1	4.1	1.8	2.0	1.9	10	22	26	6.7	5.0	6.0	1.5
8	4.1	3.9	1.7	2.4	1.8	7.5	21	25	6.0	6.2	5.8	2.5
9	4.5	3.8	1.7	2.5	1.8	7.0	20	28	5.2	8.3	5.5	3.2
10	4.9	3.6	1.6	2.6	1.7	7.5	19	27	5.2	12	4.7	3.4
11	5.0	3.5	1.6	3.0	1.7	9.5	18	26	4.1	14	4.1	3.1
12	5.2	3.3	1.5	2.9	1.7	12	18	86	3.4	15	3.8	3.1
13	5.4	3.1	1.5	2.8	1.6	18	17	56	3.5	16	3.6	2.7
14	5.5	2.9	1.5	2.7	1.6	32	14	75	3.5	5.6	4.5	1.9
15	5.3	2.8	1.5	2.6	1.6	46	16	81	3.8	4.4	7.5	1.8
16	5.1	2.9	1.5	2.5	1.6	61	19	72	4.2	4.2	12	2.2
17	5.4	2.9	1.5	2.5	1.6	79	22	62	4.0	3.9	10	2.9
18	5.6	2.8	1.5	2.5	1.6	65	27	52	3.4	3.5	8.3	3.1
19	5.6	2.5	1.5	2.5	1.6	77	43	45	2.8	3.3	6.7	2.2
20	5.7	2.5	1.5	2.5	1.6	171	52	37	3.2	4.0	4.4	2.1
21	5.6	2.4	1.7	2.4	1.5	145	53	32	3.5	3.8	3.1	3.5
22	5.5	2.4	2.0	2.4	1.5	143	55	27	4.2	3.7	2.5	8.6
23	6.0	2.4	2.2	2.4	1.4	112	50	27	4.5	4.0	2.1	12
24	5.7	2.4	2.0	2.4	1.4	87	41	28	3.2	4.0	1.9	12
25	5.5	2.3	2.0	2.4	1.4	71	38	26	2.0	3.9	1.8	12
26	5.2	2.3	2.0	2.2	1.6	72	40	25	2.0	3.9	1.8	13
27	4.9	2.2	2.0	2.1	2.1	54	44	23	2.0	5.4	1.7	11
28	4.5	2.2	2.0	2.0	2.8	44	45	20	1.9	6.0	1.5	11
29	4.4	2.1	2.0	2.0	---	38	43	19	1.9	6.5	1.4	12
30	4.4	2.1	2.0	2.0	---	35	42	17	1.9	6.8	1.0	10
31	4.2	---	2.0	2.0	---	35	---	13	---	6.5	1.1	---
TOTAL	150.7	91.4	55.4	72.3	48.5	1507.4	933	1160	141.9	175.6	143.3	155.8
MEAN	4.86	3.05	1.79	2.33	1.73	48.6	31.1	37.4	4.73	5.66	4.62	5.19
MAX	6.0	4.2	2.2	3.0	2.8	171	55	86	11	16	12	13
MIN	3.6	2.1	1.5	2.0	1.4	3.2	14	13	1.9	1.8	1.0	1.0
AC-FT	299	181	110	143	96	2990	1850	2300	281	348	284	309

CAL YR 1985	TOTAL	1748.06	MEAN	4.79	MAX	62	MIN	.25	AC-FT	3470
WTR YR 1986	TOTAL	4635.3	MEAN	12.7	MAX	171	MIN	1.0	AC-FT	9190



## RED RIVER OF THE NORTH BASIN

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05057200 BALDHILL CREEK NEAR DAZEY, ND--CONTINUED

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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 23...	1130	5.9	--	--	9.5	5.5	--	--	--	--	--
DEC 10...	1410	1.6	650	--	-8.0	0.5	--	--	--	--	--
JAN 08...	1455	2.4	1420	--	0.5	1.0	--	--	--	--	--
FEB 20...	1240	1.6	850	--	-22.5	0.0	--	--	--	--	--
MAR 18...	0910	56	308	7.30	0.5	0.5	120	26	29	11	9.0
MAR 31...	1300	35	580	--	11.5	9.0	--	--	--	--	--
APR 08...	1250	21	710	--	11.0	5.5	--	--	--	--	--
MAY 22...	1125	28	490	--	21.0	15.0	--	--	--	--	--
JUN 25...	1300	1.9	860	8.40	30.0	21.5	350	66	59	48	70
AUG 05...	1045	6.1	485	--	20.0	23.0	--	--	--	--	--
DATE	PERCENT SODIUM RATIO (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR 18...	13	0.4	13	92	43	2.9	0.1	11	199	170	0.27
JUN 25...	30	2	8.9	280	190	17	0.2	2.2	591	560	0.8
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)	
MAR 18...	<1	60	140	<1	11	140	0.2	1	<1	88	
JUN 25...	4	240	20	<1	69	80	<0.1	1	<1	360	

## RED RIVER OF THE NORTH BASIN

05057500 LAKE ASHTABULA AT BALDHILL DAM, ND

LOCATION.--Lat 47°02'00", long 98°05'00", in NW¼ sec.18, T.141 N., R.58 W., Barnes County, Hydrologic Unit 09020203 at Baldhill Dam on Sheyenne River, and 8 mi northwest of Valley City.

DRAINAGE AREA.--7,470 mi<sup>2</sup>, approximately, of which about 5,560 mi<sup>2</sup> is probably noncontributing, including 3,800 mi<sup>2</sup> in closed basins.

## MONTHEND-ELEVATION AND CONTENTS RECORDS

PERIOD OF RECORD.--July 1949 to current year.

REVISED RECORDS.--WSP 1238: 1950(M). WSP 1728: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is National Geodetic Vertical Datum of 1929.

REMARKS.--Reservoir is formed by an earth-fill dam, 1,650 ft long; storage began on July 30, 1949; dam completed September 1949. Usable capacity, 69,100 acre-ft between invert of outlet conduit, elevation, 1,238.0 ft, and normal pool level, elevation, 1,266.0 ft. Dead storage below elevation 1,238.0 ft, 1,500 acre-ft. Maximum pool elevation, 1,273.2 ft, capacity, 116,500 acre-ft. Low flows are controlled by 2 sluice gates 3 ft in diameter. The spillway crest is 120 ft long at elevation 1,252.0 ft, surmounted by 3 taintor gates, each 15 ft high and 40 ft long. The reservoir is operated for flood control and to increase low-water flow.

COOPERATION.--Records furnished by U.S. Army Corps of Engineers.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 91,400 acre-ft, May 14, 1950, elevation, 1,269.46 ft; minimum since reservoir first reached spillway level, 6,660 acre-ft, Aug. 11-14, 1950, elevation, 1,245.13 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 74,820 acre-ft, April 28, elevation, 1,266.74 ft; minimum, 33,880 acre-ft, Mar. 14, elevation, 1,257.90 ft.

## MONTHEND ELEVATION AND CONTENTS WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30-----	1,265.31	66,740	--
Oct. 31-----	1,265.48	67,690	+950
Nov. 30-----	1,265.11	65,620	-2,070
Dec. 31-----	1,263.79	58,450	-7,170
CAL YR 1985-----	--	--	+5,110
Jan. 31-----	1,262.33	51,480	-6,970
Feb. 28-----	1,259.72	40,550	-10,930
Mar. 31-----	1,264.44	61,920	+21,370
Apr. 30-----	1,266.33	72,480	+10,560
May 31-----	1,266.26	72,080	-400
June 30-----	1,266.06	70,940	-1,140
July 31-----	1,266.13	71,340	+400
Aug. 31-----	1,265.78	69,370	-1,970
Sept. 30-----	1,265.93	70,210	+840
WTR YR 1986-----	--	--	+3,470

## 05058000 SHEYENNE RIVER BELOW BALDHILL DAM, ND

LOCATION.--Lat 47°01'50", long 98°05'50", in NW¼ sec.18, T.141 N., R.58 W., Barnes County, Hydrologic Unit 09020204, on right bank 600 ft downstream from Baldhill Dam, 8 mi northwest of Valley City, and at mile 270.5.

DRAINAGE AREA.--7,470 mi<sup>2</sup>, approximately, of which about 5,560 mi<sup>2</sup> is probably noncontributing, including 3,800 mi<sup>2</sup> in closed basins.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1949 to current year. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WSP 1728: Drainage area.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 1,200.00 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Sept. 18-30. Records good except those for period of missing record, Sept. 18-30, which are fair. Flow completely regulated by Lake Ashtabula (station 05057500). Records 1955 to 1972 include releases at Baldhill Dam to the fish-rearing ponds of the Fish and Wildlife Service. Small diversions are still made but not published.

AVERAGE DISCHARGE (UNADJUSTED).--37 years, 126 ft<sup>3</sup>/s, 91,290 acre-ft/yr; median of yearly mean discharges, 96 ft<sup>3</sup>/s, 69,600 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,740 ft<sup>3</sup>/s, Apr. 24, 1979, gage height, 36.26 ft; no flow at times in 1950, 1952-53, 1970.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,050 ft<sup>3</sup>/s, Apr. 19, gage height, 30.22 ft; minimum daily, 7.4 ft<sup>3</sup>/s, Sept. 14.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	21	63	125	148	138	263	175	460	125	14	72	10
2	21	63	126	146	132	256	207	509	124	14	60	9.2
3	21	64	126	152	135	255	252	538	127	14	59	9.0
4	21	64	136	148	133	259	323	529	129	14	43	9.6
5	23	64	141	149	139	261	362	527	129	13	32	9.9
6	23	64	139	147	138	262	359	525	108	13	32	10
7	23	64	144	141	138	272	361	430	93	13	32	10
8	22	77	146	143	135	262	317	366	93	13	31	9.8
9	22	99	146	132	138	257	239	395	70	15	30	9.8
10	22	100	149	139	116	253	145	381	39	19	30	9.5
11	22	97	145	135	89	193	73	355	27	21	31	8.5
12	21	101	138	140	117	163	44	353	27	19	31	9.4
13	21	101	137	142	167	169	45	382	26	19	28	9.4
14	21	98	147	147	205	169	125	443	26	21	32	7.4
15	21	98	145	146	259	172	258	475	26	38	67	7.8
16	21	98	147	138	247	178	291	443	27	56	99	11
17	22	99	143	132	247	180	418	414	26	73	98	28
18	23	101	142	135	242	182	1280	413	26	89	98	41
19	23	97	151	138	241	202	1690	335	26	66	98	38
20	23	99	154	135	244	145	500	189	26	67	100	47
21	34	101	145	140	259	92	182	113	27	146	100	47
22	44	116	133	137	271	93	44	95	27	186	149	47
23	45	135	142	138	267	93	18	86	27	182	188	47
24	45	128	139	134	276	75	14	81	27	184	186	52
25	45	129	145	141	270	34	210	78	29	134	95	56
26	45	128	146	139	259	23	441	78	30	77	11	65
27	46	126	153	134	274	23	721	90	22	110	11	57
28	53	125	152	142	265	88	1090	102	15	143	11	57
29	61	132	150	141	---	103	992	102	15	115	11	57
30	63	128	148	138	---	80	561	112	14	87	11	58
31	63	---	150	134	---	103	---	123	---	87	11	---
TOTAL	981	2959	4430	4351	5541	5160	11737	9522	1533	2062	1887	847.3
MEAN	31.6	98.6	143	140	198	166	391	307	51.1	66.5	60.9	28.2
MAX	63	135	154	152	276	272	1690	538	129	186	188	65
MIN	21	63	125	132	89	23	14	78	14	13	11	7.4
AC-FT	1950	5870	8790	8630	10990	10230	23280	18890	3040	4090	3740	1680
CAL YR 1985	TOTAL	25592.5		MEAN	70.1	MAX	588	MIN	5.0	AC-FT	50760	
WTR YR 1986	TOTAL	51010.3		MEAN	140	MAX	1690	MIN	7.4	AC-FT	101200	

## RED RIVER OF THE NORTH BASIN

05058000 SHEYENNE RIVER BELOW BALDHILL DAM, ND--CONTINUED

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1959 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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 23...	0925	43	475	--	4.5	4.0	--	--	--	--	--
DEC 10...	1550	151	--	--	-8.0	4.0	--	--	--	--	--
JAN 09...	1050	140	850	--	4.0	3.0	--	--	--	--	--
FEB 20...	1545	235	650	--	20.0	3.0	--	--	--	--	--
MAR 22...	1455	90	535	--	22.5	16.0	--	--	--	--	--
APR 07...	1630	364	670	--	13.5	6.0	--	--	--	--	--
JUL 29...	1320	144	718	--	30.5	24.0	--	--	--	--	--
SEP 15...	1520	11	725	8.70	16.0	19.0	240	19	50	29	69
DATE	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
SEP 15...	37	2	11	220	140	12	0.2	17	501	460	0.68
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)	
SEP 15...	4	100	10	<1	53	30	0.1	2	1	300	



## 05058500 SHEYENNE RIVER AT VALLEY CITY, ND

LOCATION.--Lat 46°54'50", long 98°00'30", in SE1/4NW1/4 sec.28, T.140 N., R.58 W., Barnes County, Hydrologic Unit 09020204, on left bank 100 ft downstream from College Dam in Valley City, and at mile 253.0.

DRAINAGE AREA.--7,810 mi<sup>2</sup>, approximately, of which about 5,700 mi<sup>2</sup> is probably noncontributing, includes 3,800 mi<sup>2</sup> in closed basins.

## GAGE-HEIGHT RECORDS

PERIOD OF RECORD.--March to August 1919, March to June 1938, August 1938 to September 1975; October 1979 to current year (gage heights and annual maximum discharge since 1979). Records for July 1938, published in WSP 855, have been found to be unreliable and should not be used.

REVISED RECORDS.---WSP 1388: 1939 (M). WSP 1728: Drainage area.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 1,199.27 ft above National Geodetic Vertical Datum of 1929. March to August 1919, nonrecording gage at site 0.5 mi upstream at different datum. March to Oct. 13, 1938, nonrecording gage at present site and datum.

REMARKS.--Flow regulated by Lake Ashtabula 13 mi upstream (see station 05057500). Small diversions above station for municipal supply.

AVERAGE DISCHARGE (UNADJUSTED).--37 years (1938-75), 124 ft<sup>3</sup>/s, 89,840 acre-ft/yr; median of yearly mean discharges, 97 ft<sup>3</sup>/s, 70,300 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,580 ft<sup>3</sup>/s, Apr. 28, 1948, gage height, 17.51 ft; maximum gage height, 17.62 ft, Apr. 19, 1969; no flow during several periods in 1938-41.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2100 ft<sup>3</sup>/s, Apr. 19, gage height, 11.04 ft; minimum not determined.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.97	3.22	---	---	4.25	4.98	3.82	5.40	3.72	2.89	3.32	2.88
2	2.96	3.22	---	---	4.19	4.83	4.06	5.87	3.69	2.86	3.23	2.90
3	2.98	3.22	---	---	4.18	4.74	4.38	5.97	3.70	2.85	3.17	2.89
4	3.02	3.29	---	---	4.16	4.70	4.78	5.88	3.70	2.89	3.15	2.87
5	3.00	3.40	---	---	4.19	4.62	5.12	5.96	3.69	2.86	2.99	2.85
6	3.01	3.35	---	---	4.18	4.57	5.19	5.95	3.64	2.82	3.20	2.84
7	3.05	3.12	---	---	4.12	4.56	5.19	5.86	3.48	2.83	3.22	2.84
8	3.05	2.97	3.76	---	4.08	4.62	5.09	5.21	3.41	2.87	3.10	2.84
9	3.01	3.07	4.07	4.30	4.10	4.53	4.58	5.32	3.36	2.86	3.06	2.86
10	3.01	3.07	4.07	4.27	3.76	4.51	4.23	5.52	3.13	2.94	3.03	2.89
11	3.01	3.13	4.07	4.24	3.63	4.45	3.26	5.02	3.00	2.97	3.02	2.90
12	3.06	3.43	4.02	4.19	4.09	4.03	2.92	5.17	2.96	3.06	3.01	2.91
13	3.05	3.46	4.00	4.25	4.61	3.99	3.00	5.20	2.94	3.00	3.14	2.88
14	3.04	3.46	4.02	4.21	5.18	4.06	3.31	5.56	2.96	2.96	3.44	2.87
15	3.03	3.47	4.13	4.26	5.49	4.23	4.22	5.78	2.98	2.95	3.44	2.89
16	3.02	3.48	4.13	4.23	5.47	4.39	4.85	5.58	2.97	3.01	3.43	2.88
17	3.02	3.46	4.13	4.10	5.46	4.66	5.12	5.42	2.96	3.10	3.48	2.94
18	3.03	3.51	4.13	4.10	5.37	4.44	6.91	5.41	2.96	3.25	3.46	3.03
19	3.03	3.60	4.15	4.14	5.43	4.34	10.40	5.11	2.96	3.33	3.45	3.12
20	3.04	3.58	4.22	4.12	5.43	4.24	7.68	4.52	2.99	3.19	3.44	3.13
21	3.05	---	4.23	4.08	5.37	3.76	4.71	3.79	3.00	3.40	3.42	3.15
22	3.14	---	4.22	4.08	5.65	4.07	3.21	3.54	2.99	4.01	3.74	3.15
23	3.18	---	4.16	4.07	5.68	4.40	3.10	3.42	2.96	3.95	4.29	3.14
24	3.16	---	3.88	4.04	5.71	3.85	3.04	3.38	2.94	3.90	3.70	3.15
25	3.15	---	3.94	4.09	5.75	3.35	3.65	3.40	2.97	3.70	3.70	3.17
26	3.16	---	4.16	4.00	5.48	3.06	5.56	3.38	2.97	3.56	3.38	3.18
27	3.15	---	---	4.08	5.29	3.07	6.43	3.36	2.96	3.37	3.05	3.18
28	3.15	---	---	4.11	5.18	3.10	7.41	3.51	2.94	3.53	2.95	3.19
29	3.19	---	---	4.20	---	3.59	8.41	3.56	2.91	3.68	2.82	3.20
30	3.22	---	---	4.21	---	3.46	6.46	3.70	2.90	3.56	2.74	3.19
31	3.22	---	---	4.20	---	3.60	---	3.79	---	3.36	2.84	---
MEAN	3.07	---	---	---	4.84	4.15	5.00	4.79	3.16	3.21	3.27	3.00
MAX	3.22	---	---	---	5.75	4.98	10.40	5.97	3.72	4.01	4.29	3.20
MIN	2.96	---	---	---	3.63	3.06	2.92	3.36	2.90	2.82	2.74	2.84

## RED RIVER OF THE NORTH BASIN

05058700 SHEYENNE RIVER AT LISBON, ND

LOCATION.--Lat 46°26'49", long 97°40'44", on line between secs.1 and 2, T.134 N., R.56 W., Ransom County, Hydrologic Unit 09020204, on left bank 150 ft downstream from dam at State Fish Hatchery at north edge of city of Lisbon, 3 mi upstream from Timber Coulee, and at mile 162.1.

DRAINAGE AREA.--8,190 mi<sup>2</sup>, approximately, of which about 5,700 mi<sup>2</sup> is probably noncontributing, including 3,800 mi<sup>2</sup> in closed basins.

## WATER-DISCHARGE RECORDS

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

REVISED RECORDS.--WSP 1728: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,066.46 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Nov. 27 to Mar. 27 and Sept. 9-15. Records good except those for period with ice effect, Nov. 27 to Mar. 27, which are fair. Flow regulated by Lake Ashtabula (station 05057500) 108.5 mi upstream.

AVERAGE DISCHARGE.--30 years, 158 ft<sup>3</sup>/s, 114,400 acre-ft/yr; median of yearly mean discharges, 162 ft<sup>3</sup>/s, 117,400 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,270 ft<sup>3</sup>/s, July 1, 1975, gage height, 19.04 ft; no flow Sept. 19-21, Oct. 23, 24, 1956, Aug. 16, 1961.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,110 ft<sup>3</sup>/s, Apr. 21, gage height, 10.75 ft; minimum daily, .70 ft<sup>3</sup>/s, Sept. 12.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	24	62	139	150	149	347	174	1450	116	41	141	32
2	27	75	143	150	153	335	144	1050	135	38	129	38
3	28	79	156	150	152	334	184	683	137	34	106	36
4	29	80	147	150	148	342	205	728	132	38	95	35
5	25	82	136	150	139	339	254	754	131	37	87	32
6	24	80	136	150	134	357	315	699	133	35	76	29
7	23	95	137	150	126	366	367	694	135	31	72	27
8	28	105	139	150	129	325	367	724	136	29	60	24
9	31	75	141	150	140	298	356	770	130	29	56	1.7
10	33	61	134	150	140	288	341	646	118	32	75	24
11	37	69	134	150	140	284	285	613	110	29	67	35
12	40	75	136	150	140	272	237	597	105	32	55	.70
13	36	109	144	149	140	280	202	472	92	42	52	.80
14	35	109	148	135	130	271	145	459	74	49	48	.90
15	33	108	136	136	123	280	93	455	70	57	45	2.6
16	34	109	137	144	195	328	92	535	79	69	68	25
17	37	115	150	135	200	407	169	576	59	60	100	30
18	33	112	162	135	210	514	371	521	50	54	102	25
19	32	97	163	135	220	578	696	479	47	49	93	32
20	31	89	152	130	230	583	1390	463	47	64	96	31
21	30	84	151	130	230	519	1970	395	49	80	95	33
22	32	94	148	130	270	494	1590	290	54	97	101	46
23	34	115	144	130	300	494	585	194	43	88	100	59
24	32	120	131	130	290	466	299	156	42	105	99	77
25	33	125	130	130	295	550	242	128	42	163	149	69
26	49	130	130	130	300	405	258	117	41	165	184	45
27	59	138	130	132	300	265	512	113	38	161	130	47
28	58	140	149	130	300	199	910	108	36	153	112	57
29	58	139	150	130	---	161	1190	105	34	135	98	64
30	58	136	150	130	---	150	1350	104	39	124	63	60
31	58	---	150	135	---	151	---	112	---	125	43	---
TOTAL	1121	3007	4433	4336	5423	10982	15293	15190	2454	2245	2797	1018.70
MEAN	36.2	100	143	140	194	354	510	490	81.8	72.4	90.2	34.0
MAX	59	140	163	150	300	583	1970	1450	137	165	184	77
MIN	23	61	130	130	123	150	92	104	34	29	43	.70
AC-FT	2220	5960	8790	8600	10760	21780	30330	30130	4870	4450	5550	2020
CAL YR 1985	TOTAL	30212.4		MEAN	82.8	MAX	627	MIN	6.2	AC-FT	59930	
WTR YR 1986	TOTAL	68299.70		MEAN	187	MAX	1970	MIN	.70	AC-FT	135500	

## RED RIVER OF THE NORTH BASIN

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05058700 SHEYENNE RIVER AT LISBON, ND--CONTINUED

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	COLOR (PLAT- INUM- COBALT UNITS) (00080)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	HARD- NESS (MG/L AS CACO3) (00900)	
OCT	25...	1305	32	980	8.10	18.5	9.5	10	9.2	85	300
DEC	13...	1135	151	835	8.20	-20.0	0.0	15	11.6	81	260
FEB	13...	1210	140	975	7.90	-16.5	0.0	30	13.4	95	270
MAR	26...	1000	418	690	--	1.0	0.5	--	--	--	--
APR	03...	1115	186	709	8.20	4.5	4.0	25	12.0	95	220
	22...	1050	1770	715	--	15.0	7.0	--	--	--	--
	22...	1300	1600	715	--	16.0	7.0	--	--	--	--
MAY	01...	1610	1480	718	8.10	9.5	9.5	50	10.4	95	230
JUL	03...	1120	33	935	8.06	26.0	23.0	5	8.1	100	310
	29...	1645	130	750	8.20	24.0	24.5	15	6.6	82	240
SEP	10...	1050	81	860	8.30	14.0	15.5	12	8.2	86	280
DATE		HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	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)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)
OCT	25...	43	66	34	94	39	2	11	262	4.0	200
DEC	13...	1	54	31	84	40	2	10	262	3.2	140
FEB	13...	0	57	32	90	40	2	11	303	7.4	170
APR	03...	23	51	23	56	34	2	8.4	199	2.4	130
MAY	01...	24	52	25	62	35	2	9.8	209	3.2	150
JUL	03...	63	69	33	77	34	2	12	245	4.1	200
	29...	15	52	27	64	36	2	9.3	226	2.7	150
SEP	10...	35	63	31	74	35	2	10	250	2.4	170
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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P) (00666)	BORON, DIS- SOLVED (UG/L AS B) (01020)
OCT	25...	41	0.2	12	600	620	0.82	52	0.12	0.10	240
DEC	13...	21	0.2	19	530	520	0.72	216	0.27	0.17	200
FEB	13...	21	0.2	21	605	580	0.82	229	0.62	0.24	220
APR	03...	20	0.2	13	457	420	0.62	230	0.48	0.15	120
MAY	01...	17	0.1	14	468	460	0.64	1870	0.30	0.13	130
JUL	03...	33	0.2	18	572	590	0.78	51	<0.10	<0.01	220
	29...	19	0.3	15	489	470	0.67	172	<0.10	0.08	160
SEP	10...	25	0.2	15	607	540	0.83	133	<0.10	0.04	180

## RED RIVER OF THE NORTH BASIN

05059000 SHEYENNE RIVER NEAR KINDRED, ND  
(National stream-quality accounting network station)

LOCATION.--Lat 46°37'35", long 97°00'05", in NE1/4NW1/4 sec.5, T.136 N., R.50 W., Richland County, Hydrologic Unit 09020204, on right bank 25 ft downstream from Burlington Northern Railway bridge, 1.5 mi southeast of Kindred, and at mile 68.1.

DRAINAGE AREA.--8,800 mi<sup>2</sup>, approximately, of which about 5,780 mi<sup>2</sup> is probably noncontributing, including 3,800 mi<sup>2</sup> in closed basins.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--July 1949 to current year.

REVISED RECORDS.--WSP 1728: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 925.55 ft above National Geodetic Vertical Datum of 1929. July 1949 to Sept. 30, 1962, nonrecording gage at same site and datum.

REMARKS.--Estimated daily discharges: Nov. 10 to Apr. 3. Records good except those for period with ice effect, Nov. 10 to Apr. 3, which are fair. Flow regulated to a large degree by Lake Ashtabula (station 05057500) 202 mi upstream and several small reservoirs.

AVERAGE DISCHARGE.--37 years, 200 ft<sup>3</sup>/s, 144,900 acre-ft/yr; median of yearly mean discharges, 167 ft<sup>3</sup>/s, 121,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,690 ft<sup>3</sup>/s, Apr. 15, 1969, gage height, 21.03 ft; maximum gage height, 21.66 ft, July 6, 1975; minimum daily discharge, 13 ft<sup>3</sup>/s, Nov. 13, 1955, Aug. 22-24, 1959.

EXTREMES OUTSIDE PERIOD OF RECORD.--Spring flood in 1947 or 1948 reached a stage of 22.1 ft from floodmarks, discharge about 3,600 ft<sup>3</sup>/s.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,740 ft<sup>3</sup>/s, Apr. 24, gage height, 11.13 ft; minimum daily, 38 ft<sup>3</sup>/s, Oct. 2.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	39	77	122	146	164	342	292	1250	215	92	172	138
2	38	77	124	149	163	355	253	1360	206	90	166	122
3	42	75	155	131	162	370	265	1420	206	89	150	110
4	48	74	147	119	161	380	281	1310	208	95	162	97
5	49	78	133	120	160	375	300	980	216	93	167	85
6	51	83	147	131	160	380	349	797	220	95	157	81
7	53	85	152	160	160	380	372	797	217	90	144	79
8	57	87	152	192	160	380	413	777	214	87	130	76
9	57	84	145	193	160	385	463	854	209	82	122	72
10	57	40	138	179	160	400	497	895	208	82	112	71
11	56	52	134	173	160	395	494	902	210	110	105	75
12	60	77	148	167	159	390	481	844	209	100	101	76
13	64	76	168	166	158	380	454	743	195	96	97	73
14	65	76	164	172	154	390	475	700	184	91	107	75
15	67	64	169	182	153	390	481	638	181	84	112	92
16	70	66	157	182	158	395	469	572	183	86	111	80
17	66	80	147	176	140	410	485	564	171	97	100	71
18	64	80	146	172	109	460	482	568	170	115	91	63
19	62	75	150	172	110	500	631	615	160	159	88	67
20	61	71	143	170	151	550	682	612	145	150	107	86
21	62	73	148	169	169	719	817	575	136	129	121	96
22	63	78	145	168	194	816	1160	546	128	112	127	93
23	62	74	127	165	265	917	1530	527	118	101	138	89
24	61	80	119	160	277	834	1700	488	110	107	144	86
25	60	96	145	154	302	779	1210	416	112	119	148	98
26	59	83	150	168	322	780	856	345	105	124	143	104
27	59	66	138	168	328	687	723	298	99	132	137	109
28	59	68	131	167	330	685	870	265	96	171	154	123
29	58	89	126	166	---	686	847	247	92	179	186	120
30	61	115	125	165	---	581	1080	235	92	182	168	108
31	73	---	121	165	---	388	---	225	---	176	143	---
TOTAL	1803	2299	4416	5067	5249	15879	19412	21365	5015	3515	4110	2715
MEAN	58.2	76.6	142	163	187	512	647	689	167	113	133	90.5
MAX	73	115	169	193	330	917	1700	1420	220	182	186	138
MIN	38	40	119	119	109	342	253	225	92	82	88	63
AC-FT	3580	4560	8760	10050	10410	31500	38500	42380	9950	6970	8150	5390
CAL YR 1985	TOTAL	40784	MEAN	112	MAX	528	MIN	27	AC-FT	80900		
WTR YR 1986	TOTAL	90845	MEAN	249	MAX	1700	MIN	38	AC-FT	180200		



## RED RIVER OF THE NORTH BASIN

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05059000 SHEYENNE RIVER NEAR KINDRED, ND--CONTINUED

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	TUR- BID- ITY (NTU) (00076)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED SATUR- ATION (00301)	COLI- FORM, FECAL, O.7 UM-MF (COLS./ 100 ML) (31625)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)
OCT 31...	1425	73	870	8.50	11.5	6.0	6.0	9.6	80	30	70
DEC 18...	1340	146	870	8.00	-19.0	0.0	10	9.0	64	40	60
FEB 13...	1630	160	905	7.90	-13.5	0.0	14	13.3	94	30	35
APR 10...	1045	501	815	8.20	12.0	9.0	33	10.4	93	70	40
24...	1055	1740	700	--	10.0	9.0	--	--	--	--	--
JUL 01...	1540	90	850	8.10	24.0	21.0	7.0	10.4	122	81	100
AUG 08...	0940	130	760	8.10	22.0	21.0	--	7.3	86	--	--
SEP 17...	1250	70	760	8.00	11.5	12.5	--	8.5	83	--	--

DATE	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	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)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)
OCT 31...	310	44	75	29	67	31	2	8.6	263	1.6	160
DEC 18...	280	6	61	31	82	38	2	10	274	5.3	110
FEB 13...	290	0	62	32	83	37	2	12	306	7.4	170
APR 10...	280	0	66	29	65	32	2	10	237	5.5	150
JUL 01...	320	99	76	31	56	27	1	7.8	--	3.4	150
AUG 08...	--	--	--	--	--	--	--	--	--	4.1	--
SEP 17...	--	--	--	--	--	--	--	--	--	5.2	--

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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)
OCT 31...	34	0.3	17	552	550	0.75	109	<0.01	<0.10	0.05
DEC 18...	21	0.2	20	559	500	0.76	220	0.01	0.33	0.14
FEB 13...	22	0.2	22	606	590	0.82	262	0.01	0.66	0.20
APR 10...	24	0.3	16	539	630	0.73	729	--	--	--
JUL 01...	25	0.2	17	501	490	0.68	122	0.02	<0.10	0.04
SEP 17...	--	--	--	--	--	--	--	0.01	<0.10	0.03

## RED RIVER OF THE NORTH BASIN

05059000 SHEYENNE RIVER NEAR KINDRED, ND--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS NH4) (71846)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS- PHORUS, TOTAL (MG/L AS P) (00665)	PHOS- PHORUS TOTAL (MG/L AS PO4) (71886)	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)
OCT 31...	0.03	0.04	0.7	0.09	0.28	0.03	0.02	20	4	110
DEC 18...	0.14	0.18	0.9	0.14	--	0.11	0.13	--	--	--
FEB 13...	0.20	0.26	1.5	0.22	--	0.20	0.16	<10	5	82
APR 10...	--	--	--	--	--	--	--	20	4	100
JUL 01...	0.08	0.1	0.9	0.12	--	0.02	<0.01	--	--	--
SEP 17...	0.03	0.04	0.9	0.08	--	0.04	0.03	--	--	--
DATE	BERYL- LIUM, DIS- SOLVED (UG/L AS BE) (01010)	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)
OCT 31...	<0.5	<1	<1	<3	2	9	2	55	43	<0.1
FEB 13...	<0.5	1	<1	<3	<1	13	<1	60	27	0.2
APR 10...	<0.5	<1	<1	<3	3	12	3	52	16	<0.1
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)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	SEDI- MENT, DIS- SUS- PENDE (MG/L) (80154)	SEDI- MENT, DIS- CHARGE, SUS- PENDE (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
OCT 31...	<10	4	<1	<1	350	<6	12	--	--	--
FEB 13...	<10	6	<1	<1	320	<6	13	--	--	--
APR 10...	<10	4	<1	<1	310	<6	6	316	427	98
JUL 01...	--	--	--	--	--	--	--	90	22	88
SEP 17...	--	--	--	--	--	--	--	29	5.5	96

## RED RIVER OF THE NORTH BASIN

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05059400 SHEYENNE RIVER NEAR HORACE, ND

LOCATION.--Lat 46°48'13", long 96°54'13", in NW¼NW¼ sec.5, T.138 N., R.49 W., Cass County, Hydrologic Unit 09020204, at bridge on county road 3 mi north and 0.1 mi east of Horace.

DRAINAGE AREA.--8,850 mi<sup>2</sup>, approximately, of which about 5,780 mi<sup>2</sup> is probably noncontributing, including 3,800 mi<sup>2</sup> in closed basins.

## GAGE-HEIGHT RECORDS

PERIOD OF RECORD.--October 1979 to current year (gage heights and annual maximum discharge).

GAGE.--Water-stage recorder. Datum of gage is 888.94 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Records fair. Mean-daily gage heights for Apr. 2, May 11-19, 22, 26, 27, 29, June 2, 4, 5, 9, 10, 12, and 16 were obtained by using observer readings or telemark readings. Flow regulated to a large degree by Lake Ashtabula (station 05057500) 241 mi upstream. Above 3,000 ft<sup>3</sup>/s overflow occurs upstream between Kindred and Horace. This overflow bypasses the station by flowing into the Maple River to the west and into the Wild Rice River to the east.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,070 ft<sup>3</sup>/s, Apr. 12, 1984, determined from a hydrographic comparison with stations 05059000, Sheyenne River near Kindred, ND and 05059500, Sheyenne River at West Fargo, ND; maximum recorded gage height, 21.31 ft, Mar. 22, 1983, ice jam; minimum not determined.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,720 ft<sup>3</sup>/s, Apr. 25, gage height, 16.08 ft; minimum not determined.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.66	5.11	---	7.15	7.73	9.79	10.70	13.42	---	5.47	6.58	6.28
2	4.61	5.22	---	7.35	7.74	9.80	8.33	14.20	7.50	5.46	6.51	6.18
3	4.58	5.25	---	7.49	7.71	9.86	---	14.67	---	5.44	6.41	6.02
4	4.59	5.25	---	7.52	7.71	10.01	7.93	14.90	6.88	5.50	6.22	5.77
5	4.64	5.24	---	7.53	7.72	10.14	7.98	14.16	6.91	5.51	6.26	5.55
6	4.72	5.27	6.77	7.42	7.72	10.20	8.06	12.68	---	5.47	6.36	5.36
7	4.77	5.38	6.74	7.41	7.73	10.24	8.35	11.89	---	5.48	6.28	5.26
8	4.82	5.46	6.74	7.62	7.74	10.34	8.46	11.82	---	5.46	6.09	5.25
9	4.86	5.11	6.81	7.67	7.76	10.47	8.82	11.82	6.92	5.39	5.86	5.20
10	4.91	5.01	6.80	7.69	7.79	10.61	9.24	12.19	6.91	5.42	5.72	5.18
11	4.91	5.24	6.82	7.70	7.84	10.77	9.47	12.39	---	5.64	5.61	5.17
12	4.97	5.06	6.87	7.66	7.89	10.85	9.43	12.45	6.91	5.73	5.51	5.19
13	4.95	5.58	6.94	7.62	7.95	10.77	9.34	12.13	---	5.63	5.42	5.22
14	5.00	5.77	7.06	7.64	7.98	10.70	9.35	11.57	---	5.48	5.38	5.22
15	5.03	5.75	7.19	7.67	7.99	10.74	9.57	11.31	---	5.50	5.50	5.23
16	5.07	5.53	7.25	7.72	7.96	10.82	9.71	10.93	6.57	5.39	5.57	5.47
17	5.12	5.45	7.26	7.74	7.93	10.88	9.71	10.53	---	5.34	5.58	5.42
18	5.13	6.05	7.24	7.73	7.83	11.00	9.75	10.43	6.49	5.47	5.47	5.23
19	5.07	6.32	7.21	7.70	7.55	11.11	10.30	10.40	6.43	5.72	5.34	5.13
20	5.03	6.21	7.20	7.67	7.43	11.30	10.96	---	6.36	6.31	5.26	5.13
21	4.98	6.05	7.21	7.70	7.68	11.61	11.22	---	6.15	6.33	5.45	5.36
22	4.97	6.06	7.30	7.74	7.95	12.16	12.20	10.56	6.02	6.04	5.80	5.62
23	5.00	6.05	7.35	7.76	8.05	13.12	13.99	---	5.88	5.76	5.90	5.63
24	5.00	6.10	7.38	7.77	8.23	14.34	15.52	---	5.78	5.59	6.01	5.56
25	5.00	6.07	7.40	7.74	8.70	14.03	15.86	---	5.69	5.59	6.12	5.61
26	4.98	6.08	7.43	7.73	9.33	13.60	13.92	9.37	5.67	5.74	6.19	5.63
27	4.95	6.09	7.48	7.71	9.66	13.27	12.25	8.80	5.63	6.02	6.15	5.71
28	4.93	6.35	7.50	7.67	9.77	12.52	12.14	---	5.54	5.96	6.08	5.81
29	4.92	---	7.42	7.67	---	12.53	12.44	7.93	5.48	6.41	6.22	6.03
30	4.92	---	7.29	7.69	---	12.44	12.42	---	5.46	6.73	6.75	6.11
31	4.92	---	7.20	7.72	---	11.76	---	---	---	6.71	6.65	---
MEAN	4.90	---	---	7.63	8.04	11.35	---	---	---	5.73	5.94	5.52
MAX	5.13	---	---	7.77	9.77	14.34	---	---	---	6.73	6.75	6.28
MIN	4.58	---	---	7.15	7.43	9.79	---	---	---	5.34	5.26	5.13

## RED RIVER OF THE NORTH BASIN

## 05059500 SHEYENNE RIVER AT WEST FARGO, ND

LOCATION.--Lat 46°53'28", long 96°54'24", in SE¼SE¼ sec.31, T.140 N., R.49 W., Cass County, Hydrologic Unit 09020204, on right bank at downstream side of county highway bridge, 1 mi north of West Fargo, 3 mi upstream from Maple River, and at mile 24.5.

DRAINAGE AREA.--8,870 mi<sup>2</sup>, approximately, of which about 5,780 mi<sup>2</sup> is probably noncontributing, including 3,800 mi<sup>2</sup> in closed basins.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--March to November 1902 (gage heights only), April 1903 to October 1905, March to August 1919, September 1929 to current year. Published as "at or near Haggart" 1902-7, 1919. Records for March to November 1902 and November 1905 to June 1907, published in WSP 100, 171, 207, and 245, have been found to be unreliable and should not be used. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WSP 1388: 1904(M). WSP 1728: Drainage area. See also "PERIOD OF RECORD."

GAGE.--Water-stage recorder. Datum of gage is 877.19 ft above National Geodetic Vertical Datum of 1929. June 27, 1933, to September 1969 on left bank about 600 ft downstream on unimproved channel at same datum. See WSP 1728 or 1913 for history of changes prior to June 27, 1933.

REMARKS.--Estimated daily discharges: Nov. 10 to Mar. 31. Records good except those for period with ice effect, Nov. 10 to Mar. 31, which are fair. Flow regulated to a large degree by Lake Ashtabula (station 05057500) 246 mi upstream. Above 3,000 ft<sup>3</sup>/s overflow that occurs upstream from the gaging station Sheyenne River near Horace (station 05059400) bypasses this station by flowing into the Maple River drainage to the west or into the Wild Rice River drainage to the east. This overflow is not included in the flow for this station. During some years, flow is diverted from just above the station into the Red River of the North in order to maintain adequate supply for municipal uses. Figures of daily discharge do not include this diversion.

AVERAGE DISCHARGE (ADJUSTED).--59 years (water years 1904-5, 1930-86), 179 ft<sup>3</sup>/s, 129,700 acre-ft/yr; median of yearly mean discharges, 149 ft<sup>3</sup>/s, 108,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,480 ft<sup>3</sup>/s, Apr. 21, 1979, gage height, 22.12 ft, backwater from Red and/or Maple Rivers; maximum gage height, 22.25 ft, July 5, 1975, backwater from Red and/or Maple Rivers; minimum daily, 1.0 ft<sup>3</sup>/s, Sept. 23, 1976, caused by diversion to Red River of the North.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,720 ft<sup>3</sup>/s, Apr. 25, gage height, 14.97 ft; maximum gage height, 16.48 ft, Mar. 26, backwater from ice; minimum daily, 50 ft<sup>3</sup>/s, Oct. 31.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	58	56	112	143	153	290	551	1200	245	114	214	190
2	53	66	118	152	157	287	425	1320	233	114	207	177
3	52	67	124	167	156	286	330	1410	223	114	198	168
4	51	65	144	169	155	293	298	1450	217	127	184	144
5	54	64	142	167	155	302	320	1360	217	117	176	125
6	62	64	143	136	155	307	312	1060	222	117	192	110
7	66	68	141	118	154	309	345	863	237	116	186	99
8	75	73	140	171	154	317	356	842	232	119	173	97
9	73	82	142	171	152	325	390	835	227	115	153	95
10	74	72	144	177	155	335	441	882	228	128	139	94
11	75	66	139	174	138	347	481	930	226	145	129	94
12	82	54	146	172	146	358	484	941	227	137	121	91
13	75	59	145	168	164	355	473	900	228	140	114	92
14	73	88	145	166	166	352	511	810	223	125	113	93
15	77	90	155	164	163	350	504	760	209	128	113	94
16	78	82	170	168	165	356	540	703	196	123	120	103
17	78	71	170	171	163	359	530	642	201	109	122	112
18	80	70	153	171	162	368	566	621	209	110	119	98
19	73	70	166	167	147	375	683	625	185	124	108	92
20	67	75	147	162	132	387	935	657	187	164	100	85
21	63	80	148	163	143	413	883	673	170	190	103	97
22	60	75	150	163	160	465	912	645	158	169	131	114
23	60	75	150	162	165	609	1190	618	144	145	142	121
24	59	75	150	168	172	879	1510	598	136	129	151	116
25	59	75	150	163	182	1140	1680	565	129	121	160	117
26	58	70	145	155	217	1190	1400	501	125	131	169	119
27	56	80	140	142	264	948	1060	423	126	160	168	118
28	52	80	140	156	285	709	1070	362	119	154	163	125
29	51	87	140	156	---	673	1240	318	114	177	163	139
30	51	108	140	156	---	728	1170	286	113	226	208	156
31	50	---	140	155	---	667	---	262	---	226	222	---
TOTAL	1995	2207	4479	4993	4680	15079	21590	24062	5706	4314	4761	3475
MEAN	64.4	73.6	144	161	167	486	720	776	190	139	154	116
MAX	82	108	170	177	285	1190	1680	1450	245	226	222	190
MIN	50	54	112	118	132	286	298	262	113	109	100	85
AC-FT	3960	4380	8880	9900	9280	29910	42820	47730	11320	8560	9440	6890
CAL YR 1985	TOTAL	43390	MEAN	119	MAX	596	MIN	30	AC-FT	86060		
WTR YR 1986	TOTAL	97341	MEAN	267	MAX	1680	MIN	50	AC-FT	193100		



## RED RIVER OF THE NORTH BASIN

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05059500 SHEYENNE RIVER AT WEST FARGO, ND--CONTINUED

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1969 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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 23...	1425	60	878	--	13.5	10.5	--	--	--	--	--
DEC 17...	1540	169	875	--	-21.0	0.0	--	--	--	--	--
JAN 31...	1050	154	890	--	-6.5	0.0	--	--	--	--	--
MAR 27...	1620	896	545	7.60	11.0	0.5	190	22	43	19	39
APR 02...	1715	400	662	--	10.5	4.5	--	--	--	--	--
24...	1700	1570	688	--	13.0	9.0	--	--	--	--	--
JUL 11...	1315	145	760	--	19.0	22.0	--	--	--	--	--
AUG 08...	1350	173	788	--	27.0	22.5	--	--	--	--	--
SEP 05...	1345	124	780	8.20	15.0	17.5	290	44	67	29	61
.											
DATE	PERCENT SODIUM RATIO (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINIT LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR 27...	30	1	9.8	160	8.6	12	0.2	17	246	280	0.33
SEP 05...	31	2	9.8	240	140	21	0.2	14	469	490	0.64
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)	
MAR 27...	3	100	70	<1	29	60	0.1	1	<1	230	
SEP 05...	5	120	30	<1	50	<1	0.4	3	<1	360	

## RED RIVER OF THE NORTH BASIN

05059600 MAPLE RIVER NEAR HOPE, ND

LOCATION.--Lat 47°19'30", long 97°47'25", in NW1/4NW1/4 sec.4, T.144 N., R.56 W., Steele County, Hydrologic Unit 09020205, 100 ft downstream from box culvert on State Highway 38, 500 ft east of the intersection of State Highway 32 and 38, and 3 mi west of Hope.

DRAINAGE AREA.--20.2 mi<sup>2</sup>, of which about 2.8 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1964 to current year (seasonal records only since 1983).

GAGE.--Water-stage recorder. Datum of gage is 1,296.62 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Mar. 1-23, Apr. 12-16, and Aug. 4, 5. Records good except those for periods with ice effect, Mar. 1-23 and Apr. 12-16, and period of missing record, Aug. 4, 5, which are fair.

AVERAGE DISCHARGE.--18 years (water years 1965-82), 2.82 ft<sup>3</sup>/s, 2,040 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 900 ft<sup>3</sup>/s, Apr. 18, 1979, gage height, 5.86 ft, backwater from ice; no flow for many months each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 100 ft<sup>3</sup>/s, Mar. 17, gage height, 3.69 ft, backwater from ice; maximum gage height, 3.99 ft, Mar. 15, backwater from ice; no flow for many days.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1						.00	2.7	5.3	.06	.00	4.3	.00
2						.00	2.5	3.7	.04	.00	1.9	.00
3						.05	2.4	2.8	.02	.00	.79	.00
4						.10	2.3	2.3	.00	.00	.30	.00
5						.00	2.1	2.1	.00	.00	.10	.00
6						.00	2.1	1.8	.00	.00	.02	.00
7						.00	2.0	1.5	.00	.00	.02	.00
8						.00	1.6	1.4	.00	.00	.00	.00
9						.00	1.5	2.0	.00	.00	.00	.00
10						.00	1.4	2.0	.00	.00	.00	.00
11						.00	1.2	1.8	.00	.00	.00	.00
12						.00	1.0	7.7	.00	.00	.00	.00
13						.00	.90	22	.00	.00	.00	.00
14						.10	.80	9.9	.00	.00	.00	.00
15						4.5	.70	6.3	.00	.00	.00	.00
16						60	.60	4.3	.00	.00	.09	.00
17						70	1.0	2.9	.00	.00	.15	.00
18						10	3.5	2.3	.00	.00	.07	.00
19						6.5	9.3	1.9	.00	.00	.04	.00
20						5.5	13	1.5	.00	.00	.02	.00
21						6.0	8.0	1.3	.00	.00	.01	.00
22						15	5.3	1.0	.00	.00	.01	.01
23						24	3.8	.88	.00	.00	.01	.00
24						17	2.8	.92	.00	.00	.00	.00
25						12	2.5	.81	.00	.00	.00	.00
26						7.9	5.2	.82	.00	.00	.00	.00
27						6.3	8.3	.68	.00	.00	.00	.00
28						5.6	14	.54	.00	11	.00	.00
29						4.7	9.5	.40	.00	26	.00	.00
30						3.7	7.1	.25	.00	14	.00	.00
31						3.2	---	.15	---	9.3	.00	---
TOTAL						262.15	119.10	93.25	.12	60.30	7.83	.01
MEAN						8.46	3.97	3.01	.00	1.95	.25	.00
MAX						70	14	22	.06	26	4.3	.01
MIN						.00	.60	.15	.00	.00	.00	.00

## RED RIVER OF THE NORTH BASIN

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05059600 MAPLE RIVER NEAR HOPE, ND--CONTINUED

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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)
MAR											
03...	1425	0.03	810	--	--	0.0	--	--	--	--	--
17...	1530	91	272	6.70	1.5	0.5	110	35	24	11	11
25...	1205	12	570	--	6.5	3.5	--	--	--	--	--
APR											
07...	1315	2.0	590	--	10.5	8.0	--	--	--	--	--
MAY											
23...	1120	0.77	695	--	13.5	13.0	--	--	--	--	--
AUG											
06...	1030	0.02	1020	7.30	20.0	25.0	430	150	98	46	75
SEP											
19...	1048	0.01	510	--	10.0	11.5	--	--	--	--	--
		SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR											
17...	17	0.5	11	71	44	3.3	0.1	13	190	160	0.26
AUG											
06...	27	2	9.3	280	280	18	0.2	33	748	730	1.0
		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											
17...	1	50	160	<1	11	40	0.2	1	<1	76	
AUG											
06...	4	170	60	<1	51	180	<0.1	3	<1	350	

## RED RIVER OF THE NORTH BASIN

05059700 MAPLE RIVER NEAR ENDERLIN, ND

LOCATION.--Lat 46°37'18", long 97°34'25", on west line sec.2, T.136 N., R.55 W., Ransom County, Hydrologic Unit 09020205, on left bank 25 ft downstream from county highway bridge, 1 mi downstream from South Branch, and 1.2 mi east of Enderlin.

DRAINAGE AREA.--843 mi<sup>2</sup>, of which about 47 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

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

REVISED RECORDS.--WSP 1728: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,056.72 ft above National Geodetic Vertical Datum of 1929. Sept. 21, 1956 to June 9, 1969, recording gage on right bank at same datum. Prior to Sept. 20, 1956, nonrecording gage at site 25 ft upstream at same datum.

REMARKS.--Estimated daily discharges: Oct. 1-25, Feb. 4-25, Mar. 19-23, and May 9-12. Records good except those for periods of estimated daily discharges, which are fair.

AVERAGE DISCHARGE.--30 years, 37.8 ft<sup>3</sup>/s, 27,390 acre-ft/yr; median of yearly mean discharges, 26 ft<sup>3</sup>/s, 18,800 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,610 ft<sup>3</sup>/s, June 30, 1975, gage height, 15.41 ft; minimum daily, 0.1 ft<sup>3</sup>/s, Dec. 7-9, 1963.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 100 ft<sup>3</sup>/s and maximum (\*):

Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)	Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)
Mar. 16	2215	209	5.63	Apr. 28	1545	618	7.33
Mar. 24	0815	*1090	*8.48	May 16	0315	132	5.07
Apr. 22	0515	665	7.47				

Minimum daily discharge, 1.6 ft<sup>3</sup>/s, Dec. 22.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.3	2.6	4.7	1.7	1.9	2.1	244	453	20	3.9	15	5.2
2	2.3	2.8	4.6	1.7	1.9	2.2	195	351	19	3.7	18	6.3
3	2.4	3.1	3.6	1.7	1.9	2.3	163	271	17	3.8	13	5.8
4	2.5	3.0	3.6	1.8	1.9	2.7	137	207	16	4.5	8.5	5.4
5	2.5	2.8	3.3	1.8	1.9	14	126	155	13	3.4	7.3	4.8
6	2.4	2.7	3.2	1.9	1.9	24	116	121	9.4	3.8	5.8	4.3
7	2.5	2.9	3.2	1.9	1.9	13	103	98	8.2	3.6	5.0	3.8
8	2.7	3.0	3.2	1.9	1.9	9.4	93	92	4.5	3.3	5.2	3.7
9	2.8	3.6	3.2	1.9	1.9	6.8	85	89	6.8	3.6	4.5	3.6
10	2.7	3.3	2.9	1.9	1.9	12	79	87	6.5	13	3.8	3.6
11	2.6	3.2	2.8	1.8	1.9	12	73	84	6.3	26	3.5	4.0
12	2.7	3.0	2.2	1.7	1.9	12	66	82	5.4	14	3.7	3.6
13	2.8	3.2	2.1	1.9	1.9	15	59	79	4.6	8.5	7.1	4.0
14	2.7	3.2	1.9	1.9	1.9	22	71	74	4.6	10	22	3.8
15	2.7	3.4	1.8	1.9	1.9	65	53	98	6.8	11	12	5.4
16	2.7	3.5	1.8	1.9	1.9	132	62	130	6.1	10	15	4.7
17	2.7	3.4	1.8	1.8	1.9	145	73	111	4.9	8.6	15	5.2
18	2.7	3.5	1.8	1.9	1.9	107	121	91	5.2	7.5	11	5.5
19	2.7	3.6	1.8	1.9	1.9	73	397	76	5.1	6.7	8.6	7.3
20	2.6	3.3	1.8	1.8	1.9	130	448	62	4.9	5.8	7.5	7.4
21	2.6	3.4	1.8	2.3	1.9	234	602	53	6.0	5.6	5.7	7.4
22	2.6	3.5	1.6	2.1	1.9	340	648	45	5.8	5.1	6.4	7.9
23	2.6	3.5	1.7	2.0	1.9	726	534	40	5.3	5.1	6.3	7.1
24	2.6	3.5	1.8	1.8	1.9	963	387	38	5.8	7.7	8.3	7.3
25	2.6	3.5	1.8	1.9	1.9	866	311	35	5.7	7.8	5.8	8.9
26	2.1	3.6	1.8	2.0	1.9	802	338	32	5.2	7.6	4.9	7.6
27	2.2	3.5	1.8	2.0	2.1	704	385	30	4.8	9.5	4.2	8.0
28	2.4	3.5	1.7	2.0	2.1	556	572	28	4.6	8.4	4.3	7.8
29	2.6	3.6	1.8	2.0	---	451	578	26	4.6	7.5	4.2	7.8
30	2.8	3.6	1.7	1.9	---	369	579	24	4.4	14	4.4	8.4
31	3.1	---	1.7	1.9	---	304	---	22	---	13	4.7	---
TOTAL	80.2	98.3	74.5	58.6	53.6	7116.5	7698	3184	226.5	246.0	250.7	175.6
MEAN	2.59	3.28	2.40	1.89	1.91	230	257	103	7.55	7.94	8.09	5.85
MAX	3.1	3.6	4.7	2.3	2.1	963	648	453	20	26	22	8.9
MIN	2.1	2.6	1.6	1.7	1.9	2.1	53	22	4.4	3.3	3.5	3.6
AC-FT	159	195	148	116	106	14120	15270	6320	449	488	497	348
CAL YR 1985	TOTAL	4428.5		MEAN	12.1	MAX	272	MIN	1.4	AC-FT	8780	
WTR YR 1986	TOTAL	19262.5		MEAN	52.8	MAX	963	MIN	1.6	AC-FT	38210	



05059700 MAPLE RIVER NEAR ENDERLIN, ND--CONTINUED

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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											
25...	1100	2.6	1510	--	13.0	8.0	--	--	--	--	--
DEC											
05...	1125	3.2	1510	--	-18.0	0.5	--	--	--	--	--
JAN											
29...	1505	2.0	2800	--	-15.0	0.5	--	--	--	--	--
MAR											
26...	1220	8.1	418	7.80	5.0	3.5	160	40	39	14	16
APR											
03...	1505	158	650	--	6.0	7.5	--	--	--	--	--
17...	1525	74	1040	--	11.0	6.0	--	--	--	--	--
22...	1600	619	830	--	15.5	9.0	--	--	--	--	--
JUN											
17...	1435	4.7	--	--	21.5	18.5	--	--	--	--	--
JUL											
30...	1130	14	1150	--	23.5	21.5	--	--	--	--	--
SEP											
16...	1025	4.5	1390	7.60	9.5	11.0	610	310	150	56	86
DATE	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR											
26...	17	0.6	15	120	68	8.5	0.2	19	259	310	0.35
SEP											
16...	23	2	12	300	380	56	0.1	14	901	940	1.2
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)	
MAR											
26...	3	60	70	<1	17	50	0.4	2	<1	180	
SEP											
16...	2	210	30	1	96	730	0.3	3	1	680	

## RED RIVER OF THE NORTH BASIN

05060500 RUSH RIVER AT AMENIA, ND

LOCATION.--Lat 47°01'00", long 97°12'50", in SE1/4NW1/4 sec.24, T.141 N., R.52 W., Cass County, Hydrologic Unit 09020204, on left bank on downstream side of bridge on State Highway 18, 0.6 mi north of Amenia.

DRAINAGE AREA.--116 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

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

REVISED RECORDS.--WSP 1728: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 943 ft above National Geodetic Vertical Datum of 1929, from topographic map. See WSP 1913 for history of changes prior to June 10, 1961.

REMARKS.--Estimated daily discharges: Mar. 10-28 and May 14 to June 4. Records fair except those for period with ice effect, Mar. 10-28, and period of no gage height record, May 14 to June 4, which are poor.

AVERAGE DISCHARGE.--40 years, 9.56 ft<sup>3</sup>/s, 6,930 acre-ft/yr; median of yearly mean discharges, 6.2 ft<sup>3</sup>/s, 4,500 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,490 ft<sup>3</sup>/s, Apr. 19, 1979, gage height, 10.37 ft; maximum gage height, 12.15 ft, Mar. 23, 1966, backwater from ice; no flow at times each year.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 27 ft<sup>3</sup>/s and maximum (\*):

Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)	Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)
Mar. 23	0930	ice jam	a*10.27	Apr. 28	1400	325	7.18
Mar. 24	0315	328	10.20	May 13	0930	362	7.29
Apr. 19	0600	434	7.48	July 11	1345	*767	10.12

No flow for several months.

a - Backwater from ice

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.00	.00	48	105	11	.00	.39	.37
2	.00	.00	.00	.00	.00	.00	39	87	8.0	.00	.30	.51
3	.00	.00	.00	.00	.00	.00	33	69	4.0	.00	.27	.54
4	.00	.00	.00	.00	.00	.00	29	56	1.0	.00	.14	.49
5	.00	.00	.00	.00	.00	.00	29	47	.80	.00	.09	.30
6	.00	.00	.00	.00	.00	.00	28	40	.75	.00	.10	.21
7	.00	.00	.00	.00	.00	.00	25	36	.80	.00	.35	.19
8	.00	.00	.00	.00	.00	.00	22	32	.70	.00	.34	.18
9	.00	.00	.00	.00	.00	.00	19	31	.65	.00	.24	.11
10	.00	.00	.00	.00	.00	.00	17	32	.60	.00	3.2	.12
11	.00	.00	.00	.00	.00	.00	17	36	.40	467	4.7	.31
12	.00	.00	.00	.00	.00	.00	17	41	.30	335	4.5	.31
13	.00	.00	.00	.00	.00	.00	16	283	.20	156	5.0	.61
14	.00	.00	.00	.00	.00	.00	16	220	.10	84	14	.66
15	.00	.00	.00	.00	.00	.00	15	130	.05	52	16	.97
16	.00	.00	.00	.00	.00	.00	16	100	.05	37	11	.90
17	.00	.00	.00	.00	.00	.00	17	85	.04	30	7.1	.83
18	.00	.00	.00	.00	.00	.00	60	70	.04	26	4.6	.70
19	.00	.00	.00	.00	.00	1.8	412	55	.02	22	3.4	.57
20	.00	.00	.00	.00	.00	9.5	331	45	.01	18	2.1	1.4
21	.00	.00	.00	.00	.00	23	185	40	.01	13	1.2	1.8
22	.00	.00	.00	.00	.00	52	123	38	.04	8.1	.85	3.6
23	.00	.00	.00	.00	.00	189	92	35	.04	4.1	1.0	2.8
24	.00	.00	.00	.00	.00	267	70	33	.01	2.1	1.1	3.0
25	.00	.00	.00	.00	.00	209	65	30	.00	1.3	.94	3.3
26	.00	.00	.00	.00	.00	115	176	28	.00	.93	.83	2.3
27	.00	.00	.00	.00	.00	95	195	25	.00	1.0	.65	5.0
28	.00	.00	.00	.00	.00	76	287	22	.00	1.2	.48	2.9
29	.00	.00	.00	.00	---	82	220	20	.00	1.0	.42	2.7
30	.00	.00	.00	.00	---	70	134	17	.00	1.3	.37	2.8
31	.00	---	.00	.00	---	58	---	14	---	.84	.36	---
TOTAL	.00	.00	.00	.00	.00	1247.30	2753	1902	29.61	1261.87	86.02	40.48
MEAN	.00	.00	.00	.00	.00	40.2	91.8	61.4	.99	40.7	2.77	1.35
MAX	.00	.00	.00	.00	.00	267	412	283	11	467	16	5.0
MIN	.00	.00	.00	.00	.00	.00	15	14	.00	.00	.09	.11
AC-FT	.00	.00	.00	.00	.00	2470	5460	3770	59	2500	171	80
CAL YR 1985	TOTAL	1145.73		MEAN	3.14	MAX	85	MIN	.00	AC-FT	2270	
WTR YR 1986	TOTAL	7320.28		MEAN	20.1	MAX	467	MIN	.00	AC-FT	14520	

## RED RIVER OF THE NORTH BASIN

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05060500 RUSH RIVER AT AMENIA, ND--CONTINUED

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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)
MAR 25...	1405	226	395	7.40	10.5	2.5	150	53	38	14	15
APR 04...	1600	28	800	--	6.5	7.5	--	--	--	--	--
MAY 01...	1225	106	675	--	3.0	9.5	--	--	--	--	--
JUN 16...	1220	0.05	--	--	18.0	21.0	--	--	--	--	--
JUL 11...	1005	619	345	--	19.5	18.0	--	--	--	--	--
JUL 14...	1600	75	--	--	29.0	24.0	--	--	--	--	--
AUG 12...	1425	4.1	1420	--	23.0	20.5	--	--	--	--	--
SEP 16...	1245	0.88	1060	8.00	10.0	11.0	500	150	120	49	55

DATE	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR 25...	16	0.5	10	100	61	8.9	0.2	14	254	220	0.35
SEP 16...	19	1	13	350	220	24	0.3	16	717	710	0.98

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)
MAR 25...	3	90	120	<1	23	150	0.3	1	<1	220
SEP 16...	6	190	20	1	96	50	0.2	4	<1	570

## RED RIVER OF THE NORTH BASIN

05062200 ELM RIVER NEAR KELSO, ND

LOCATION.--Lat 47°17'30", long 97°06'50", in sec.23, T.144 N., R.51 W., Traill County, Hydrologic Unit 09020107, on left bank 50 ft upstream from county road, 4.0 mi south and 3.4 mi west of Kelso.

DRAINAGE AREA.--199 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--December 1955 to September 1963, 1964-73 (annual maximum only), October 1980 to August 1986 (seasonal records only since 1982, discontinued).

GAGE.--Water-stage recorder. Elevation of gage is 893 ft above National Geodetic Vertical Datum of 1929, from topographic map. Prior to September 1973, gage located at site one mile upstream at datum of 887.60 ft above National Geodetic Vertical Datum of 1929, Emerson-Crookston supplementary adjustment of 1941.

REMARKS.--Estimated daily discharges: Mar. 1-27 and Apr. 3-28. Records poor.

AVERAGE DISCHARGE.--9 years (water years 1956-63, 1981), 2.22 ft<sup>3</sup>/s, 1,610 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,000 ft<sup>3</sup>/s, occurred during March 1966; maximum gage height, 13.75 ft, Mar. 6, 1983, from floodmark, backwater from ice; no flow at times each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 362 ft<sup>3</sup>/s, Mar. 23, gage height, 10.22 ft, from floodmark, backwater from ice; no flow for most of the year.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1						.00	85	153	2.8	.89	.25	
2						.00	73	116	4.0	.54	.13	
3						.00	72	82	3.5	.34	.04	
4						.00	72	58	3.4	.39	.00	
5						.00	72	42	2.1	.29	.00	
6						.00	65	29	2.7	.17	.00	
7						.00	57	22	2.9	.06	.00	
8						.00	50	18	1.1	.05	.00	
9						.00	42	17	1.7	.01	.00	
10						.00	35	17	.99	.01	.43	
11						.00	27	15	1.0	.00	.27	
12						.00	20	36	.62	.01	.29	
13						.00	20	23	.25	9.6	.29	
14						.01	30	17	.67	30	1.9	
15						.05	50	18	.85	12	.57	
16						.10	50	22	1.8	7.5	.37	
17						.47	40	17	3.5	5.6	.17	
18						4.9	40	13	3.5	4.1	.12	
19						9.0	320	9.0	2.0	2.8	.07	
20						95	240	6.6	3.9	1.8	.01	
21						180	150	4.9	5.2	.95	.00	
22						265	100	4.1	4.5	.34	.00	
23						350	70	2.5	2.1	.18	.00	
24						320	50	3.2	4.7	.14	.00	
25						290	50	3.5	5.2	.14	.00	
26						260	160	2.4	6.7	.18	.00	
27						230	200	1.2	4.5	7.4	.00	
28						203	300	1.2	3.7	5.0	.00	
29						192	207	1.0	2.2	2.3	.00	
30						138	180	2.1	1.5	1.2	.00	
31						105	---	2.0	---	.49	.00	
TOTAL						2642.53	2927	758.7	83.58	94.48	4.91	
MEAN						85.2	97.6	24.5	2.79	3.05	.16	
MAX						350	320	153	6.7	30	1.9	
MIN						.00	20	1.0	.25	.00	.00	
AC-FT						5240	5810	1500	166	187	9.7	



## RED RIVER OF THE NORTH BASIN

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05062200 ELM RIVER NEAR KELSO, ND--CONTINUED

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1981 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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)
MAR 17...	1310	0.13	490	--	1.0	0.5	--	--	--	--	--
MAR 28...	1250	203	520	7.30	16.5	6.0	200	91	46	20	22
APR 29...	1530	216	668	--	20.0	11.5	--	--	--	--	--
AUG 01...	1435	0.21	430	7.70	21.0	24.5	170	42	43	16	19
DATE	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINIT LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR 28...	18	0.7	12	110	100	13	0.1	18	313	320	0.43
AUG 01...	18	0.6	9.5	130	65	11	0.2	17	292	260	0.4
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)	
MAR 28...	4	50	70	<1	32	160	<0.1	2	<1	250	
AUG 01...	6	60	40	<1	30	30	0.3	2	<1	220	

## RED RIVER OF THE NORTH BASIN

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

LOCATION.--Lat 47°21'10", long 96°50'50", on line between secs.24 and 25, T.145 N., R.49 W., Traill 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 mi<sup>2</sup>, approximately, including 3,800 mi<sup>2</sup> 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 National Geodetic Vertical Datum of 1929. Prior to July 17, 1961, nonrecording gage at same site and datum.

REMARKS.--Estimated daily discharges: Nov. 8 to Mar. 30 and Sept. 25-30. Records good except those for period with ice effect, Nov. 8 to Mar. 30, and period of no gage height record, Sept. 25-30, which are fair.

AVERAGE DISCHARGE.--25 years (1961-86), 1,839 ft<sup>3</sup>/s, 1,332,000 acre-ft/yr; median of yearly mean discharges, 1,760 ft<sup>3</sup>/s, 1,275,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 42,000 ft<sup>3</sup>/s, Apr. 22, 1979, gage height, 39.00 ft; minimum observed, 5.4 ft<sup>3</sup>/s, Oct. 8, 9, 12-14, 1936.

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

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 17,400 ft<sup>3</sup>/s, Mar. 31, gage height, 25.89 ft; minimum daily 894 ft<sup>3</sup>/s, Jan. 7.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1310	1360	1000	980	915	971	17200	12700	4190	3150	1830	1280
2	1300	1360	940	970	931	1030	16800	12700	4060	3040	1760	1290
3	1290	1350	960	957	943	1080	16300	12600	3960	2960	1700	1270
4	1260	1350	980	956	950	1120	15500	12300	3870	2970	1640	1350
5	1230	1340	1100	964	956	1150	14700	12000	3780	3020	1570	1370
6	1210	1330	1040	975	952	1180	14000	11500	3700	2910	1500	1420
7	1220	1320	990	894	954	1220	13300	10800	4040	2760	1450	1570
8	1240	1300	1010	962	955	1270	12400	9840	4030	2660	1460	1740
9	1280	1200	1000	946	952	1310	11200	8740	3840	2600	1440	1790
10	1300	1200	1050	937	954	1360	9800	7750	3810	2570	1370	1740
11	1300	1190	1150	933	955	1420	8550	7260	3800	2600	1310	1670
12	1330	1170	1150	940	952	1480	7420	7970	3760	2820	1270	1580
13	1340	1160	1150	954	950	1540	6490	8990	3730	3210	1180	1470
14	1360	1140	1140	959	952	1600	5920	9830	3770	3790	1140	1400
15	1360	1130	1130	959	945	1660	6520	10600	3890	3930	1120	1350
16	1370	1110	1120	951	938	1730	8050	11100	4040	3790	1160	1330
17	1370	1090	1110	942	936	1810	9090	11200	4050	3590	1180	1310
18	1380	1080	1100	935	944	1930	9710	10800	4780	3390	1230	1300
19	1390	1060	1090	941	947	2070	11100	9960	5770	3190	1250	1310
20	1410	1040	1080	948	951	2220	12600	8840	5490	3030	1250	1320
21	1420	1030	1070	955	937	2380	13500	7710	5250	2980	1210	1410
22	1410	1010	1060	956	923	2660	13600	6850	5330	2900	1160	1680
23	1400	1000	1060	966	915	3460	13300	6200	5410	2780	1130	2390
24	1400	980	1060	977	918	5740	12700	5740	5200	2620	1130	2850
25	1410	960	1080	959	935	9010	12200	5410	4440	2460	1120	3300
26	1400	947	1060	949	928	11900	11800	5190	4210	2320	1150	3700
27	1390	959	1040	946	911	13800	11500	5000	3930	2310	1200	4100
28	1370	1060	1030	954	925	15400	11700	4820	3680	2250	1260	4250
29	1370	1060	1010	956	---	16200	12200	4630	3460	2100	1290	4300
30	1380	1020	992	933	---	16900	12500	4470	3280	1930	1300	4200
31	1370	---	989	914	---	17300	---	4320	---	1870	1290	---
TOTAL	41570	34306	32741	29468	26324	143901	351650	267820	126550	88500	41050	61040
MEAN	1341	1144	1056	951	940	4642	11720	8639	4218	2855	1324	2035
MAX	1420	1360	1150	980	956	17300	17200	12700	5770	3930	1830	4300
MIN	1210	947	940	894	911	971	5920	4320	3280	1870	1120	1270
AC-FT	82450	68050	64940	58450	52210	285400	697500	531200	251000	175500	81420	121100
CAL YR 1985	TOTAL	771772		MEAN	2114	MAX	10100	MIN	440	AC-FT	1531000	
WTR YR 1986	TOTAL	1244920		MEAN	3411	MAX	17300	MIN	894	AC-FT	2469000	

## RED RIVER OF THE NORTH BASIN

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

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	TUR- BID- ITY (NTU) (00076)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	HARD- NESS (MG/L AS CACO3) (00900)
DATE	TIME											
NOV 04...	1430	1310	535	8.40	5.0	5.0	7.0	12.2	98	K20	K20	250
DEC 19...	1530	1100	578	8.40	-18.0	0.0	4.9	9.8	69	24	32	270
FEB 14...	1545	956	625	7.90	-16.5	0.0	5.4	13.4	95	36	21	280
MAR 31...	1225	17300	445	--	13.0	4.0	--	--	--	--	--	--
APR 09...	1130	11300	650	7.90	13.0	8.5	39	10.2	90	--	--	290
29...	1205	12300	625	--	15.5	8.5	--	--	--	--	--	--
JUL 02...	1135	3070	748	8.20	25.0	23.0	180	6.5	79	150	85	340
AUG 04...	1255	1670	738	8.20	22.0	24.0	--	--	--	--	--	--
SEP 17...	1730	1370	--	--	15.0	14.0	--	--	--	--	--	--
	HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	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)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	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)
NOV 04...	24	49	30	15	11	0.4	4.8	222	1.7	45	11	0.2
DEC 19...	22	53	33	22	15	0.6	5.5	246	1.9	49	11	0.2
FEB 14...	12	56	33	25	16	0.7	5.9	264	6.4	58	12	0.2
APR 09...	0	66	31	18	11	0.5	7.9	179	8.7	130	11	0.2
JUL 02...	120	69	41	24	13	0.6	7.1	224	2.8	160	12	0.2
	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS NH4) (71846)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS- PHORUS, TOTAL (MG/L AS P) (00665)
NOV 04...	12	295	300	0.4	1050	<0.01	<0.10	0.06	0.04	0.05	0.9	0.09
DEC 19...	18	332	340	0.45	986	<0.01	0.20	0.19	0.18	0.23	0.9	0.08
FEB 14...	19	370	370	0.5	955	<0.01	0.40	0.19	0.19	0.24	1.2	0.10
APR 09...	18	425	500	0.58	13000	--	--	--	--	--	--	--
JUL 02...	15	480	460	0.65	3980	--	--	--	--	--	--	--

K - Results based on colony count outside the acceptable range (non-ideal colony count).

## RED RIVER OF THE NORTH BASIN

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	PHOS- PHORUS TOTAL (MG/L AS PO4) (71886)	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)	BERYL- LIUM, DIS- SOLVED (UG/L AS BE) (01010)	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)
NOV 04...	0.28	0.04	0.04	20	2	67	<0.5	<1	<1	<3	3	3
DEC 19...	--	0.05	0.06	--	--	--	--	--	--	--	--	--
FEB 14...	--	0.08	0.07	20	2	83	<0.5	<1	<1	<3	1	14
APR 09...	--	--	--	20	4	96	<0.5	<1	<1	<3	4	24
DATE	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)	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)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	
NOV 04...	1	20	3	<0.1	<10	<1	<1	<1	160	<6	5	
FEB 14...	1	26	14	<0.1	<10	5	<1	<1	200	<6	9	
APR 09...	3	31	9	--	<10	2	1	<1	240	<6	10	
DATE	GROSS ALPHA, DIS- SOLVED (UG/L AS U-NAT) (80030)	GROSS ALPHA, SUSP. TOTAL (UG/L AS U-NAT) (80040)	GROSS BETA, DIS- SOLVED (PCI/L AS CS-137) (03515)	GROSS BETA, SUSP. TOTAL (PCI/L AS CS-137) (03516)	GROSS BETA, DIS- SOLVED (PCI/L AS SR/ YT-90) (80050)	GROSS BETA, SUSP. TOTAL (PCI/L AS SR/ YT-90) (80060)	RADIUM 226, DIS- SOLVED (PCI/L METHOD PCI/L) (09511)	URANIUM DIS- SOLVED, EXTRAC- TION (UG/L) (80020)	SEDI- MENT, DIS- CHARGE, SUS- PENDED (MG/L) (80154)	SEDI- MENT, DIS- CHARGE, SUS- PENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)	
NOV 04...	--	--	--	--	--	--	--	--	12	44	95	
DEC 19...	--	--	--	--	--	--	--	--	12	36	73	
FEB 14...	--	--	--	--	--	--	--	--	12	31	73	
APR 09...	7.1	6.3	13	5.1	9.7	4.4	0.09	7.2	--	--	--	
JUL 02...	--	--	--	--	--	--	--	--	295	2450	100	
SEP 17...	--	--	--	--	--	--	--	--	95	351	99	



## RED RIVER OF THE NORTH BASIN

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05064900 BEAVER CREEK NEAR FINLEY, ND  
(Hydrologic bench-mark station)

LOCATION.--Lat 47°35'40", long 97°42'18", in NE¼ sec.31, T.148 N., R.55 W., Steele County, Hydrologic Unit 09020109, on right bank 500 ft upstream from bridge on county highway, and 7 mi northeast of Finley.

DRAINAGE AREA.--160 mi<sup>2</sup>, approximately.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1964 to current year.

GAGE.--Water-stage recorder and concrete broad-crested weir. Datum of gage is 1,170.08 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Nov. 18 to Mar. 22, Apr. 12-16, and Sept. 4-23. Records good except those for periods of estimated daily discharges, which are poor.

AVERAGE DISCHARGE.--22 years, 8.74 ft<sup>3</sup>/s, 6,330 acre-ft/yr; median of yearly mean discharges, 9.0 ft<sup>3</sup>/s, 6,500 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,900 ft<sup>3</sup>/s, Apr. 19, 1979, gage height, 8.35 ft, backwater from ice; maximum gage height, 9.70 ft, Mar. 14, 1966, backwater from ice; no flow for several months each year.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 50 ft<sup>3</sup>/s and maximum (\*):

Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)	Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)
Mar. 16	----	200	b*4.79	May 12	0445	*282	4.60
Mar. 22	----	280	ice jam	July 10	1500	76	3.59
Apr. 28	1430	91	3.69	July 14	0830	162	4.13

b - Backwater from ice

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.19	1.6	.22	.07	.00	.00	27	44	1.0	.00	.89	.22
2	.19	1.6	.21	.07	.00	.00	23	36	.85	.00	.75	.47
3	.13	1.5	.21	.07	.00	.00	21	33	.70	.00	.54	.52
4	.13	1.4	.20	.06	.00	.00	28	26	.61	.00	.38	2.0
5	.13	1.3	.20	.06	.00	.00	30	21	.47	.00	.29	5.0
6	.13	1.1	.20	.02	.00	.00	29	17	.40	.00	.30	3.0
7	.21	1.1	.19	.00	.00	.00	23	13	.40	.00	.30	1.8
8	.34	.95	.19	.00	.00	.00	19	12	.36	.00	.25	1.5
9	.34	.82	.18	.00	.00	.00	15	15	.30	.00	.25	1.4
10	.34	.69	.18	.00	.00	.00	11	14	.26	5.2	.19	1.3
11	.44	.61	.17	.00	.00	.00	8.8	16	.25	9.7	.08	1.2
12	.56	.52	.17	.00	.00	.00	7.5	120	.23	3.2	.07	1.0
13	.66	.45	.16	.00	.00	1.0	6.0	40	.19	6.5	.10	.80
14	.82	.40	.16	.00	.00	38	5.0	21	.17	66	.67	.50
15	.89	.38	.15	.00	.00	125	4.0	15	.18	48	.70	.25
16	.89	.35	.15	.00	.00	158	6.0	9.4	.32	15	.43	7.0
17	.89	.34	.14	.00	.00	86	8.1	6.9	.30	9.0	.33	3.5
18	.82	.32	.14	.00	.00	73	23	5.6	.26	9.8	.31	3.0
19	.82	.30	.14	.00	.00	28	39	4.9	.20	25	.33	2.5
20	1.0	.27	.13	.00	.00	17	38	4.3	.24	15	.31	2.0
21	1.3	.26	.13	.00	.00	112	31	3.8	.25	15	.26	5.0
22	4.2	.26	.12	.00	.00	170	25	3.2	.22	12	.25	3.5
23	4.2	.25	.12	.00	.00	152	20	2.8	.20	9.9	.25	1.5
24	3.4	.25	.11	.00	.00	122	16	2.7	.12	9.6	.25	.99
25	3.0	.24	.11	.00	.00	114	17	3.0	.05	5.2	.21	1.2
26	2.8	.24	.10	.00	.00	80	29	3.9	.01	3.8	.22	1.4
27	2.6	.23	.10	.00	.00	51	55	3.7	.01	3.0	.20	1.1
28	2.3	.23	.09	.00	.00	47	81	2.9	.01	2.2	.14	.96
29	2.0	.23	.09	.00	---	40	72	2.2	.00	1.9	.18	.96
30	1.8	.22	.08	.00	---	29	56	1.7	.00	1.4	.26	.95
31	1.6	---	.08	.00	---	26	---	1.4	---	1.1	.24	---
TOTAL	39.12	18.41	4.62	.35	.00	1469.00	773.4	505.4	8.56	277.50	9.93	56.52
MEAN	1.26	.61	.15	.01	.00	47.4	25.8	16.3	.29	8.95	.32	1.88
MAX	4.2	1.6	.22	.07	.00	170	81	120	1.0	66	.89	7.0
MIN	.13	.22	.08	.00	.00	.00	4.0	1.4	.00	.00	.07	.22
AC-FT	78	37	9.2	.7	.00	2910	1530	1000	17	550	20	112
CAL YR 1985	TOTAL	1501.60		MEAN	4.11	MAX	186	MIN	.00	AC-FT	2980	
WTR YR 1986	TOTAL	3162.81		MEAN	8.67	MAX	170	MIN	.00	AC-FT	6270	

RED RIVER OF THE NORTH BASIN  
05064900 BEAVER CREEK NEAR FINLEY, ND--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1965 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	TUR- BID- ITY (NTU) (00076)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	HARD- NESS (MG/L AS CACO3) (00900)	
NOV 04...	1125	1.5	1160	8.30	5.0	2.5	1.0	13.8	105	20	40	430	
MAR 25...	1500	114	474	7.80	9.0	3.5	--	10.2	82	K10	880	--	
APR 09...	1335	14	915	7.70	12.5	8.0	2.4	11.8	103	ND	43	350	
MAY 28...	0820	3.1	860	7.80	25.0	19.5	--	11.0	122	--	--	--	
JUN 26...	1200	0.1	492	7.70	29.5	21.5	--	9.2	107	--	--	--	
AUG 06...	1225	0.29	1120	7.90	19.5	25.0	--	9.0	116	140	280	--	
SEP 24...	1100	1.1	942	8.10	16.5	13.5	--	9.2	92	--	--	--	
DATE		HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	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)	PERCENT SODIUM RATIO (00932)	SODIUM AD- SORP- TION (MG/L AS K) (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	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)
NOV 04...	410	100	44	77	27	2	11	294	0.2	280	19	0.2	
APR 09...	150	81	35	67	29	2	13	223	7.7	260	11	0.1	
JUN 26...	--	--	--	--	--	--	--	--	7.3	--	--	--	
AUG 06...	--	--	--	--	--	--	--	--	5.4	--	--	--	
DATE		SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, 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) (00610)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS NH4) (71846)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS- PHORUS, TOTAL (MG/L AS P) (00665)
NOV 04...	13	652	560	0.89	2.6	<0.01	<0.10	0.07	0.06	0.08	0.8	0.09	
MAR 25...	--	--	--	--	--	0.06	1.10	0.10	0.10	0.13	1.5	0.40	
APR 09...	15	648	600	0.88	24	<0.01	<0.10	0.07	0.07	0.09	0.9	0.07	
AUG 06...	--	--	--	--	--	0.01	0.14	0.07	0.25	0.32	1.4	0.45	
DATE		PHOS- PHORUS TOTAL (MG/L AS P) (71886)	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)	BERYL- LIUM, DIS- SOLVED (UG/L AS BE) (01010)	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)
NOV 04...	0.28	0.07	0.05	<10	2	48	<0.5	<1	<1	<3	1	9	
MAR 25...	--	0.31	0.24	--	--	--	--	--	--	--	--	--	
APR 09...	--	0.06	0.03	20	3	8	<0.5	<1	<10	<3	8	33	
AUG 06...	--	0.41	0.35	--	--	--	--	--	--	--	--	--	

K - Results based on colony count outside the acceptable range (non-ideal colony count).  
ND - Not detected.

## RED RIVER OF THE NORTH BASIN

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05064900 BEAVER CREEK NEAR FINLEY, ND--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	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)	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)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)
NOV 04...	1	57	23	0.2	<10	2	<1	<1	410	<6	11
APR 09...	2	44	58	<0.1	<10	4	<1	<1	320	<6	14
DATE	GROSS ALPHA, DIS- SOLVED (UG/L AS U-NAT) (80030)	GROSS ALPHA, SUSP. TOTAL (UG/L AS U-NAT) (80040)	GROSS BETA, DIS- SOLVED (PCI/L AS CS-137) (03515)	GROSS BETA, SUSP. TOTAL (PCI/L AS CS-137) (03516)	GROSS BETA, DIS- SOLVED (PCI/L AS SR/ YT-90) (80050)	RADIUM BETA, SUSP. TOTAL (PCI/L AS SR/ YT-90) (80060)	226, DIS- SOLVED, RADON METHOD (PCI/L) (09511)	URANIUM DIS- SOLVED, EXTRAC- TION (UG/L) (80020)	SEDI- MENT, SUS- PENDE (MG/L) (80154)	SED. MENT, DIS- CHARGE, SUS- PENDE (T/DAY) (80155)	SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
NOV 04...	--	--	--	--	--	--	--	--	19	0.07	83
MAR 25...	--	--	--	--	--	--	--	--	48	15	99
APR 09...	13	<0.8	23	1.9	16	1.7	0.04	8.1	15	0.54	94
AUG 06...	--	--	--	--	--	--	--	--	52	0.04	85

DATE	TIME	SAMPLE LOC- ATION, CROSS SECTION (FT FM L BANK) (00009)	DEPTH TO TOP OF SAMPLE INTER- VAL (FT) (72015)	TEMPER- ATURE (DEG C) (00010)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	OXYGEN, DIS- SOLVED (MG/L) (00300)
NOV 04...	1200	1.00	0.5	2.5	1170	8.21	13.5
04...	1205	2.00	0.5	2.5	--	8.24	13.6
04...	1210	3.00	0.5	2.5	1160	8.30	13.6
04...	1220	4.00	0.5	2.5	1160	8.31	13.8
04...	1230	5.00	0.5	2.5	1150	8.32	13.8
04...	1240	6.00	0.5	2.5	1140	8.33	13.8

## RED RIVER OF THE NORTH BASIN

05065500 GOOSE RIVER NEAR PORTLAND, ND

LOCATION.--Lat 47°32'20", long 97°27'20", in SE1/4NE1/4 sec.19, T.147 N., R.53 W., Traill County, Hydrologic Unit 09020101, on left bank 75 ft upstream from bridge on State Highway 18, 1.2 mi upstream from unnamed tributary, 4 mi downstream from Beaver Creek, and 5 mi northwest of Portland.

DRAINAGE AREA.--517 mi<sup>2</sup>, of which about 110 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1939 to September 1975, October 1980 to current year (seasonal records only since 1983, discontinued).

GAGE.--Water-stage recorder. Datum of gage is 967.48 ft above National Geodetic Vertical Datum of 1929. Prior to Oct. 1, 1956, nonrecording gages at site 2 mi upstream at datum 11.28 ft higher.

AVERAGE DISCHARGE.--38 years (water years 1940-75, 1981-82), 29.8 ft<sup>3</sup>/s, 21,590 acre-ft/yr; median of yearly mean discharges, 15 ft<sup>3</sup>/s, 10,900 acre-ft/yr.

REMARKS.--Estimated daily discharges: Mar. 1-25 and Apr. 12-16. Records poor.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,530 ft<sup>3</sup>/s, May 9, 1950, gage height, 20.12 ft, on basis of contracted opening measurement, present site and datum; no flow at times most years.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 20, 21, 1979, reached a stage of 20.96, present datum, from floodmark; discharge not determined.

EXTREMES FOR CURRENT YEAR.--Maximum recorded discharge, 818 ft<sup>3</sup>/s, Mar. 25, gage height, 10.71 ft; no flow for many days.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1						.00	171	356	18	2.7	6.1	1.7
2						.00	153	298	16	2.6	5.1	1.7
3						.00	140	244	15	2.6	4.7	1.7
4						.00	130	211	12	2.6	4.5	1.7
5						.00	121	186	12	2.6	4.5	1.6
6						.00	114	158	11	2.4	4.7	1.5
7						.00	110	135	11	2.4	4.7	1.4
8						.00	103	118	10	2.4	4.4	1.2
9						.00	94	108	9.7	2.4	4.5	1.0
10						.00	86	99	9.3	8.8	4.6	.93
11						.00	79	98	8.9	12	4.5	.87
12						.00	70	97	8.7	20	4.3	.77
13						.00	60	103	8.4	27	4.3	.47
14						.00	55	260	7.8	47	4.7	.23
15						.00	50	225	7.8	52	4.7	.10
16						.00	45	158	9.8	35	4.7	.04
17						.05	49	123	9.1	41	4.6	.04
18						2.0	60	100	8.5	59	3.9	.03
19						317	86	84	7.3	84	3.3	.02
20						340	125	71	7.3	81	2.8	.02
21						354	196	61	7.4	57	2.6	.02
22						538	222	49	6.4	38	2.6	.04
23						594	211	38	5.8	40	2.6	.08
24						673	177	34	5.5	36	2.6	.15
25						713	146	30	4.3	26	2.5	.33
26						669	135	28	3.8	19	2.4	.63
27						398	136	25	3.2	16	2.3	.76
28						336	161	24	2.8	14	2.1	.78
29						263	260	23	2.7	10	2.0	.84
30						216	365	22	2.7	8.2	2.0	.86
31						185	---	20	---	7.2	1.8	---
TOTAL						5598.05	3910	3586	252.2	760.9	115.1	21.51
MEAN						181	130	116	8.41	24.5	3.71	.72
MAX						713	365	356	18	84	6.1	1.7
MIN						.00	45	20	2.7	2.4	1.8	.02
AC-FT						11100	7760	7110	500	1510	228	43



05065500 GOOSE RIVER NEAR PORTLAND, ND--CONTINUED

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1969 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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)
MAR											
17...	1040	0.01	815	--	1.0	0.5	--	--	--	--	--
24...	1000	615	560	8.00	8.0	1.5	220	100	53	21	30
24...	1245	711	--	--	8.0	1.5	--	--	--	--	--
26...	1005	704	480	--	2.0	4.0	--	--	--	--	--
APR											
07...	1145	111	630	--	10.0	7.5	--	--	--	--	--
23...	1315	38	375	--	11.0	13.0	--	--	--	--	--
JUN											
23...	1225	5.7	1240	7.70	--	21.0	490	210	92	64	91
AUG											
05...	1440	4.2	640	--	29.0	25.0	--	--	--	--	--
SEP											
19...	0915	0.02	640	--	10.0	11.0	--	--	--	--	--
		SODIUM AD- SORP- TION RATIO (00932)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR											
24...	22	0.9	11	120	140	9.8	0.1	17	375	350	0.51
JUN											
23...	28	2	18	290	370	26	0.2	9.7	875	840	1.2
		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											
24...	3	50	130	<1	25	180	0.2	2	1	220	
JUN											
23...	4	250	20	<1	89	740	<0.1	2	<1	490	

## RED RIVER OF THE NORTH BASIN

05066500 GOOSE RIVER AT HILLSBORO, ND

LOCATION.--Lat 47°24'34", long 97°03'39", in NW¼ sec.5, T.145 N., R.50 W., Traill County, Hydrologic Unit 09020109, on right bank 600 ft upstream from Foogman Dam in Hillsboro, and 27.5 mi upstream from mouth.

DRAINAGE AREA.--1,203 mi<sup>2</sup>, of which about 110 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--March 1931 to current year (no winter records 1932-34). Monthly discharge only for some periods, published in WSP 1308.

GAGE.--Water-stage recorder and masonry dam. Datum of gage is 879.52 ft above National Geodetic Vertical Datum of 1929. Sept. 26, 1941, to Oct. 27, 1965, at site 600 ft downstream at same datum. See WSP 1728 or 1913 for history of changes prior to Sept. 26, 1941.

REMARKS.--Estimated daily discharges: Nov. 9 to Mar. 23. Records fair.

AVERAGE DISCHARGE.--53 years (1931-32, 1934-86), 68.7 ft<sup>3</sup>/s, 49,770 acre-ft/yr; median of yearly mean discharges, 42 ft<sup>3</sup>/s, 30,400 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 14,800 ft<sup>3</sup>/s, Apr. 21, 1979, gage height, 16.76 ft; no flow at times.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 200 ft<sup>3</sup>/s and maximum (\*):

Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)	Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)
Mar. 24	2315	*1630	*4.81	May 1	1800	510	3.00
Apr. 20	1045	510	3.00	May 15	2130	384	2.75

Minimum daily discharge, .20 ft<sup>3</sup>/s, Oct. 1.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.20	4.0	6.3	5.9	5.9	3.7	345	494	84	12	26	2.0
2	.28	3.5	5.9	5.9	5.9	5.0	297	490	77	11	15	2.1
3	.43	7.4	5.6	6.2	5.9	4.8	255	432	70	11	12	2.3
4	1.3	7.2	5.2	6.7	5.9	4.9	221	365	65	13	10	1.6
5	.97	6.1	5.0	6.3	5.9	3.6	207	314	61	8.6	11	1.2
6	1.1	7.7	5.0	5.9	5.9	3.6	192	276	59	6.7	9.0	1.0
7	2.6	6.2	5.0	5.7	6.7	3.3	180	241	59	6.9	11	1.2
8	8.7	5.0	5.0	5.7	5.9	3.0	175	211	58	7.9	8.5	1.2
9	3.6	4.0	5.0	5.3	5.9	3.3	168	197	55	7.7	8.0	1.7
10	2.4	3.8	5.0	5.7	5.9	3.0	157	184	48	8.9	6.4	2.2
11	2.1	3.9	5.1	5.3	5.9	2.5	146	176	45	7.5	5.1	2.5
12	5.0	4.2	5.8	6.7	5.9	2.9	131	182	44	6.9	5.0	2.4
13	6.6	4.2	5.9	6.2	5.7	3.5	120	183	40	11	5.2	1.8
14	4.9	4.2	5.6	6.0	5.2	4.4	118	202	38	47	6.9	1.4
15	4.2	4.2	5.0	7.1	5.0	5.4	117	334	41	63	5.4	1.5
16	4.4	4.1	5.0	5.6	5.4	8.3	103	358	36	103	5.4	1.5
17	5.6	4.5	5.5	6.2	5.9	15	110	279	37	104	6.6	1.8
18	4.4	4.6	5.8	6.1	6.0	50	178	224	41	87	7.8	1.6
19	4.2	5.9	5.3	5.9	5.9	233	272	192	34	76	8.4	2.5
20	5.0	4.3	5.9	8.0	4.7	452	483	171	37	85	7.7	3.1
21	7.5	4.3	5.5	6.8	4.5	587	465	150	33	103	6.2	6.4
22	7.9	5.6	5.2	5.9	4.9	856	434	133	30	108	7.1	8.9
23	6.6	5.0	6.3	5.9	4.2	1350	403	121	27	92	6.9	6.0
24	5.3	5.0	5.9	6.0	4.2	1610	371	115	27	77	5.0	5.9
25	4.2	6.2	5.5	6.2	4.6	1570	349	114	27	68	4.3	9.2
26	4.1	6.2	6.0	6.2	4.2	1500	350	112	21	73	4.1	7.1
27	3.6	5.8	6.2	5.5	3.6	1290	337	113	18	69	3.6	9.1
28	5.0	5.9	5.9	6.0	3.0	966	390	106	15	54	3.7	12
29	5.2	5.9	6.2	5.9	---	655	430	100	14	47	3.3	20
30	4.2	6.1	5.6	5.9	---	514	461	95	12	39	3.3	27
31	4.2	---	5.9	5.9	---	417	---	91	---	33	3.2	---
TOTAL	125.78	155.0	172.1	188.6	148.6	12130.2	7965	6755	1253	1447.1	231.1	148.2
MEAN	4.06	5.17	5.55	6.08	5.31	391	266	218	41.8	46.7	7.45	4.94
MAX	8.7	7.7	6.3	8.0	6.7	1610	483	494	84	108	26	27
MIN	.20	3.5	5.0	5.3	3.0	2.5	103	91	12	6.7	3.2	1.0
AC-FT	249	307	341	374	295	24060	15800	13400	2490	2870	458	294
CAL YR 1985	TOTAL	15799.16		MEAN	43.3	MAX	1180	MIN	.01	AC-FT	31340	
WTR YR 1986	TOTAL	30719.68		MEAN	84.2	MAX	1610	MIN	.20	AC-FT	60930	

## RED RIVER OF THE NORTH BASIN

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05066500 GOOSE RIVER AT HILLSBORO, ND--CONTINUED

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1969 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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)	
DEC 19...	1205	4.6	--	--	-20.5	0.0	--	--	--	--	--	
MAR 28...	0920	972	526	7.60	13.0	1.0	210	83	50	20	23	
MAY 02...	1640	477	1280	--	12.5	10.0	--	--	--	--	--	
JUL 11...	1610	7.2	1500	--	23.0	22.5	--	--	--	--	--	
AUG 04...	1505	11	955	8.10	25.0	24.0	390	170	88	42	58	
DATE		PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR 28...	19	0.7	9.9	120	130	8.8	0.1	17	324	360	0.44	
AUG 04...	24	1	11	220	260	26	0.2	18	674	640	0.92	
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)	
MAR 28...	2	60	70	<1	25	260	<0.1	2	<1	230		
AUG 04...	7	120	20	<1	63	<1	0.6	4	<1	450		

## 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, .4 mi downstream from Red Lake River, and at mile 293.8.

DRAINAGE AREA.--30,100 mi<sup>2</sup>, approximately, including 3,800 mi<sup>2</sup> in closed basins.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--April 1882 to current year. Prior to May 1901 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 780.00 ft above National Geodetic Vertical Datum of 1929. 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.--Estimated daily discharges: Oct. 23, 24, Mar. 29, Apr. 13, 14, 16, May 11, 12, 22, 23, June 10-16, June 23 to July 9, and Aug. 26-28. Records good.

AVERAGE DISCHARGE.--104 years, 2,623 ft<sup>3</sup>/s, 1,900,000 acre-ft/yr; median of yearly mean discharge, 2,370 ft<sup>3</sup>/s, 1,720,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, about 85,000 ft<sup>3</sup>/s, Apr. 10, 1897, gage height, 50.2 ft, site and datum then in use, from rating curve extended above 54,000 ft<sup>3</sup>/s; minimum, 1.8 ft<sup>3</sup>/s, Sept. 2, 1977, caused by unusual regulation during repair of dam at Grand Forks.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 31,900 ft<sup>3</sup>/s, Apr. 2, gage height, 37.00 ft; minimum daily, 1,630 ft<sup>3</sup>/s, Nov. 24.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3560	3540	2230	1880	1850	1790	30500	22800	6980	4760	3080	2260
2	3530	3480	2230	1870	1820	1800	31800	23300	6660	4560	2930	2320
3	3470	3390	2190	1890	1840	1850	31200	23600	6430	4480	2910	2360
4	3410	3310	2150	1870	1860	1850	29600	22800	6270	4460	2830	2440
5	3380	3310	2110	1840	1860	1890	27700	21200	6150	4370	2770	2520
6	3170	3280	2090	1850	1860	1910	25400	19700	6050	4320	2710	2430
7	3070	3240	2080	1840	1850	1940	23500	18400	6010	4220	2620	2710
8	3120	3190	2050	1850	1840	1980	21800	17300	6160	3980	2580	2860
9	3220	3110	2020	1870	1840	2020	20000	16100	6320	3890	2560	3000
10	4050	2490	2030	1880	1850	2060	18400	14900	6140	3750	2580	3070
11	5190	1870	2030	1890	1840	2070	16900	13700	5880	3710	2590	3070
12	5390	1650	2030	1890	1840	2110	15200	12900	5820	3820	2520	2970
13	5010	2110	2030	1900	1830	2140	13400	13000	5790	3950	2440	2780
14	4560	2200	2030	1910	1830	2200	11600	14000	5710	4450	2430	2660
15	4460	2180	2040	1940	1830	2240	10300	15100	5620	5190	2380	2550
16	4420	2190	2020	1950	1830	2300	11200	15700	5570	5570	2270	2480
17	4240	2400	1980	1950	1840	2350	13300	16100	5610	5400	2260	2470
18	4110	2530	1960	1980	1820	2430	14100	16200	5670	5430	2270	2460
19	4050	2270	2000	1980	1800	2530	14900	15800	6280	5280	2290	2440
20	4050	2110	2010	1950	1820	2660	17000	15200	7160	5120	2280	2470
21	4140	1980	2000	1920	1800	2910	19200	14100	7200	4900	2240	2480
22	4170	1760	2030	1900	1800	3580	20200	12700	7000	4680	2220	2580
23	4130	1650	2010	1870	1800	5140	20300	11300	7020	4600	2140	2820
24	4100	1630	1970	1910	1800	6680	19100	10200	7020	4440	2060	3410
25	4060	1820	1950	1910	1800	11100	17900	9380	6780	4220	2000	4160
26	4010	1920	1960	1880	1810	15800	16900	8740	6360	4010	1980	4670
27	3910	1940	1960	1840	1820	18700	16500	8430	6040	3830	2030	5170
28	3830	2010	1940	1830	1800	20800	17700	8190	5710	3780	2090	5580
29	3730	2070	1900	1830	---	22700	20000	7880	5280	3620	2140	5950
30	3750	2170	1900	1850	---	25300	21900	7550	5030	3430	2190	6110
31	3670	---	1900	1850	---	27900	---	7340	---	3210	2230	---
TOTAL	122960	72800	62830	58570	51180	202730	587500	453610	185720	135430	74620	95250
MEAN	3966	2427	2027	1889	1828	6540	19580	14630	6191	4369	2407	3175
MAX	5390	3540	2230	1980	1860	27900	31800	23600	7200	5570	3080	6110
MIN	3070	1630	1900	1830	1800	1790	10300	7340	5030	3210	1980	2260
AC-FT	243900	144400	124600	116200	101500	402100	1165000	899700	368400	268600	148000	188900
CAL YR 1985	TOTAL	1700320		MEAN	4658	MAX	17700	MIN	1230	AC-FT	3373000	
WTR YR 1986	TOTAL	2103200		MEAN	5762	MAX	31800	MIN	1630	AC-FT	4172000	



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

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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	22...	1230	4210	480	--	13.0	9.0	--	--	--	--
DEC	19...	1530	1990	475	--	-16.0	0.0	--	--	--	--
JAN	27...	1615	1850	275	--	-16.0	0.5	--	--	--	--
FEB	26...	1215	1810	525	--	0.0	0.5	--	--	--	--
MAR	29...	1420	22600	--	--	20.0	--	--	--	--	--
	30...	1525	25700	--	--	10.0	--	--	--	--	--
APR	02...	1110	31800	350	--	0.0	4.5	--	--	--	--
	05...	1025	27800	425	--	4.0	6.0	--	--	--	--
	08...	1140	21800	460	7.15	7.0	6.5	220	80	55	21
	11...	1320	16800	500	--	20.0	11.0	--	--	--	8.0
	14...	1155	11500	635	--	-3.0	8.0	--	--	--	--
	21...	1200	19200	--	--	7.0	--	--	--	--	--
	25...	1035	17900	515	--	5.0	9.0	--	--	--	--
	30...	1130	21800	545	--	8.0	9.5	--	--	--	--
MAY	07...	1240	18500	--	--	10.0	10.0	--	--	--	--
	12...	1240	12800	555	--	16.0	15.0	--	--	--	--
	16...	1245	15700	590	--	8.0	15.0	--	--	--	--
	21...	1140	14200	658	--	17.0	16.5	--	--	--	--
AUG	25...	1630	1930	--	--	22.0	--	--	--	--	--
SEP	26...	1340	4700	610	7.79	14.0	15.5	--	--	--	--
		SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
APR	08...	7	0.2	6.0	140	83	7.3	0.1	12	300	280
		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...	2	60	40	<1	14	20	0.2	1	<1	220

## RED RIVER OF THE NORTH BASIN

05083600 MIDDLE BRANCH FOREST RIVER NEAR WHITMAN, ND

LOCATION.--Lat 48°14'50", long 98°07'00", in SE1/4NW1/4 sec.16, T.155 N., R.58 W., Walsh County, Hydrologic Unit 09020308, 150 ft downstream from bridge on State Highway 35, and 6 mi north of Whitman.

DRAINAGE AREA.--47.7 mi<sup>2</sup>, of which about 9 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

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

GAGE.--Water-stage recorder. Elevation of gage is 1,510 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Mar. 4-23. Records good except those for period with ice effect, Mar. 4-23, which are fair.

AVERAGE DISCHARGE.--26 years, 2.95 ft<sup>3</sup>/s, 2,140 acre-ft/yr; median of yearly mean discharges, 2.2 ft<sup>3</sup>/s, 1,600 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 984 ft<sup>3</sup>/s, May 19, 1974, gage height, 7.11 ft; no flow for many months each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 86 ft<sup>3</sup>/s, Mar. 25, gage height, 5.10 ft; maximum gage height, 5.46 ft, Mar. 17, backwater from ice; only peak discharge greater than base discharge of 70 ft<sup>3</sup>/s; no flow for several months.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.74	.00	.00	.00	.00	12	3.0	.00	2.5	.99	.00
2	.00	.60	.00	.00	.00	.00	10	2.7	.00	1.8	.89	.06
3	.00	.56	.00	.00	.00	.00	7.5	2.6	.00	1.6	.79	.07
4	.04	.52	.00	.00	.00	.00	5.8	2.8	.00	2.5	.54	.03
5	.04	.49	.00	.00	.00	.00	4.6	2.6	.00	4.4	1.0	.00
6	.03	.46	.00	.00	.00	.00	4.7	2.5	.00	9.0	4.5	.00
7	.07	.40	.00	.00	.00	.00	4.4	2.1	.00	5.3	1.3	.00
8	.51	.31	.00	.00	.00	.00	2.8	2.0	.00	1.8	.61	.00
9	.58	.19	.00	.00	.00	.00	2.1	2.1	.00	2.1	.66	.00
10	1.3	.07	.00	.00	.00	.00	2.0	1.8	.00	9.4	.52	.00
11	1.5	.00	.00	.00	.00	.00	2.0	1.7	.00	11	.38	.00
12	2.4	.00	.00	.00	.00	.00	1.8	2.0	.00	7.9	.31	.00
13	3.2	.00	.00	.00	.00	.00	1.4	1.5	.00	5.8	.48	.00
14	.57	.00	.00	.00	.00	.50	2.3	1.3	.00	28	1.5	.00
15	.36	.00	.00	.00	.00	7.0	4.4	1.2	.00	27	1.3	.00
16	.85	.00	.00	.00	.00	15	3.4	1.1	.00	15	1.0	.00
17	.87	.00	.00	.00	.00	27	2.2	.94	.00	11	.78	.00
18	.87	.00	.00	.00	.00	18	3.1	.85	.00	10	.58	.00
19	.97	.00	.00	.00	.00	15	3.5	.78	.00	8.7	.42	.00
20	1.6	.00	.00	.00	.00	10	3.5	.71	.00	6.8	.43	.00
21	2.0	.00	.00	.00	.00	5.0	5.1	.61	.00	5.3	.25	.00
22	3.1	.00	.00	.00	.00	27	11	.51	.00	3.9	.26	.00
23	2.9	.00	.00	.00	.00	48	8.3	.47	.00	3.1	.22	.00
24	3.4	.00	.00	.00	.00	51	6.1	.51	.00	2.4	.17	.00
25	3.8	.00	.00	.00	.00	59	5.1	.44	.00	2.0	.12	.06
26	3.1	.00	.00	.00	.00	30	4.5	.34	.00	1.8	.14	.03
27	2.2	.00	.00	.00	.00	32	4.1	.26	.00	1.7	.08	.02
28	1.8	.00	.00	.00	.00	31	3.7	.21	.84	1.6	.06	.00
29	1.4	.00	.00	.00	---	28	3.0	.17	3.5	1.4	.03	.04
30	1.1	.00	.00	.00	---	24	3.3	.11	3.2	1.2	.00	.09
31	.87	---	.00	.00	---	20	---	.06	---	1.1	.00	---
TOTAL	41.43	4.34	.00	.00	.00	447.50	137.7	39.97	7.54	197.1	20.31	.40
MEAN	1.34	.14	.00	.00	.00	14.4	4.59	1.29	.25	6.36	.66	.01
MAX	3.8	.74	.00	.00	.00	59	12	3.0	3.5	28	4.5	.09
MIN	.00	.00	.00	.00	.00	.00	1.4	.06	.00	1.1	.00	.00
AC-FT	82	8.6	.00	.00	.00	888	273	79	15	391	40	.8
CAL YR 1985	TOTAL	530.79		MEAN	1.45	MAX	46	MIN	.00	AC-FT	1050	
WTR YR 1986	TOTAL	896.29		MEAN	2.46	MAX	59	MIN	.00	AC-FT	1780	

## RED RIVER OF THE NORTH BASIN

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05083600 MIDDLE BRANCH FOREST RIVER NEAR WHITMAN, ND--CONTINUED

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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 21...	1130	1.8	1730	--	10.0	8.5	--	--	--	--	--
MAR 24...	1530	68	400	6.60	0.0	3.0	130	48	32	13	27
APR 29...	1305	3.1	1320	--	10.0	12.0	--	--	--	--	--
JUL 07...	1400	5.0	630	--	23.0	24.0	--	--	--	--	--
AUG 19...	1250	0.43	2150	7.76	25.0	23.0	750	320	150	92	250

DATE	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR 24...	29	1	6.7	85	89	6.6	0.1	13	259	240	0.35
AUG 19...	42	4	5.5	440	710	88	0.2	26	1680	1600	2.3

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)
MAR 24...	2	30	60	<1	13	370	0.2	2	<1	130
AUG 19...	5	130	20	<1	87	80	0.4	8	2	700

## RED RIVER OF THE NORTH BASIN

05084000 FOREST RIVER NEAR FORDVILLE, ND

LOCATION.--Lat 48°11'50", long 97°43'49", on line between secs.32 and 33, T.155 N., R.55 W., Walsh County, Hydrologic Unit 09020308, on right bank 50 ft upstream from highway bridge, 0.5 mi downstream from South Branch, and 3 mi southeast of Fordville.

DRAINAGE AREA.--456 mi<sup>2</sup>, of which about 120 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

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

GAGE.--Water-stage recorder. Elevation of gage is 1,035 ft above National Geodetic Vertical Datum of 1929, from topographic map. Prior to July 21, 1951, nonrecording gage at site 50 ft downstream at same datum.

REMARKS.--Estimated daily discharges: Nov. 8 to Mar. 18. Records fair. Some regulation of high flows by temporary retention in several retarding basins above station. Retarding basins have a combined capacity of about 14,000 acre-ft.

AVERAGE DISCHARGE.--46 years, 38.0 ft<sup>3</sup>/s, 27,500 acre-ft/yr; median of yearly mean discharges, 36 ft<sup>3</sup>/s, 26,100 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 16,400 ft<sup>3</sup>/s, Apr. 18, 1950, gage height, 14.48 ft, from flood-mark, from rating curve extended above 5,600 ft<sup>3</sup>/s on basis of contracted opening and slope-area measurements of peak flow; no flow Apr. 1-13, Sept. 3, 1940.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 200 ft<sup>3</sup>/s and maximum (\*):

Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)	Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)
Mar. 17	----	*1,380	a*5.79	July 15	1900	304	3.47
Mar. 23	0030	570	4.11				

Minimum daily, 4.2 ft<sup>3</sup>/s, Feb. 25-28.

a - Backwater from ice

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16	13	17	18	16	4.4	134	102	35	10	24	9.4
2	16	21	17	18	16	4.7	116	95	31	8.2	22	16
3	17	46	17	18	16	5.0	101	86	32	11	20	17
4	17	44	17	18	16	5.3	90	84	30	15	18	17
5	17	39	17	17	16	5.4	81	71	28	16	17	16
6	16	25	17	17	16	5.3	54	51	27	15	17	16
7	17	23	18	16	15	5.1	48	47	29	12	16	14
8	24	22	18	16	14	5.1	44	42	30	11	15	12
9	21	22	19	16	13	5.1	38	43	28	11	16	11
10	22	21	19	16	12	4.9	34	42	29	17	16	11
11	22	21	19	16	10	5.3	31	42	28	20	15	10
12	23	21	19	16	9.0	6.0	31	42	27	43	14	10
13	26	21	19	16	8.0	7.4	28	40	26	52	13	9.6
14	29	20	19	16	7.0	13	26	40	27	86	13	9.3
15	31	20	19	16	6.0	88	25	38	25	234	16	9.9
16	28	20	19	16	5.8	436	26	39	24	272	19	11
17	26	19	20	16	5.8	1150	26	34	22	239	21	11
18	24	19	20	16	5.7	811	29	31	22	204	19	11
19	21	19	20	16	5.6	528	45	31	21	175	18	11
20	20	19	19	16	5.2	301	75	31	23	149	16	12
21	19	19	19	16	4.8	211	64	29	27	123	15	12
22	19	19	19	16	4.5	379	47	23	25	73	15	14
23	19	19	18	16	4.3	455	43	23	21	64	14	12
24	18	18	18	16	4.3	270	41	25	18	60	13	12
25	18	18	18	16	4.2	254	40	25	15	48	13	15
26	17	18	18	16	4.2	223	54	23	13	41	13	14
27	16	18	18	16	4.2	214	68	25	14	46	12	14
28	16	18	18	16	4.2	201	95	30	10	38	10	13
29	15	18	18	16	---	183	124	28	9.3	33	10	14
30	14	17	18	16	---	171	110	33	8.9	31	9.7	15
31	13	---	18	16	---	154	---	39	---	27	9.2	---
TOTAL	617	657	569	506	252.8	6111.0	1768	1334	705.2	2184.2	478.9	379.2
MEAN	19.9	21.9	18.4	16.3	9.03	197	58.9	43.0	23.5	70.5	15.4	12.6
MAX	31	46	20	18	16	1150	134	102	35	272	24	17
MIN	13	13	17	16	4.2	4.4	25	23	8.9	8.2	9.2	9.3
AC-FT	1220	1300	1130	1000	501	12120	3510	2650	1400	4330	950	752
CAL YR 1985	TOTAL	9082.3		MEAN	24.9	MAX	523	MIN	2.9	AC-FT	18010	
WTR YR 1986	TOTAL	15562.3		MEAN	42.6	MAX	1150	MIN	4.2	AC-FT	30870	



05084000 FOREST RIVER NEAR FORDVILLE, ND--CONTINUED

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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 21...	1050	19	850	--	20.0	8.5	--	--	--	--	--
DEC 16...	1335	19	420	--	-20.0	0.0	--	--	--	--	--
JAN 30...	1205	16	840	--	-12.0	0.5	--	--	--	--	--
MAR 13...	1215	6.8	735	--	1.0	1.0	--	--	--	--	--
MAR 25...	1430	270	575	--	10.0	5.5	--	--	--	--	--
APR 29...	1610	124	1000	--	15.0	13.5	--	--	--	--	--
JUN 05...	1800	27	890	--	22.0	22.5	--	--	--	--	--
JUL 16...	1630	262	900	7.45	24.0	24.0	330	130	76	35	73
AUG 22...	1425	15	810	7.30	15.0	18.0	340	100	78	34	56

DATE	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
JUL 16...	31	2	9.2	210	250	18	0.1	22	646	610	0.88
AUG 22...	26	1	7.4	230	200	15	0.2	23	577	550	0.78

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)
JUL 16...	4	60	10	<1	38	150	0.7	5	1	310
AUG 22...	8	70	10	<1	35	310	0.3	7	2	310

## RED RIVER OF THE NORTH BASIN

05085000 FOREST RIVER AT MINTO, ND

LOCATION.--Lat 48°16'10", long 97°22'10", in SE¼ sec.31, T.156 N., R.52 W., Walsh County, Hydrologic Unit 09020308, on right bank 30 ft upstream from dam in Minto, 150 ft upstream from Burlington Northern Railway bridge, and 900 ft east of U.S. Highway 81.

DRAINAGE AREA.--740 mi<sup>2</sup>, of which about 120 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--April 1944 to current year.

REVISED RECORDS.--WSP 1438: 1948-50. WSP 1728: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 806.95 ft above National Geodetic Vertical Datum of 1929. Prior to July 15, 1954, nonrecording gage at site 400 ft upstream at same datum.

REMARKS.--Estimated daily discharges: Nov. 23 to Mar. 30. Records good except those for period with ice effect, Nov. 23 to Mar. 23, which are fair. Occasionally during high stages, particularly when the channel is filled with snow, overflow occurs 0.5 mi below the municipality of Forest River and bypasses the gage 3 mi south of Minto and flows into Lake Ardoch. Bypass flow is not included in computation of discharge record for station at Minto.

AVERAGE DISCHARGE.--42 years, 49.4 ft<sup>3</sup>/s, 35,790 acre-ft/yr; median of yearly mean discharges, 45 ft<sup>3</sup>/s, 32,600 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 16,600 ft<sup>3</sup>/s, Apr. 18, 1950, gage height, 11.80 ft from flood-marks, from rating curve extended above 7,200 ft<sup>3</sup>/s, on basis of contracted opening measurement of peak flow; no flow at times each year 1945-47, 1953-55, 1959-64.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 200 ft<sup>3</sup>/s and maximum (\*):

Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)	Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)
C----	----	*690	ab*3.4	July 18	0230	201	2.11

Minimum daily discharge, 4.0 ft<sup>3</sup>/s, Feb. 27 to Mar. 1.--

a - Backwater from ice

b - From high-water mark

c - Sometime between Mar. 19-25

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.3	25	8.6	6.4	5.6	4.0	234	182	26	8.3	45	11
2	6.5	23	8.6	6.3	5.6	4.1	213	171	25	8.0	39	17
3	6.9	23	8.6	6.2	5.6	4.1	190	161	25	8.3	35	18
4	7.5	28	8.6	6.1	5.6	4.5	176	166	24	8.3	31	20
5	8.4	61	8.6	6.1	5.6	4.5	161	146	22	8.7	31	17
6	9.9	66	8.6	6.0	5.6	4.5	149	129	22	7.0	27	16
7	11	62	11	6.0	5.6	4.5	130	107	20	7.1	24	15
8	11	30	10	6.0	5.6	4.5	111	99	19	7.1	22	14
9	10	28	10	6.0	5.6	4.5	101	94	19	7.1	22	13
10	9.7	24	10	5.8	5.4	4.7	93	88	19	7.6	21	13
11	15	23	9.8	5.6	5.4	4.5	87	87	19	6.9	20	12
12	15	26	9.6	5.6	5.2	4.5	80	85	18	7.9	19	11
13	15	25	9.4	6.0	5.2	4.5	73	85	18	11	18	9.5
14	18	23	9.3	6.5	5.2	4.3	68	84	18	24	17	10
15	19	19	9.2	7.0	5.2	4.5	50	83	17	37	17	9.2
16	23	15	9.0	7.0	5.2	11	70	91	16	63	15	10
17	27	14	8.8	7.0	5.0	54	63	86	15	165	15	10
18	30	13	8.6	7.0	5.0	420	63	78	14	195	19	11
19	28	12	8.5	7.0	5.0	505	73	72	13	183	23	12
20	27	9.5	8.5	7.0	4.8	416	84	66	13	165	22	10
21	25	9.2	8.3	7.0	4.8	399	100	64	12	149	20	10
22	25	8.9	7.8	7.0	4.6	500	106	62	13	133	19	10
23	25	9.0	8.2	6.8	4.6	540	101	59	11	113	18	12
24	25	9.0	9.6	6.8	4.6	520	89	55	12	86	17	13
25	25	9.0	9.3	6.6	4.4	510	83	52	11	75	15	11
26	24	8.8	7.8	6.4	4.4	383	88	47	11	71	16	10
27	24	8.8	7.0	6.2	4.0	332	101	41	9.8	65	13	13
28	24	8.8	6.8	6.2	4.0	327	125	37	9.1	70	13	13
29	23	8.8	6.6	6.2	---	317	148	34	8.6	62	13	13
30	25	8.8	6.5	6.0	---	332	184	32	8.3	55	12	12
31	24	---	6.4	5.6	---	257	---	29	---	49	12	---
TOTAL	573.2	638.6	267.6	197.4	142.4	5889.2	3394	2672	487.8	1863.3	650	375.7
MEAN	18.5	21.3	8.63	6.37	5.09	190	113	86.2	16.3	60.1	21.0	12.5
MAX	30	66	11	7.0	5.6	540	234	182	26	195	45	20
MIN	6.3	8.8	6.4	5.6	4.0	4.0	50	29	8.3	6.9	12	9.2
AC-FT	1140	1270	531	392	282	11680	6730	5300	968	3700	1290	745
CAL YR 1985	TOTAL	11201.88		MEAN	30.7	MAX	550	MIN	.00	AC-FT	22220	
WTR YR 1986	TOTAL	17151.2		MEAN	47.0	MAX	540	MIN	4.0	AC-FT	34020	

## RED RIVER OF THE NORTH BASIN

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05085000 FOREST RIVER AT MINTO, ND--CONTINUED

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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												
15...	1530	18	810	--	4.0	6.5	--	--	--	--	--	
DEC												
10...	1340	9.8	960	--	-7.0	0.5	--	--	--	--	--	
JAN												
29...	1210	6.1	970	--	-15.0	0.5	--	--	--	--	--	
MAR												
12...	1520	4.8	905	--	1.0	1.0	--	--	--	--	--	
28...	1435	324	600	--	12.0	4.0	--	--	--	--	--	
MAY												
05...	1350	150	1050	--	23.0	18.5	--	--	--	--	--	
JUN												
06...	1150	21	920	--	21.0	21.0	--	--	--	--	--	
JUL												
*17...	1240	176	870	7.27	30.0	24.0	340	150	78	34	63	
17...	1241	176	870	7.27	30.0	24.0	330	330	77	33	60	
SEP												
*02...	1520	18	840	7.95	16.0	17.0	340	100	78	35	56	
02...	1521	18	840	7.95	16.0	17.0	340	340	78	36	57	
DATE		PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINEITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
JUL												
*17...	28	2	9.7	180	260	17	0.1	24	622	600	0.85	
17...	28	1	9.1	150	260	18	0.3	26	584	570	0.79	
SEP												
*02...	26	1	7.9	240	180	26	0.2	14	559	540	0.76	
02...	26	1	7.7	235	200	27	0.2	15	520	560	0.71	
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)	
JUL												
*17...		4	80	10	<1	37	40	0.5	5	1	310	
17...		4	70	10	<5	43	27	--	1	<1	290	
SEP												
*02...		4	70	10	<1	36	120	0.1	3	1	280	
02...		4	70	8	<5	42	120	--	1	<1	300	

\*Split sample - analysis by North Dakota State Water Commission Laboratory.

## RED RIVER OF THE NORTH BASIN

05088500 HOMME RESERVOIR NEAR PARK RIVER, ND

LOCATION.--Lat 48°24'20", long 97°47'10", in SE1/4NW1/4 sec.19, T.157 N., R.55 W., Walsh County, Hydrologic Unit 09020310, at Homme Dam on South Branch Park River, and 2 mi west of town of Park River.

DRAINAGE AREA.--226 mi<sup>2</sup>.

## MONTHEND-ELEVATION AND CONTENTS RECORDS

PERIOD OF RECORD.--September 1949 to current year.

REVISED RECORDS.--WSP 1728: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is National Geodetic Vertical Datum of 1929.

REMARKS.--Reservoir is formed by an earth-fill dam, 865 ft long; storage began in September 1949, dam completed in October 1950. Usable capacity between invert of outlet, elevation, 1,048.0 ft, and crest of spillway, elevation, 1,080.0 ft, is 3,550 acre-ft. Dead storage is 100 acre-ft. Low flows are controlled by two sluice gates 3 x 5 ft. The spillway, which is 150 ft long, is uncontrolled. The records herein represent total contents. The reservoir is operated for flood control, water supply, and pollution abatement during low-flow periods.

COOPERATION.--Records furnished by U.S. Army Corps of Engineers.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 4,710 acre-ft, Apr. 20, 1979, elevation, 1,084.58 ft; minimum since first reaching spillway level, 184 acre-ft, Feb. 8, 1952, elevation, 1,051.22 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 3,564 acre-ft, Mar. 22, elevation, 1,083.52 ft; minimum, 1,630 acre-ft, Mar. 15, elevation, 1,072.42 ft.

## MONTHEND ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30-----	1,079.52	2,753	--
Oct. 31-----	1,080.09	2,858	+105
Nov. 30-----	1,079.91	2,823	-35
Dec. 31-----	1,079.15	2,687	-136
CAL YR 1985-----	--	--	+880
Jan. 31-----	1,076.92	2,306	-381
Feb. 28-----	1,073.96	1,824	-482
Mar. 31-----	1,080.55	2,950	1,126
Apr. 30-----	1,079.80	2,804	-146
May 31-----	1,079.80	2,804	0
June 30-----	1,079.89	2,820	+16
July 31-----	1,080.05	2,850	+30
Aug. 31-----	1,079.25	2,705	-145
Sept. 30-----	1,077.99	2,488	-217
WTR YR 1985-----	--	--	-265



## RED RIVER OF THE NORTH BASIN

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05089000 SOUTH BRANCH PARK RIVER BELOW HOMME DAM, ND

LOCATION.--Lat 48°24'07", long 97°46'55", in SE1/4 sec.19, T.157 N., R.55 W., Walsh County, Hydrologic Unit 09020310, on right bank 0.5 mi downstream from Homme Dam, and 2 mi west of town of Park River.

DRAINAGE AREA.--226 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1949 to current year. Monthly discharge only for October and November 1949, published in WSP 1308.

REVISED RECORDS.--WSP 1728: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,000.00 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Nov. 9 to Mar. 22. Records good except those for periods of estimated record, which are fair. Flow regulated by Homme Lake (station 05088500).

AVERAGE DISCHARGE.--37 years, 26.1 ft<sup>3</sup>/s, 18,910 acre-ft/yr; median of yearly mean discharges, 20 ft<sup>3</sup>/s, 14,500 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, about 13,000 ft<sup>3</sup>/s, Apr. 24, 1950, gage height, 37.52 ft, from rating curve extended above 5,500 ft<sup>3</sup>/s, result of failure of emergency embankment at site of Homme Dam; no flow Oct. 1 to Dec. 3, 1949, Oct. 1-4, 1969, Sept. 21, 1970, July 1, 1974.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 620 ft<sup>3</sup>/s, Mar. 23, gage height, 25.90 ft; minimum daily, 0.35 ft<sup>3</sup>/s, Sept. 18.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.9	9.0	3.4	4.4	12	11	123	63	9.9	5.5	5.6	4.0
2	1.9	5.9	3.3	4.4	12	11	112	56	10	5.3	3.7	4.4
3	2.1	6.1	3.2	4.3	12	11	86	51	11	5.3	3.4	7.8
4	2.6	6.1	3.2	4.2	12	11	75	43	10	5.1	3.4	9.9
5	3.1	9.2	3.2	4.1	12	11	67	36	9.9	8.9	3.4	13
6	3.3	6.0	3.3	4.1	12	11	58	32	9.8	6.5	3.2	18
7	2.7	7.3	3.4	4.0	12	11	44	23	9.6	3.8	3.6	18
8	3.7	3.6	3.8	4.0	12	11	44	23	9.3	6.3	2.8	13
9	3.1	3.4	4.2	4.1	11	11	36	24	9.0	9.5	2.9	1.9
10	2.3	3.6	4.6	4.4	11	11	32	26	8.5	22	2.5	1.8
11	2.3	3.7	4.7	4.8	11	11	29	24	8.1	42	2.8	1.8
12	2.8	3.8	4.8	5.5	11	11	25	28	8.4	40	2.9	1.0
13	4.0	3.8	4.7	6.0	11	11	19	21	6.3	35	2.6	.93
14	5.2	3.8	4.6	6.4	11	11	22	24	5.0	55	2.5	1.1
15	5.8	3.7	4.6	6.9	11	12	15	21	4.6	75	2.7	.70
16	7.6	3.5	4.5	7.4	11	12	18	21	4.8	58	2.5	.41
17	13	3.5	4.4	7.9	11	12	20	13	4.8	44	2.6	.37
18	8.5	3.6	4.4	8.5	11	12	34	14	4.8	32	2.8	.35
19	9.5	3.6	4.4	9.0	11	12	103	14	4.8	25	2.8	.43
20	11	3.6	4.4	10	11	20	212	13	5.1	20	3.1	.46
21	12	3.6	4.4	11	11	63	134	12	5.1	19	3.0	.53
22	13	3.6	4.6	12	11	210	89	11	5.1	17	3.4	.57
23	14	3.6	4.8	12	11	499	70	11	6.8	18	3.5	.61
24	14	3.6	4.6	12	11	258	54	9.9	14	15	3.5	.72
25	10	3.6	4.4	12	11	300	55	10	21	9.2	3.5	1.1
26	15	3.5	4.4	12	11	282	55	10	16	12	3.5	.72
27	7.2	3.5	4.4	12	11	181	61	9.7	13	19	3.5	.45
28	8.5	3.4	4.4	12	11	183	74	9.4	8.7	16	3.8	.45
29	11	3.4	4.4	12	---	181	72	9.3	6.3	12	3.8	.57
30	7.1	3.4	4.4	12	---	179	70	9.3	5.5	12	3.7	.54
31	7.3	---	4.4	12	---	149	---	9.8	---	7.5	3.9	---
TOTAL	215.5	132.0	130.3	245.4	316	2719	1908	681.4	255.2	660.9	100.9	105.61
MEAN	6.95	4.40	4.20	7.92	11.3	87.7	63.6	22.0	8.51	21.3	3.25	3.52
MAX	15	9.2	4.8	12	12	499	212	63	21	75	5.6	18
MIN	1.9	3.4	3.2	4.0	11	11	15	9.3	4.6	3.8	2.5	.35
AC-FT	427	262	258	487	627	5390	3780	1350	506	1310	200	209
CAL YR 1985	TOTAL	4765.21		MEAN	13.1	MAX	380	MIN	.34	AC-FT	9450	
WTR YR 1986	TOTAL	7470.21		MEAN	20.5	MAX	499	MIN	.35	AC-FT	14820	

## RED RIVER OF THE NORTH BASIN

05089000 SOUTH BRANCH PARK RIVER BELOW HOMME DAM, ND--CONTINUED

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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 21...	1410	13	690	--	14.0	10.0	--	--	--	--	--
DEC 12...	1330	4.7	840	--	-17.0	0.5	--	--	--	--	--
JAN 29...	1550	12	850	--	-15.0	0.5	--	--	--	--	--
MAR 07...	1150	11	880	--	14.0	1.0	--	--	--	--	--
MAR 25...	0920	199	350	6.81	4.0	1.5	110	23	29	10	24
APR 23...	0925	68	670	--	10.0	9.5	--	--	--	--	--
JUN 03...	1600	10	840	--	20.0	17.5	--	--	--	--	--
JUL 11...	1135	45	850	--	20.0	22.5	--	--	--	--	--
AUG 22...	1010	3.2	850	7.31	15.0	18.0	310	97	77	29	67
DATE	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR 25...	30	1	6.8	91	61	5.3	0.1	15	227	210	0.31
AUG 22...	31	2	10	220	220	15	0.2	23	597	570	0.81
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)	
MAR 25...	2	50	100	<1	18	430	0.2	2	<1	140	
AUG 22...	6	130	10	1	50	690	0.3	8	2	370	

## RED RIVER OF THE NORTH BASIN

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05089100 MIDDLE BRANCH PARK RIVER NEAR UNION, ND

LOCATION.--Lat 48°32'32", long 98°01'10", on north line of sec.5, T.158 N., R.57 W., Walsh County, Hydrologic Unit 09020310, on left bank 150 ft downstream from bridge on county highway between Walsh and Cavalier counties, and 3.5 mi southwest of Union.

DRAINAGE AREA.--15.3 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1965 to September 1986 (seasonal records only since 1983, discontinued).

GAGE.--Water-stage recorder. Elevation of gage is 1,495 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Mar. 1-30. Records good except those for period of estimated daily discharges, which are fair.

AVERAGE DISCHARGE.--17 years (water years 1966-82), 2.18 ft<sup>3</sup>/s, 1,580 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 960 ft<sup>3</sup>/s, Apr. 20, 1979, gage height, 6.16 ft, backwater from ice; maximum gage height, 7.51 ft, May 4, 1966, from floodmark, backwater from snowdrift; no flow for several months each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 507 ft<sup>3</sup>/s, June 20, gage height, 5.38 ft; no flow for several days.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1						.00	4.7	4.6	.06	.26	.25	.03
2						.00	3.6	2.2	.09	.24	.21	.07
3						.00	3.1	1.4	.17	.28	.18	.08
4						.00	2.4	1.1	.15	.39	.17	.05
5						.00	1.7	.93	.14	15	.17	.03
6						.00	1.4	.77	.15	12	.17	.02
7						.00	1.4	.51	.11	2.4	.17	.02
8						.00	1.1	.56	.08	.68	.16	.00
9						.00	.99	.78	.08	.36	.17	.00
10						.00	.85	.60	.07	3.0	.16	.02
11						.00	.65	.52	.07	11	.15	.00
12						.00	.58	.68	.06	4.1	.14	.00
13						.00	.48	.55	.03	8.6	.15	.00
14						.00	.42	.47	.07	15	.16	.00
15						.20	.45	.39	.06	14	.12	.00
16						.50	.67	.36	.13	3.9	.08	.00
17						.80	1.3	.42	.10	2.4	.06	.07
18						1.0	10	.26	.04	6.2	.05	.07
19						1.5	28	.25	.02	3.1	.05	.06
20						2.0	8.0	.22	110	2.5	.04	.05
21						2.0	3.2	.21	39	2.3	.05	.04
22						15	1.8	.19	17	1.2	.12	.06
23						12	1.2	.19	8.0	.84	.15	.02
24						10	.89	.19	3.6	1.1	.09	.00
25						10	.88	.17	1.8	.77	.07	.14
26						8.3	1.9	.17	.98	.48	.11	.09
27						7.8	8.8	.17	.58	.63	.07	.05
28						13	12	.16	.37	.55	.04	.03
29						12	5.4	.16	.32	.37	.03	.06
30						11	4.2	.13	.29	.36	.02	.07
31						6.8	---	.08	---	.26	.01	---
TOTAL						113.90	112.06	19.39	183.62	114.27	3.57	1.13
MEAN						3.67	3.74	.63	6.12	3.69	.12	.04
MAX						15	28	4.6	110	15	.25	.14
MIN						.00	.42	.08	.02	.24	.01	.00
AC-FT						226	222	38	364	227	7.1	2.2

## RED RIVER OF THE NORTH BASIN

05089100 MIDDLE BRANCH PARK RIVER NEAR UNION, ND--CONTINUED

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	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)	PERCENT SODIUM (00932)
OCT 16...	1055	2.3	700	--	1.0	1.5	--	--	--	--	--
MAR 26...	1010	8.3	200	6.51	-3.0	1.0	62	15	6.0	22	40
APR 03...	0935	3.3	360	--	3.0	--	--	--	--	--	--
23...	1230	1.0	500	--	15.0	15.0	--	--	--	--	--
MAY 30...	1135	0.15	635	7.21	25.0	23.5	220	55	19	63	38
JUL 15...	1530	10	380	--	24.0	23.0	--	--	--	--	--
AUG 20...	1635	0.01	660	--	20.0	20.0	--	--	--	--	--
SEP 30...	1610	0.06	545	--	16.0	14.0	--	--	--	--	--

DATE	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR 26...	1	6.7	75	21	4.0	0.2	15	164	140	0.22
MAY 30...	2	5.7	270	63	11	0.3	19	406	400	0.55

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)
MAR 26...	1	50	440	<1	13	430	0.1	1	<1	84
MAY 30...	2	160	50	1	43	1100	0.2	2	<1	250



## 05090000 PARK RIVER AT GRAFTON, ND

LOCATION.--Lat 48°25'29", long 97°24'42", in NE¼ sec.13, T.157 N., R.53 W., Walsh County, Hydrologic Unit 09020310, on right bank at the upstream corner of Highway 81 bridge in Grafton, and 3.5 mi downstream from South Branch.

DRAINAGE AREA.--695 mi<sup>2</sup>, approximately.

## WATER-DISCHARGE RECORDS

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

REVISED RECORDS.--WSP 955: 1941. WSP 1438: 1932, 1933(M), 1936-37(M), 1939(M), 1944. WSP 1728: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 811.00 ft above National Geodetic Vertical Datum of 1929. Prior to Oct. 1, 1984, gage located on right bank 30 ft upstream of Wakeman Avenue bridge. Datum of gage was 807.39 ft. Prior to Sept. 30, 1940, nonrecording gage at site 30 ft downstream at same datum. Oct. 1, 1940, to Sept. 17, 1946, nonrecording gage at site 2 mi downstream above masonry dam at same datum. Sept. 18, 1946, to July 25, 1952, nonrecording gage at site 30 ft downstream at same datum.

REMARKS.--Estimated daily discharges: Nov. 19 to Mar. 22. Records good except those for period with ice effect, Nov. 19 to Mar. 22, and period of no gage-height record, Dec. 12-15, which are fair. Flow regulated by by Homme Reservoir (station 05088500) and several small reservoirs.

AVERAGE DISCHARGE.--55 years, 57.3 ft<sup>3</sup>/s, 41,510 acre-ft/yr; median of yearly mean discharges, 43 ft<sup>3</sup>/s, 31,200 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 12,600 ft<sup>3</sup>/s, Apr. 19, 1950, gage height, 20.13 ft, result of dam failure, from rating curve extended above 9,000 ft<sup>3</sup>/s; no flow at times in most years.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 859 ft<sup>3</sup>/s, Mar. 24, gage height, 9.48 ft; minimum daily discharge, 0.10 ft<sup>3</sup>/s, Oct. 2 and 5.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.0	13	1.2	.46	13	10	437	310	19	24	81	6.4
2	.10	13	1.2	.45	14	10	371	288	19	19	85	10
3	.24	15	1.2	.45	15	10	320	267	22	15	78	11
4	.65	12	1.4	.45	15	11	266	238	21	14	67	10
5	.10	12	1.5	.45	15	11	221	199	17	16	56	16
6	.13	24	1.8	.45	14	11	188	164	17	16	47	19
7	1.7	29	2.0	.45	14	11	164	130	19	15	40	33
8	2.6	16	2.3	.45	13	11	140	97	16	11	36	39
9	1.3	12	2.6	.50	12	11	127	101	16	9.0	34	39
10	2.4	9.4	3.0	2.0	12	11	112	115	16	19	30	18
11	1.4	6.5	2.8	3.0	11	12	103	112	14	41	25	8.5
12	2.1	6.2	2.5	3.5	11	12	92	111	13	63	19	6.1
13	2.7	6.1	2.2	4.0	10	13	95	107	10	83	15	4.5
14	2.6	5.2	1.9	7.0	10	14	95	84	10	88	13	4.0
15	1.7	5.2	1.6	12	10	16	89	83	8.1	110	11	3.9
16	1.9	4.6	1.3	13	10	26	73	83	6.8	135	8.4	3.1
17	3.8	4.0	1.0	14	10	88	64	88	6.3	123	6.8	2.1
18	10	3.4	.80	14	10	140	82	65	6.3	105	5.5	1.3
19	11	3.0	.60	14	10	49	100	69	6.5	89	5.4	1.3
20	9.5	2.6	.45	15	9.0	116	216	94	7.0	74	4.4	1.5
21	11	1.9	.40	15	9.0	240	376	84	8.4	64	2.9	2.0
22	14	1.5	.60	15	9.0	431	347	63	6.6	61	4.1	2.2
23	22	1.4	.73	13	9.0	624	306	52	3.9	68	4.7	1.3
24	38	1.4	.60	14	9.0	812	241	49	12	62	5.0	1.8
25	36	1.3	.50	14	9.0	621	161	46	37	52	4.5	2.6
26	32	1.3	.60	14	9.5	700	145	44	54	43	4.1	.71
27	31	1.2	.56	13	10	725	148	40	49	50	4.1	.22
28	25	1.2	.53	13	10	664	229	38	43	61	4.3	.37
29	17	1.2	.50	13	---	636	263	36	34	51	5.2	.62
30	17	1.2	.48	13	---	528	285	32	29	58	6.4	.91
31	15	---	.47	13	---	497	---	24	---	78	7.2	---
TOTAL	314.92	215.8	39.32	255.61	312.5	7071	5856	3313	546.9	1717.0	720.0	250.43
MEAN	10.2	7.19	1.27	8.25	11.2	228	195	107	18.2	55.4	23.2	8.35
MAX	38	29	3.0	15	15	812	437	310	54	135	85	39
MIN	.10	1.2	.40	.45	9.0	10	64	24	3.9	9.0	2.9	.22
AC-FT	625	428	78	507	620	14030	11620	6570	1080	3410	1430	497
CAL YR 1985	TOTAL	11359.07		MEAN	31.1	MAX	840	MIN	.00	AC-FT	22530	
WTR YR 1986	TOTAL	20612.48		MEAN	56.5	MAX	812	MIN	.10	AC-FT	40880	

RED RIVER OF THE NORTH BASIN  
05090000 PARK RIVER AT GRAFTON, ND--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1969 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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 15...	1310	2.3	920	--	2.0	5.0	--	--	--	--	--
DEC 10...	1615	3.2	1500	--	-8.0	0.0	--	--	--	--	--
JAN 21...	1645	15	1420	--	-7.0	0.0	--	--	--	--	--
MAR 12...	1230	12	1010	--	0.0	0.5	--	--	--	--	--
MAR 28...	1000	675	390	6.35	10.0	1.5	130	30	34	12	25
APR 03...	1240	321	535	--	6.0	6.0	--	--	--	--	--
APR 10...	1310	111	735	--	21.0	11.0	--	--	--	--	--
APR 22...	1520	346	730	--	10.0	8.5	--	--	--	--	--
JUN 03...	1310	23	1180	--	22.0	23.0	--	--	--	--	--
JUL 16...	1125	138	770	--	22.0	23.0	--	--	--	--	--
SEP 02...	1335	14	910	7.61	16.0	16.5	310	100	72	32	76

DATE	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR 28...	27	1	7.3	100	63	12	0.2	16	246	230	0.33
SEP 02...	34	2	11	210	180	61	0.3	19	616	580	0.84

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)
MAR 28...	2	60	90	<1	19	210	0.1	2	<1	150
SEP 02...	6	220	10	<1	51	300	0.3	6	1	360

## 05092000 RED RIVER OF THE NORTH AT DRAYTON, ND

LOCATION.--Lat 48°34'20", long 97°08'50", in SE1/4SE1/4SE1/4 sec.24, T.159 N., R.51 W., Pembina County, Hydrologic Unit 09020311, on downstream end of east pier of interstate highway bridge, 1.5 mi northeast of Drayton, and at mile 206.7.

DRAINAGE AREA.--34,800 mi<sup>2</sup>, approximately, includes 3,800 mi<sup>2</sup> 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 National Geodetic Vertical Datum of 1929 (Minnesota highway benchmark). Prior to Nov. 30, 1954, nonrecording gage at site 1.5 mi upstrea at datum 1.59 ft higher.

REMARKS.--Estimated daily discharges: Nov. 7 to Mar. 24. Records good except those for period with ice effect, Nov. 7 to Mar. 24, which are fair. Some regulation by reservoirs on tributaries.

AVERAGE DISCHARGE.--37 years (water years 1950-86), 3,906 ft<sup>3</sup>/s, 2,830,000 acre-ft/yr; median of yearly mean discharges, 3,800 ft<sup>3</sup>/s, 2,753,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 92,900 ft<sup>3</sup>/s, Apr. 28, 1979, gage height, 43.66 ft; minimum observed, 7.7 ft<sup>3</sup>/s, Oct. 16, 1936, gage height, 1.75 ft, former site and datum.

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.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 29,700 ft<sup>3</sup>/s, Apr. 7, gage height, 36.59 ft; minimum daily, 1,600 ft<sup>3</sup>/s, Nov. 13.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3110	3420	2500	2180	1730	1640	25200	20300	7660	5430	3900	2200
2	3080	3330	2500	2180	1720	1640	26500	21600	7320	5210	3780	2380
3	3060	3220	2400	2180	1710	1640	27400	22900	7030	5000	3600	2430
4	3030	3110	2400	2180	1720	1650	28500	23900	6770	4870	3460	2430
5	3010	3000	2400	2180	1720	1640	29100	24600	6580	4800	3360	2430
6	2970	2950	2300	2050	1720	1640	29500	25000	6450	4680	3260	2520
7	2910	2900	2300	2020	1720	1650	29100	24500	6330	4600	3120	2510
8	2870	2900	2300	2040	1710	1650	28500	23600	6250	4550	3020	2580
9	2840	2800	2300	2080	1700	1650	27700	22300	6320	4400	2930	2780
10	2820	2700	2320	2040	1690	1660	26600	21100	6460	4340	2890	2970
11	3070	2500	2320	2040	1690	1660	25700	19900	6470	4200	2870	3110
12	4170	2000	2300	2020	1680	1670	24500	18600	6350	4100	2860	3180
13	5210	1600	2340	1940	1680	1680	23400	17500	6190	4110	2840	3190
14	5500	1900	2370	1940	1680	1720	22000	16700	6000	4180	2740	3100
15	5330	2100	2370	1940	1680	1760	20500	16300	5880	4530	2630	2940
16	4990	2400	2390	1950	1680	1810	18800	16200	5770	4940	2560	2800
17	4840	2600	2370	1950	1670	1900	17400	16000	5690	5370	2510	2670
18	4690	2700	2360	1950	1670	2010	16300	15800	5690	5450	2460	2570
19	4500	2500	2370	1950	1660	2200	15500	15600	5730	5460	2410	2520
20	4330	2300	2350	1950	1660	2250	15000	15400	6000	5450	2390	2490
21	4180	2100	2320	2000	1660	2370	14800	15100	6570	5400	2390	2490
22	4150	1900	2330	1980	1650	2900	15500	14600	6900	5280	2390	2500
23	4080	1800	2290	1950	1650	4300	16600	13900	6960	5170	2390	2500
24	4050	1700	2220	1930	1650	6020	17100	13100	6960	5000	2340	2600
25	4030	1800	2200	1910	1640	8630	17700	12100	6960	4960	2240	2990
26	3960	1900	2180	1900	1640	11500	17900	11100	6850	4790	2180	3530
27	3900	2000	2180	1810	1640	13800	17700	10200	6690	4620	2160	4110
28	3800	2100	2180	1800	1640	16100	17700	9400	6420	4400	2130	4630
29	3680	2200	2180	1780	---	18900	18200	8860	6120	4260	2100	5120
30	3560	2400	2180	1750	---	21600	19000	8400	5730	4120	2120	5510
31	3480	---	2180	1730	---	23400	---	8000	---	4000	2150	---
TOTAL	119200	72830	71700	61300	47060	164640	649400	522560	193100	147670	84180	89780
MEAN	3845	2428	2313	1977	1681	5311	21650	16860	6437	4764	2715	2993
MAX	5500	3420	2500	2180	1730	23400	29500	25000	7660	5460	3900	5510
MIN	2820	1600	2180	1730	1640	1640	14800	8000	5690	4000	2100	2200
AC-FT	236400	144500	142200	121600	93340	326600	1288000	1036000	383000	292900	167000	178100
CAL YR 1985	TOTAL	1836090		MEAN	5030	MAX	17400	MIN	1250	AC-FT	3642000	
WTR YR 1986	TOTAL	2223420		MEAN	6092	MAX	29500	MIN	1600	AC-FT	4410000	

## RED RIVER OF THE NORTH BASIN

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

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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 16...	1350	4960	565	--	3.0	5.0	--	--	--	--	--
DEC 09...	1500	2140	680	--	-7.0	0.5	--	--	--	--	--
10...	1610	2330	648	--	-12.0	0.0	--	--	--	--	--
MAR 10...	1800	1660	--	--	0.0	--	--	--	--	--	--
31...	1810	23900	380	--	10.0	4.0	--	--	--	--	--
APR 04...	1105	28300	400	--	6.0	5.5	--	--	--	--	--
07...	1515	29100	470	7.09	--	7.0	210	75	50	21	12
10...	1710	26700	500	--	21.0	11.0	--	--	--	--	--
16...	1430	18600	710	--	10.0	8.0	--	--	--	--	--
MAY 02...	1600	22000	650	--	12.0	9.0	--	--	--	--	--
13...	1440	17300	760	--	--	17.0	--	--	--	--	--
JUN 06...	1620	6430	650	--	20.0	21.0	--	--	--	--	--
JUL 21...	1610	5380	--	--	26.0	--	--	--	--	--	--
AUG 28...	1730	2180	590	7.88	20.0	19.0	260	55	56	29	32
DATE	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
APR 07...	11	0.4	7.4	140	77	12	0.2	14	308	280	0.42
AUG 28...	21	0.9	5.2	200	79	31	0.1	13	396	370	0.54
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 07...	3	80	20	<1	18	20	0.1	2	<1	230	
AUG 28...	5	90	10	<1	27	10	0.6	4	1	250	



## 05092200 PEMBINA COUNTY DRAIN 20 NEAR GLASSTON, ND

LOCATION.--Lat 48°41'49", long 97°23'03", in NW¼ sec.8, T.160 N., R.52 W., Pembina County, Hydrologic Unit 09020311, on left bank 50 ft downstream from bridge on county highway, and 3 mi southeast of Glasston.

DRAINAGE AREA.--80 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1971 to September 1986 (seasonal records only since 1983, discontinued).

REVISED RECORDS.--WDR ND-78:Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 808 ft above National Geodetic Vertical Datum of 1929 from topographic map.

REMARKS.--Estimated daily discharges: Mar. 1 to Apr. 1, Apr. 16 to May 4, and July 14-22. Records poor.

AVERAGE DISCHARGE.--11 years (water years 1972-82), 2.29 ft<sup>3</sup>/s, 1,660 acre-ft/yr; median of yearly mean discharges, 1.08 ft<sup>3</sup>/s, 783 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 940 ft<sup>3</sup>/s, Apr. 20, 1979, gage height, 9.3 ft; maximum gage height, 14.64 ft, Apr. 19, 1979, backwater from ice; no flow most of time.

EXTREMES FOR CURRENT YEAR.--Maximum observed discharge, 90 ft<sup>3</sup>/s, July 12, gage height, 7.50 ft from floodmark; maximum gage height, 12.04 ft, Mar. 28, backwater from ice; no flow for several months.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1						.00	7.0	8.0	.00	.00	.44	.00
2						.00	6.0	6.0	.00	.00	.54	.00
3						.00	5.0	5.0	.00	.00	.85	.00
4						.00	3.4	4.7	.00	.00	.18	.00
5						.00	2.7	4.4	.00	.00	.03	.00
6						.00	2.1	4.0	.00	.03	.01	.00
7						.00	1.4	4.2	.00	3.2	.00	.00
8						.00	.71	3.3	.00	.63	.00	.00
9						.00	.21	2.7	.00	.02	.00	.00
10						.00	.09	2.7	.00	.05	.00	.00
11						.00	.05	2.4	.00	20	.00	.00
12						.00	.00	2.1	.00	65	.00	.00
13						.00	.00	2.7	.00	40	.00	.00
14						.00	.00	3.1	.00	25	.00	.00
15						.00	.00	3.1	.00	15	.00	.00
16						.00	.00	2.8	.00	10	.00	.00
17						.00	.00	1.9	.00	5.0	.00	.00
18						.00	.00	1.2	.00	2.0	.00	.00
19						.00	.00	.50	.00	1.0	.00	.00
20						.00	.00	.15	.00	.50	.00	.00
21						.00	.00	.04	.00	.40	.00	.00
22						.00	.00	.01	1.0	.30	.00	.00
23						.00	.00	.00	.40	.20	.00	.00
24						.00	.00	.00	.10	.09	.00	.00
25						5.0	.00	.00	.02	.03	.00	.00
26						43	5.0	.00	.00	.01	.00	.00
27						40	25	.00	.00	.01	.00	.00
28						35	30	.00	.00	.03	.00	.00
29						30	20	.00	.00	.10	.00	.00
30						20	14	.00	.00	1.6	.00	.00
31						10	---	.00	---	1.1	.00	---
TOTAL						183.00	122.66	65.00	1.52	191.30	2.05	.00
MEAN						5.90	4.09	2.10	.05	6.17	.07	.00
MAX						43	30	8.0	1.0	65	.85	.00
MIN						.00	.00	.00	.00	.00	.00	.00
AC-FT						363	243	129	3.0	379	4.1	.00

## RED RIVER OF THE NORTH BASIN

05098700 HIDDEN ISLAND COULEE NEAR HANSBORO, ND  
(International gaging station)

LOCATION.--Lat 48°57'10", long 99°25'35", in SE1/4SW1/4 sec.11, T.163 N., R.68 W., Towner County, Hydrologic Unit 09020313, on right bank 400 ft downstream from bridge on county highway, and 2.5 mi west of Hansboro.

DRAINAGE AREA.--38 mi<sup>2</sup>, approximately.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1961 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 1,615 ft above National Geodetic Vertical Datum of 1929 from topographic map. Prior to May 20, 1962, nonrecording gage 400 ft upstream at same datum.

REMARKS.--Estimated daily discharges: Mar. 6-24, Mar. 28 to Apr. 1, and Apr. 12-17. Records fair except those for periods with ice effect, Mar. 6-24 and Apr. 12-17, and period of missing record, Mar. 28 to Apr. 1, which are poor.

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

AVERAGE DISCHARGE.--25 years, 3.44 ft<sup>3</sup>/s, 2,490 acre-ft/yr; median of yearly mean discharges, 2.1 ft<sup>3</sup>/s, 1,520 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, about 1,200 ft<sup>3</sup>/s Apr. 23, 1979, gage height, 10.50 ft, from floodmark, backwater from ice; no flow for several months each year.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 25 ft<sup>3</sup>/s and maximum (\*):

Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)	Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)
Mar. 16	----	40	87.07	Apr. 19	0400	33	6.49
Mar. 23	----	87	87.14	June 21	1400	*276	*7.45

No flow for several months.

a - Backwater from ice and/or snow

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.00	.00	4.5	5.3	.03	1.5	.05	.00
2	.00	.00	.00	.00	.00	.00	3.3	4.5	.12	1.2	.05	.00
3	.00	.00	.00	.00	.00	.00	4.3	4.3	.39	.99	.04	.00
4	.00	.00	.00	.00	.00	.00	3.3	4.4	.09	.84	.03	.00
5	.00	.00	.00	.00	.00	.00	2.8	4.3	.06	.66	.02	.00
6	.00	.00	.00	.00	.00	.00	2.9	4.9	.06	.46	.02	.00
7	.00	.00	.00	.00	.00	.00	2.6	4.3	.06	.34	.02	.00
8	.00	.00	.00	.00	.00	.00	2.3	3.7	.03	.26	.01	.00
9	.00	.00	.00	.00	.00	.00	2.1	5.2	.03	.17	.01	.00
10	.00	.00	.00	.00	.00	.00	2.1	5.8	.03	.44	.01	.00
11	.00	.00	.00	.00	.00	.00	1.8	4.6	.02	.39	.01	.00
12	.00	.00	.00	.00	.00	.00	1.6	3.8	.01	.83	.00	.00
13	.00	.00	.00	.00	.00	.00	1.4	3.1	.00	1.2	.00	.00
14	.00	.00	.00	.00	.00	.05	1.2	2.7	.00	1.6	.00	.00
15	.00	.00	.00	.00	.00	.45	1.0	2.4	.11	1.6	.00	.00
16	.00	.00	.00	.00	.00	30	.80	2.2	.07	1.4	.00	.00
17	.01	.00	.00	.00	.00	21	1.0	1.9	.03	1.5	.00	.00
18	.01	.00	.00	.00	.00	16	13	1.6	.01	1.4	.00	.00
19	.01	.00	.00	.00	.00	9.0	29	1.4	.08	1.2	.00	.00
20	.01	.00	.00	.00	.00	6.5	24	1.2	.17	1.6	.00	.00
21	.02	.00	.00	.00	.00	3.0	16	1.0	.89	2.2	.00	.00
22	.01	.00	.00	.00	.00	10	14	.89	.73	1.6	.00	.00
23	.07	.00	.00	.00	.00	33	10	.75	.54	1.4	.00	.00
24	.06	.00	.00	.00	.00	21	7.2	.64	.26	1.2	.00	.00
25	.04	.00	.00	.00	.00	12	6.1	.54	.14	.42	.00	.00
26	.03	.00	.00	.00	.00	14	5.2	.41	8.8	.34	.00	.00
27	.01	.00	.00	.00	.00	9.0	4.8	.32	5.7	.21	.00	.00
28	.01	.00	.00	.00	.00	8.6	4.7	.23	3.8	.16	.00	.00
29	.00	.00	.00	.00	---	7.3	4.4	.13	2.5	.10	.00	.00
30	.00	.00	.00	.00	---	6.4	5.6	.10	2.0	.08	.00	.00
31	.00	---	.00	.00	---	5.5	---	.06	---	.05	.00	---
TOTAL	.29	.00	.00	.00	.00	212.80	183.00	76.67	280.20	27.34	.27	.00
MEAN	.01	.00	.00	.00	.00	6.86	6.10	2.47	9.34	.88	.01	.00
MAX	.07	.00	.00	.00	.00	33	29	5.8	89	2.2	.05	.00
MIN	.00	.00	.00	.00	.00	.00	.80	.06	.00	.05	.00	.00
AC-FT	.6	.00	.00	.00	.00	422	363	152	556	54	.5	.00
CAL YR 1985	TOTAL	510.56		MEAN	1.40	MAX	60	MIN	.00	AC-FT	1010	
WTR YR 1986	TOTAL	780.57		MEAN	2.14	MAX	89	MIN	.00	AC-FT	1550	

05098700 HIDDEN ISLAND COULEE NEAR HANSBORO, ND--CONTINUED

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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)
APR 01...	1335	4.6	--	--	10.0	7.0	--	--	--	--	--
24...	1145	7.3	980	7.44	12.0	10.5	440	240	94	50	51
MAY 29...	1225	0.13	1440	7.79	29.0	24.0	680	310	140	79	82
JUL 08...	1325	0.27	--	--	24.0	22.0	--	--	--	--	--
DATE	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
APR 24...	20	1	13	200	320	14	0.1	12	710	670	0.97
MAY 29...	20	1	16	360	460	21	0.2	20	1100	1000	1.5
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 24...	2	120	50	<1	54	30	0.1	2	<1	390	
MAY 29...	6	130	50	<1	88	--	0.1	5	2	510	

## RED RIVER OF THE NORTH BASIN

05098800 CYPRESS CREEK NEAR SARLES, ND  
(International gaging station)

LOCATION.--Lat 48°56'35", long 98°57'05", in SW1/4SE1/4 sec.9, T.163 N., R.64 W., Cavalier County, Hydrologic Unit 09020313, on right bank 150 ft downstream from twin multiplate culverts on county highway, and 2.5 mi east of Sarles.

DRAINAGE AREA.--71 mi<sup>2</sup>, approximately.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--May 1961 to current year. Prior to October 1973, published as Long River near Sarles.

GAGE.--Water-stage recorder. Elevation of gage is 1,545 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Mar. 6-24 and Apr. 12-17. Records good except those for periods with ice effect, Mar. 6-24 and Apr. 12-17, which are poor.

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

AVERAGE DISCHARGE.--25 years, 5.90 ft<sup>3</sup>/s, 4,270 acre-ft/yr; median of yearly mean discharges, 4.9 ft<sup>3</sup>/s, 3,550 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge observed, 2,000 ft<sup>3</sup>/s, Apr. 21, 1979, gage height, 10.35 ft, backwater from ice and snow; no flow for several months each year.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 50 ft<sup>3</sup>/s and maximum (\*):

Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)	Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)
Mar. 17	----	*198	*a5.23	Apr. 19	0745	57	4.02
Mar. 22	----	159	a4.84	June 22	1045	118	4.19

No flow for many months.  
a - Backwater from ice

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.00	.00	17	6.8	.00	5.7	.17	.00
2	.00	.00	.00	.00	.00	.00	17	5.7	.03	4.7	.12	.00
3	.00	.00	.00	.00	.00	.00	19	4.3	3.1	4.2	.07	.00
4	.00	.00	.00	.00	.00	.00	15	5.2	1.2	5.6	.03	.00
5	.00	.00	.00	.00	.00	.00	15	6.7	.41	5.0	.00	.00
6	.00	.00	.00	.00	.00	.00	14	5.7	.20	3.8	.00	.00
7	.00	.00	.00	.00	.00	.00	12	4.4	.16	2.9	.00	.00
8	.00	.00	.00	.00	.00	.00	7.8	5.3	.09	2.3	.00	.00
9	.00	.00	.00	.00	.00	.00	5.3	3.7	.06	1.7	.00	.00
10	.00	.00	.00	.00	.00	.00	4.7	5.3	.08	1.8	.00	.00
11	.00	.00	.00	.00	.00	.00	4.5	6.8	.05	2.4	.00	.00
12	.00	.00	.00	.00	.00	.00	4.1	4.9	.05	2.6	.00	.00
13	.00	.00	.00	.00	.00	.00	2.7	4.0	.02	2.6	.00	.00
14	.00	.00	.00	.00	.00	.00	1.6	3.0	.00	3.0	.00	.00
15	.00	.00	.00	.00	.00	.30	.93	2.6	.00	2.6	.00	.00
16	.00	.00	.00	.00	.00	2.5	.80	2.2	.03	2.2	.00	.00
17	.00	.00	.00	.00	.00	27	2.9	2.0	.00	1.8	.00	.00
18	.00	.00	.00	.00	.00	103	19	1.9	.00	1.6	.00	.00
19	.00	.00	.00	.00	.00	21	50	1.7	1.4	1.5	.00	.00
20	.00	.00	.00	.00	.00	10	39	1.3	16	1.2	.00	.00
21	.00	.00	.00	.00	.00	6.0	32	.80	62	.98	.00	.00
22	.00	.00	.00	.00	.00	118	28	.55	105	.74	.00	.00
23	.23	.00	.00	.00	.00	110	21	.48	84	.56	.00	.00
24	.18	.00	.00	.00	.00	127	11	.46	60	.39	.00	.00
25	.17	.00	.00	.00	.00	87	6.3	.50	49	.26	.00	.00
26	.14	.00	.00	.00	.00	62	6.9	.49	36	.30	.00	.00
27	.09	.00	.00	.00	.00	67	6.0	.38	22	.30	.00	.00
28	.05	.00	.00	.00	.00	44	5.0	.24	14	.37	.00	.00
29	.03	.00	.00	.00	---	30	3.8	.19	9.2	.35	.00	.00
30	.00	.00	.00	.00	---	23	4.7	.10	6.9	.30	.00	.00
31	.00	---	.00	.00	---	24	---	.05	---	.22	.00	---
TOTAL	.89	.00	.00	.00	.00	861.80	377.03	87.74	470.98	63.97	.39	.00
MEAN	.03	.00	.00	.00	.00	27.8	12.6	2.83	15.7	2.06	.01	.00
MAX	.23	.00	.00	.00	.00	127	50	6.8	105	5.7	.17	.00
MIN	.00	.00	.00	.00	.00	.00	.80	.05	.00	.22	.00	.00
AC-FT	1.8	.00	.00	.00	.00	1710	748	174	934	127	.8	.00
CAL YR 1985	TOTAL	2360.63		MEAN	6.47	MAX	330	MIN	.00	AC-FT	4680	
WTR YR 1986	TOTAL	1862.80		MEAN	5.10	MAX	127	MIN	.00	AC-FT	3690	



## RED RIVER OF THE NORTH BASIN

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05098800 CYPRESS CREEK NEAR SARLES, ND--CONTINUED

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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)
APR 01...	1545	16	--	--	12.0	7.0	--	--	--	--	--
24...	1520	9.9	810	7.98	10.0	12.5	330	170	81	32	48
MAY 29...	0955	0.17	1290	7.89	24.0	23.0	530	190	120	55	100
JUL 08...	1530	2.3	690	--	25.0	25.0	--	--	--	--	--

DATE	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED PER AC-FT) (70303)
APR 24...	23	1	7.6	170	230	14	0.2	15	571	530	0.78
MAY 29...	29	2	10	340	360	26	0.2	9.2	922	880	1.3

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 24...	2	90	20	<1	36	20	0.1	2	<1	380
MAY 29...	6	110	20	<1	65	1300	0.2	4	1	520

05099100 SNOWFLAKE CREEK NEAR SNOWFLAKE, MAN  
(International gaging station)

LOCATION.--Lat 49°01'17", long 98°36'13", in SW¼ sec.10, T.1, R.9 W., 1st meridian, at traffic bridge, 2.5 mi east, and 1.5 mi south of Snowflake.

DRAINAGE AREA.--348 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--March 1961 to current year.

GAGE.--Water-stage recorder since March 1968 and nonrecording gage prior thereto. Datum of gage is 1,221.66 ft above Geodetic Survey of Canada Datum of 1929. Prior to Apr. 2, 1964, nonrecording gage at present site and datum. Apr. 2, 1964, to May 10, 1965, nonrecording gage at site 0.5 mi downstream at present datum.

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

AVERAGE DISCHARGE.--25 years, 15.3 ft<sup>3</sup>/s, 11,080 acre-ft/yr; median of yearly mean discharges, 7.4 ft<sup>3</sup>/s, 5,400 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 1,130 ft<sup>3</sup>/s, Apr. 21, 1979, gage height, 8.28 ft; no flow for several months each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 427 ft<sup>3</sup>/s, June 3, gage height, 6.41 ft; no flow for several months.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.56	.00	.00	.00	.00	75	51	17	10	.95	.00
2	.00	.49	.00	.00	.00	.00	74	51	20	8.1	.92	.00
3	.00	.37	.00	.00	.00	.00	64	51	288	9.2	.78	.00
4	.00	.28	.00	.00	.00	.00	54	52	148	11	.64	.00
5	.00	.27	.00	.00	.00	.00	46	46	91	9.6	.60	.00
6	.00	.28	.00	.00	.00	.00	43	45	65	9.6	.46	.00
7	.00	.22	.00	.00	.00	.00	41	45	80	8.6	.42	.00
8	.01	.10	.00	.00	.00	.00	39	45	56	6.8	.35	.00
9	.00	.00	.00	.00	.00	.00	38	48	39	5.4	.49	.00
10	.01	.00	.00	.00	.00	.00	38	52	33	5.6	.35	.00
11	.02	.00	.00	.00	.00	.00	39	56	29	5.9	.25	.00
12	.14	.00	.00	.00	.00	.00	39	66	25	16	.25	.00
13	.24	.00	.00	.00	.00	.00	36	52	22	15	.21	.00
14	.17	.00	.00	.00	.00	.00	30	48	20	13	.18	.00
15	.07	.00	.00	.00	.00	.07	26	45	18	12	.14	.00
16	.04	.00	.00	.00	.00	10	28	44	19	11	.07	.00
17	.02	.00	.00	.00	.00	12	54	42	16	8.5	.00	.00
18	.00	.00	.00	.00	.00	5.7	73	40	15	6.7	.00	.00
19	.00	.00	.00	.00	.00	2.5	117	39	14	5.6	.00	.00
20	.00	.00	.00	.00	.00	.07	94	37	16	4.7	.00	.00
21	.07	.00	.00	.00	.00	9.3	73	35	38	3.9	.00	.00
22	.12	.00	.00	.00	.00	86	67	34	35	3.2	.00	.00
23	1.6	.00	.00	.00	.00	68	64	32	28	2.6	.00	.00
24	1.6	.00	.00	.00	.00	67	61	31	25	2.0	.00	.00
25	1.7	.00	.00	.00	.00	58	58	29	21	1.7	.00	.00
26	1.6	.00	.00	.00	.00	43	53	27	19	1.9	.00	.00
27	1.3	.00	.00	.00	.00	51	51	26	18	1.6	.00	.00
28	1.1	.00	.00	.00	.00	56	50	24	16	1.6	.00	.00
29	.92	.00	.00	.00	---	76	49	22	13	1.3	.00	.00
30	.72	.00	.00	.00	---	56	54	20	11	1.1	.00	.00
31	.62	---	.00	.00	---	32	---	19	---	.92	.00	---
TOTAL	12.07	2.57	.00	.00	.00	632.64	1628	1254	1255	204.12	7.06	.00
MEAN	.39	.09	.00	.00	.00	20.4	54.3	40.5	41.8	6.58	.23	.00
MAX	1.7	.56	.00	.00	.00	86	117	66	288	16	.95	.00
MIN	.00	.00	.00	.00	.00	.00	26	19	11	.92	.00	.00
AC-FT	24	5.1	.00	.00	.00	1250	3230	2490	2490	405	14	.00
CAL YR 1985	TOTAL	2725.36		MEAN	7.47	MAX	115	MIN	.00	AC-FT	5410	
WTR YR 1986	TOTAL	4995.46		MEAN	13.7	MAX	288	MIN	.00	AC-FT	9910	

## RED RIVER OF THE NORTH BASIN

139

05099150 MOWBRAY CREEK NEAR MOWBRAY, MAN  
(International gaging station)

LOCATION.--Lat 49°00'00", long 98°27'15", in SE¼ sec.3, T.1, R.8 W., 1st meridian, on downstream side of bridge on Municipal Road on international boundary, and 1.5 mi east of Mowbray.

DRAINAGE AREA.--93.9 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--March 1962 to current year (seasonal records only most years).

GAGE.--Water-stage recorder operated March 1 to October 31 each year. Datum of gage is Geodetic Survey of Canada datum of 1929. Nonrecording gage prior to 1971.

COOPERATION.--Records furnished by the Water Survey of Canada.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 777 ft<sup>3</sup>/s, Apr. 24, 1979, gage height, 1,533.67 ft; maximum gage height, 1,534.53 ft, Mar. 29, 1966, backwater from ice; no flow for several months each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 643 ft<sup>3</sup>/s, Mar. 28, gage height, 1,533.79 ft; no flow for several months.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.39			.00	.00	.00	91	23	.60	2.2	6.8	.00
2	.37			.00	.00	.00	81	25	.64	1.6	4.8	.00
3	.31			.00	.00	.00	100	20	239	1.7	3.7	.00
4	.32			.00	.00	.00	86	16	210	2.2	3.3	.00
5	.35			.00	.00	.00	66	13	133	13	4.4	.00
6	.32			.00	.00	.00	50	10	79	11	5.5	.00
7	.29			.00	.00	.00	36	9.2	64	5.4	6.3	.00
8	.07			.00	.00	.00	24	8.6	41	3.5	7.7	.00
9	.04			.00	.00	.00	15	12	26	2.3	8.7	.00
10	.32			.00	.00	.00	9.6	10	15	2.2	8.1	.00
11	.83			.00	.00	.00	6.9	28	7.0	3.1	6.7	.00
12	.85			.00	.00	.00	6.7	43	3.4	3.6	4.2	.00
13	1.1			.00	.00	1.8	6.4	20	2.1	2.6	3.5	.00
14	.87			.00	.00	7.1	6.0	11	1.7	3.3	3.3	.00
15	.74			.00	.00	14	5.6	12	1.4	4.1	2.7	.00
16	.93			.00	.00	12	5.3	11	1.4	5.7	2.3	.00
17	1.1			.00	.00	9.8	21	12	1.8	4.9	2.1	.00
18	1.3			.00	.00	5.0	39	18	2.5	4.1	1.7	.00
19	2.4			.00	.00	.99	53	13	2.1	3.6	1.4	.00
20	3.6			.00	.00	1.5	71	10	20	3.4	1.1	.00
21	7.9			.00	.00	.81	65	8.4	44	3.7	.83	.00
22	8.8			.00	.00	14	59	7.1	25	3.9	.67	.49
23	7.6			.00	.00	8.9	52	6.6	11	3.6	.64	.60
24	5.1			.00	.00	37	46	5.8	5.4	3.3	.42	.35
25	4.7			.00	.00	90	40	4.1	3.3	2.9	.32	.35
26	4.8			.00	.00	197	34	2.9	3.9	3.0	.21	.46
27	6.5			.00	.00	262	28	2.1	5.7	4.4	.07	.35
28	8.3			.00	.00	388	22	1.7	4.7	7.0	.00	.21
29	6.8			.00	---	245	16	1.4	3.6	15	.00	.21
30	5.2			.00	---	149	16	1.1	2.7	15	.00	.21
31	4.2			.00	---	120	---	.78	---	10	.00	---
TOTAL	86.40			.00	.00	1563.90	1157.5	366.78	960.94	155.3	91.46	3.23
MEAN	2.79			.00	.00	50.4	38.6	11.8	32.0	5.01	2.95	.11
MAX	8.8			.00	.00	388	100	43	239	15	8.7	.60
MIN	.04			.00	.00	.00	5.3	.78	.60	1.6	.00	.00
AC-FT	171			.00	.00	3100	2300	728	1910	308	181	6.4

## RED RIVER OF THE NORTH BASIN

05099300 PEMBINA RIVER NEAR WINDYGATES, MAN  
(International gaging station)

LOCATION.--Lat 49°01'53", long 98°16'40", in SE¼ sec.13, T.1, R.7 W., 1st meridian, on left bank 0.2 mi downstream from bridge, and 3 mi northeast of Windygates.

DRAINAGE AREA.--3,020 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--April 1962 to current year.

GAGE.--Water-stage recorder. Datum of gage is Geodetic Survey of Canada datum of 1929.

REMARKS.--Records fair.

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.

AVERAGE DISCHARGE.--24 years, 205 ft<sup>3</sup>/s, 148,400 acre-ft/yr; median of yearly mean discharges, 140 ft<sup>3</sup>/s, 101,400 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 11,500 ft<sup>3</sup>/s, Apr. 26, 1974, gage height, 1,121.52 ft; no flow in some years.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,230 ft<sup>3</sup>/s, Mar. 28, gage height, 1,109.49 ft; maximum gage height, 1,111.46 ft, Mar. 22, backwater from ice; minimum daily, 0.67 ft<sup>3</sup>/s, Feb. 10.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL		
1	26	31	5.5	3.9	3.3	9.5	777	660	388	132	99	65
2	27	35	5.4	4.1	4.0	4.9	706	660	396	129	98	62
3	27	35	5.3	3.8	4.5	3.5	703	657	706	124	98	60
4	27	33	5.8	3.5	4.1	2.6	689	636	636	126	96	60
5	27	32	6.7	3.3	3.6	3.5	660	615	530	129	95	60
6	26	33	7.5	3.4	2.3	5.3	636	646	459	126	94	60
7	27	22	8.2	3.7	1.7	7.3	614	802	424	127	93	59
8	26	18	8.8	4.0	1.1	9.0	597	893	388	121	93	60
9	26	15	9.8	4.8	.71	11	579	830	360	115	92	62
10	27	13	9.1	6.1	.67	15	572	752	332	115	92	59
11	28	14	8.1	8.5	1.4	15	554	752	311	115	91	57
12	28	14	7.3	9.7	3.0	16	544	915	297	118	90	54
13	28	15	6.1	7.0	3.6	14	530	745	275	118	89	52
14	28	15	5.0	5.8	4.1	9.3	530	674	254	121	88	50
15	29	16	4.4	6.1	3.5	8.6	491	643	237	118	87	48
16	29	15	4.1	7.4	2.5	22	441	625	226	126	87	49
17	29	14	3.9	8.9	1.4	33	445	604	212	124	86	48
18	29	13	3.8	9.8	1.2	31	576	597	201	123	84	48
19	31	11	3.7	10	1.1	21	876	593	189	120	83	46
20	31	9.3	3.7	10	1.3	26	1000	572	304	117	74	45
21	31	8.2	3.9	11	1.8	47	953	547	297	113	75	44
22	32	7.7	4.2	13	2.3	441	869	530	268	109	77	42
23	32	7.5	4.5	10	2.5	780	756	505	233	106	79	40
24	32	7.2	4.2	8.6	2.1	629	685	487	212	102	78	39
25	34	6.9	3.9	6.4	2.4	749	660	466	191	104	77	41
26	34	6.6	3.9	3.3	5.9	752	657	456	177	109	76	38
27	35	6.5	3.7	3.3	9.1	915	636	441	162	106	76	37
28	36	6.2	3.3	4.2	9.8	1080	636	427	155	105	76	35
29	36	5.9	3.1	3.6	---	1140	625	420	148	104	77	35
30	40	5.7	3.2	2.7	---	1010	643	410	141	102	74	34
31	41	---	3.4	2.5	---	872	---	396	---	101	69	---
TOTAL	939	471.7	163.5	192.4	84.98	8682.5	19640	18956	9109	3605	2643	1489
MEAN	30.3	15.7	5.27	6.21	3.03	280	655	611	304	116	85.3	49.6
MAX	41	35	9.8	13	9.8	1140	1000	915	706	132	99	65
MIN	26	5.7	3.1	2.5	.67	2.6	441	396	141	101	69	34
AC-FT	1860	936	324	382	169	17220	38960	37600	18070	7150	5240	2950
CAL YR 1985	TOTAL	43309.57		MEAN	119	MAX	1150	MIN	.00	AC-FT	85900	
WTR YR 1986	TOTAL	65976.08		MEAN	181	MAX	1140	MIN	.67	AC-FT	130900	



## 05099600 PEMBINA RIVER AT WALHALLA, ND

LOCATION.--Lat 48°54'50", long 97°55'00", in NE1/4NE1/4 sec.29, T.163 N., R.56 W., Pembina County, Hydrologic Unit 09020313, on left bank at downstream side of bridge on State Highway 32, at south edge of Walhalla, and 7 mi downstream from Little South Pembina River.

DRAINAGE AREA.--3,350 mi<sup>2</sup>, approximately.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1939 to current year. Prior to October 1963, published as "near Walhalla."

REVISED RECORDS.--WSP 1388: 1943, 1950(P). WSP 1558: 1957. WSP 1728: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 934 ft above National Geodetic Vertical Datum of 1929 from topographic map. Prior to Nov. 10, 1943, nonrecording gage and Nov. 10, 1943, to Sept. 30, 1963, water-stage recorder at site 5.5 mi upstream at different datum.

REMARKS.--Estimated daily discharges: Nov. 7 to Mar. 23 and Apr. 5-7. Records good except those for period with ice effect, Nov. 7 to Mar. 23, which are poor.

AVERAGE DISCHARGE.--47 years, 230 ft<sup>3</sup>/s, 166,600 acre-ft/yr; median of yearly mean discharges, 165 ft<sup>3</sup>/s, 120,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 20,400 ft<sup>3</sup>/s, Apr. 18, 1950, gage height, 19.2 ft former site and datum, 16.2 ft present site and datum, from rating curve extended above 7,000 ft<sup>3</sup>/s on basis of contracted-opening measurement of peak flow; no flow at times in some years.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 400 ft<sup>3</sup>/s and maximum (\*):

Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)	Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)
Mar. 22	----	*2800	*89.31	May 12	1415	1230	5.24
Mar. 29	1445	1920	6.45	June 4	1800	1010	4.81
Apr. 19	0615	1840	6.29	June 20	1700	673	4.00

Minimum daily discharge, 3.7 ft<sup>3</sup>/s, Feb. 24-25.

a - Backwater from ice

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	30	51	18	11	7.6	7.0	1190	968	415	149	184	74
2	29	46	18	11	7.2	9.0	980	875	411	140	171	76
3	32	41	18	11	6.8	10	931	838	704	135	159	78
4	33	43	18	11	6.4	11	920	813	837	143	155	73
5	29	41	18	11	6.0	12	897	776	758	141	148	69
6	27	39	18	11	5.8	11	832	766	616	131	143	67
7	29	39	18	11	5.6	8.3	768	868	528	135	136	65
8	44	38	18	11	5.4	8.0	706	1050	472	133	131	64
9	29	36	18	11	5.2	7.5	675	1080	425	129	133	64
10	36	34	18	12	5.0	8.7	664	965	396	133	128	63
11	39	31	18	13	4.8	9.5	648	880	367	149	123	62
12	35	31	18	14	4.7	10	631	1070	339	142	120	61
13	42	31	17	14	4.5	11	615	1010	313	164	115	58
14	46	31	16	14	4.4	10	614	842	294	170	109	56
15	49	29	15	13	4.3	11	595	765	282	158	101	54
16	45	29	14	13	4.2	16	576	719	277	149	92	51
17	47	29	13	13	4.1	40	540	683	254	148	89	54
18	44	28	13	12	4.1	170	748	661	240	147	85	51
19	43	27	12	12	4.0	210	1710	649	224	141	83	50
20	43	26	12	12	3.9	200	1520	628	478	146	81	50
21	43	25	12	12	3.9	190	1300	599	372	143	79	49
22	43	24	11	11	3.8	450	1170	576	312	132	79	49
23	70	23	11	11	3.8	1790	1020	557	287	127	81	46
24	74	22	11	10	3.7	1410	875	546	245	121	81	44
25	65	21	12	10	3.7	1360	801	529	219	115	80	48
26	59	20	12	9.6	4.0	1310	831	515	201	131	80	48
27	54	19	12	9.0	4.5	1300	916	497	187	279	79	45
28	51	18	12	8.8	6.0	1640	967	485	172	307	79	43
29	50	18	12	8.7	---	1800	869	471	163	272	79	45
30	49	18	11	8.2	---	1730	904	453	156	247	78	45
31	50	---	11	8.0	---	1390	---	434	---	206	77	---
TOTAL	1359	908	455	347.3	137.4	15150.0	26413	22568	10944	4963	3358	1702
MEAN	43.8	30.3	14.7	11.2	4.91	489	880	728	365	160	108	56.7
MAX	74	51	18	14	7.6	1800	1710	1080	837	307	184	78
MIN	27	18	11	8.0	3.7	7.0	540	434	156	115	77	43
AC-FT	2700	1800	902	689	273	30050	52390	44760	21710	9840	6660	3380
CAL YR 1985 TOTAL	58219.00			MEAN	160	MAX	1720	MIN	.00	AC-FT	115500	
WTR YR 1986 TOTAL	88304.7			MEAN	242	MAX	1800	MIN	3.7	AC-FT	175200	

## RED RIVER OF THE NORTH BASIN

05099600 PEMBINA RIVER AT WALHALLA, ND--CONTINUED

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1962 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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 17...	0930	47	880	--	2.0	2.0	--	--	--	--	--
DEC 11...	1000	18	1070	--	-2.0	0.0	--	--	--	--	--
MAR 04...	1305	11	1000	--	-4.0	0.5	--	--	--	--	--
27...	1435	1290	385	6.53	7.0	2.0	130	12	34	12	24
MAY 01...	1130	961	660	--	0.0	5.5	--	--	--	--	--
JUN 04...	1605	992	--	--	22.0	21.5	--	--	--	--	--
JUL 10...	1050	133	--	--	19.0	22.0	--	--	--	--	--
AUG 21...	1255	79	800	8.30	20.0	19.5	330	99	70	37	57
DATE	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR 27...	27	0.9	7.1	120	72	5.5	0.2	18	257	250	0.35
AUG 21...	27	1	11	230	210	14	0.2	23	590	560	0.8
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)	
MAR 27...	2	60	70	<1	22	90	0.1	2	1	170	
AUG 21...	6	170	10	<1	68	60	0.4	8	2	390	

05100000 PEMBINA RIVER AT NECHE, ND  
(International gaging station)

LOCATION.--Lat 48°59'20", long 97°33'05", in SE1/4NW1/4 sec.31, T.164 N., R.53 W., Pembina County, Hydrologic Unit 09020313, on right bank 0.3 mi east of State Highway 18, and at north edge of Neche.

DRAINAGE AREA.--3,410 mi<sup>2</sup>, approximately.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--May 1903 to September 1908, June 1909 to September 1915, April 1919 to current year. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WSP 1308: 1904-8, 1910-15, 1920, 1921, 1923, 1924. WSP 1388: 1904(M), 1914, 1915(M), 1931(M), 1933, 1938(M). WSP 1728: Drainage area.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 809.69 ft above National Geodetic Vertical Datum of 1929. Prior to May 24, 1932, nonrecording gage at Burlington Northern Railway bridge 1 mi upstream, at same datum. May 25, 1932, to Apr. 17, 1939, nonrecording gage on bridge on State Highway 18, 500 ft downstream from railway bridge, at same datum.

REMARKS.--Estimated daily discharges: Oct. 3-15 and Nov. 6 to Apr. 1. Records poor.

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

AVERAGE DISCHARGE.--78 years (1903-8, 1909-15, 1919-86), 191 ft<sup>3</sup>/s, 138,400 acre-ft/yr; median of yearly mean discharges, 146 ft<sup>3</sup>/s, 105,800 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,700 ft<sup>3</sup>/s, Apr. 20, 1950, gage height, 21.58 ft, backwater from ice; from rating curve extended above 5,300 ft<sup>3</sup>/s; maximum gage height, 23.64 ft, Apr. 20, 1979, backwater from ice; no flow at times each year 1932-41, 1953, 1960-62.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 400 ft<sup>3</sup>/s and maximum (\*):

Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)	Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)
Mar. 24	----	*2390	a <sup>b</sup> 14.83	May 13	1615	1110	9.88
Mar. 29	1800	2260	b <sup>a</sup> 15.38	June 5	1915	801	9.49
Apr. 20	0945	1550	10.93	June 21	2045	503	8.98

Minimum daily discharge, 5.5 ft<sup>3</sup>/s, Feb. 22-25.

a - From high-water mark

b - Backwater from ice

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	27	66	23	16	12	12	1420	915	434	190	251	85
2	27	66	23	15	12	14	1320	994	413	182	224	83
3	28	66	23	14	12	16	1130	905	392	173	206	82
4	28	61	22	14	12	17	1060	886	545	173	191	80
5	30	58	22	14	12	17	1010	858	726	170	183	77
6	30	57	22	13	11	16	954	826	730	163	174	76
7	32	55	22	13	11	16	894	809	615	158	166	74
8	35	53	22	13	10	16	851	868	533	151	161	72
9	38	51	22	13	10	17	801	1010	481	148	157	71
10	38	49	22	13	9.0	18	760	1040	445	148	151	70
11	44	47	22	14	8.5	20	740	988	411	154	151	69
12	52	45	21	15	8.0	23	713	927	386	154	145	68
13	59	43	20	17	7.5	27	688	1040	363	152	140	65
14	64	41	19	18	7.5	30	668	1050	342	157	135	64
15	66	40	18	19	7.5	33	650	915	324	169	132	62
16	71	40	17	19	7.0	35	631	836	307	174	127	61
17	73	40	16	18	7.0	37	619	781	305	167	119	61
18	70	40	15	18	6.5	40	601	743	290	164	111	58
19	69	38	15	18	6.5	54	843	710	277	163	108	57
20	65	36	14	18	6.5	75	1510	694	275	160	103	57
21	61	34	14	18	6.0	200	1350	671	366	166	98	57
22	59	32	13	17	5.5	540	1180	644	427	172	96	57
23	61	30	13	16	5.5	880	1130	612	345	164	94	57
24	61	28	13	15	5.5	2200	1000	591	319	157	91	55
25	87	26	14	15	5.5	2150	864	573	292	155	90	57
26	98	25	14	15	6.0	1910	815	549	263	156	90	57
27	90	24	14	14	8.0	1880	851	534	240	163	89	59
28	80	24	14	13	10	1840	931	514	224	230	89	58
29	76	24	13	13	---	2150	954	498	207	324	89	57
30	68	24	13	12	---	1800	879	481	198	315	88	56
31	65	---	17	12	---	1630	---	459	---	284	88	---
TOTAL	1752	1263	552	472	235.5	17713	27817	23921	11475	5556	4137	1962
MEAN	56.5	42.1	17.8	15.2	8.41	571	927	772	383	179	133	65.4
MAX	98	66	23	19	12	2200	1510	1050	730	324	251	85
MIN	27	24	13	12	5.5	12	601	459	198	148	88	55
AC-FT	3480	2510	1090	936	467	35130	55180	47450	22760	11020	8210	3890
CAL YR 1985	TOTAL	64262.00		MEAN	176	MAX	1720	MIN	.00	AC-FT	127500	
WTR YR 1986	TOTAL	96855.5		MEAN	265	MAX	2200	MIN	5.5	AC-FT	192100	

## RED RIVER OF THE NORTH BASIN

05100000 PEMBINA RIVER AT NECHE, ND--CONTINUED

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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 16...	1355	69	820	--	2.0	4.0	--	--	--	--	--
DEC 11...	1510	22	1060	--	-16.0	0.5	--	--	--	--	--
JAN 23...	1610	15	--	--	-16.0	0.0	--	--	--	--	--
MAR 03...	1450	15	1010	--	0.0	0.5	--	--	--	--	--
APR 01...	1130	1400	440	6.49	10.0	6.0	160	27	42	14	27
MAY 01...	1530	956	650	--	0.0	8.0	--	--	--	--	--
JUN 04...	1300	558	--	--	20.0	19.0	--	--	--	--	--
JUL 08...	1010	143	--	--	18.0	22.0	--	--	--	--	--
AUG 10...	1455	143	865	--	20.0	21.0	--	--	--	--	--
AUG 21...	1645	94	850	7.90	20.0	20.0	350	99	80	36	55
DATE	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINEITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
APR 01...	25	1	7.8	140	84	6.0	0.2	21	287	280	0.39
AUG 21...	25	1	11	250	200	16	0.2	29	604	580	0.82
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 01...	2	80	40	<1	27	160	0.1	4	2	210	
AUG 21...	7	170	10	<1	69	100	0.3	11	1	420	



## RED RIVER OF THE NORTH BASIN

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05101000 TONGUE RIVER AT AKRA, ND

LOCATION.--Lat 48°46'42", long 97°44'43", in SW¼ sec.10, T.161 N., R.55 W., Pembina County, Hydrologic Unit 09020313, on left bank 300 ft downstream from Renwick Dam, 0.9 mi northwest of Akra, and 6 mi west of Cavalier.

DRAINAGE AREA.--160 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--April to June 1950 (WSP 1137-B), October 1951 to current year (seasonal record since 1983).

REVISED RECORDS.--WSP 1728: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 930.00 ft above National Geodetic Vertical Datum of 1929. Prior to July 10, 1954, nonrecording gage 1.2 mi downstream at datum 30.00 ft lower. July 23, 1954, to Dec. 19, 1973, water stage recorder 2.7 mi downstream at datum 9.10 ft lower.

REMARKS.--Estimated daily discharges: Mar. 1-6, Apr. 15-17, and May 29-30. Records good. Flow regulated by temporary retention in ten retarding basins beginning 300 ft above station, four of which have slow release outlet structures to regulate the flow. Retarding basins were completed during the period 1955 to 1961 and have a combined capacity of 19,245 acre-ft.

AVERAGE DISCHARGE.--31 years (water years 1952-82), 21.4 ft<sup>3</sup>/s, 15,500 acre-ft/yr; median of yearly mean discharges, 19 ft<sup>3</sup>/s, 13,800 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 11,800 ft<sup>3</sup>/s, Apr. 18, 1950, gage height, 48.7 ft, from flood-marks, site and datum then in use, from rating curve extended above 1,500 ft<sup>3</sup>/s on basis of contracted-opening measurement of peak flow; no flow at times. This flood is the highest known since settlement of the region in about 1860.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 275 ft<sup>3</sup>/s, Mar. 25, gage height, 12.35 ft; minimum daily discharge, 0.20 ft<sup>3</sup>/s, May 29.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1						6.0	190	168	13	4.3	43	1.1
2						6.2	172	155	9.3	3.3	32	4.4
3						6.5	163	125	15	3.0	19	8.0
4						6.8	148	99	16	4.8	16	8.5
5						7.0	133	80	16	8.8	16	8.3
6						7.2	122	72	13	8.1	15	9.1
7						6.0	114	71	11	5.9	15	9.4
8						5.6	107	80	8.1	5.0	13	8.6
9						5.5	100	67	7.6	4.0	14	9.0
10						5.3	91	61	7.2	8.2	12	11
11						24	82	57	6.2	17	11	14
12						38	75	86	5.3	18	11	15
13						36	70	148	3.8	19	11	14
14						49	65	159	3.3	25	11	15
15						59	54	125	2.9	35	10	17
16						57	40	97	3.3	28	11	19
17						45	25	77	2.8	24	9.9	22
18						32	19	63	2.6	21	8.5	26
19						33	105	56	4.4	20	7.9	33
20						33	234	53	14	14	7.0	37
21						48	249	52	24	8.9	5.2	40
22						60	201	43	28	9.2	6.3	40
23						104	159	31	26	9.3	6.7	38
24						212	127	27	21	8.7	5.8	36
25						259	101	20	16	6.8	5.7	36
26						261	91	20	12	3.1	4.3	25
27						239	132	7.4	10	41	3.3	23
28						214	174	.21	8.5	109	3.0	21
29						229	211	.20	6.9	101	2.5	20
30						238	192	.50	5.5	76	1.7	19
31						218	---	8.3	---	56	.53	---
TOTAL						2550.1	3746	2108.61	322.7	705.4	338.33	587.4
MEAN						82.3	125	68.0	10.8	22.8	10.9	19.6
MAX						261	249	168	28	109	43	40
MIN						5.3	19	.20	2.6	3.0	.53	1.1
AC-FT						5060	7430	4180	640	1400	671	1170

## RED RIVER OF THE NORTH BASIN

05101000 TONGUE RIVER AT AKRA, ND--CONTINUED

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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 05...	0945	53	--	--	5.5	4.5	--	--	--	--	--
MAR 06...	1050	7.8	865	--	-13.0	2.0	--	--	--	--	--
27...	1720	230	375	6.49	10.0	2.5	140	26	39	11	20
APR 14...	1330	65	478	--	-2.5	2.0	--	--	--	--	--
MAY 28...	1535	0.22	680	--	30.0	26.5	--	--	--	--	--
JUL 09...	1400	4.3	610	--	20.0	26.0	--	--	--	--	--
AUG 21...	1020	5.3	610	--	17.0	20.0	--	--	--	--	--
SEP 30...	1320	19	485	8.06	17.0	15.0	--	--	--	--	--
DATE	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR 27...	22	0.8	6.4	120	56	6.8	0.2	16	247	230	0.34
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)	
MAR 27...	2	80	50	<1	20	450	0.1	2	<1	220	

05102500 RED RIVER OF THE NORTH AT EMERSON, MAN  
(National stream-quality accounting network station)  
(International gaging station)

LOCATION.--Lat 49°00'30", long 97°12'40", in sec.2, T.1, R.2 E., 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 mi<sup>2</sup>, approximately, includes 3,800 mi<sup>2</sup> 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 700.00 ft above National Geodetic Vertical Datum of 1929, by Survey of Canada. See WSP 1728 or 1913 for history of changes prior to Apr. 10, 1953.

REMARKS.--Records good. Discharge partially regulated by reservoirs on tributaries.

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.

AVERAGE DISCHARGE.--74 years (water years 1913-86), 3,390 ft<sup>3</sup>/s, 2,456,000 acre-ft/yr; median of yearly mean discharges, 2,870 ft<sup>3</sup>/s, 2,080,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 95,500 ft<sup>3</sup>/s, May 13, 1950, gage height, 90.89 ft; maximum gage height, 91.19 ft, May 1, 1979; minimum observed discharge, 0.9 ft<sup>3</sup>/s, Feb. 6-8, 1937.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 34,200 ft<sup>3</sup>/s, Apr. 7; minimum daily, 1,680 ft<sup>3</sup>/s, Mar. 3, 4.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4100	4130	2090	2090	1890	1700	30100	26300	9600	5830	4130	2310
2	4030	4100	2120	2070	1870	1690	30900	28100	9290	5540	3950	2390
3	3920	3960	2140	2080	1860	1680	32300	28900	9000	5300	3780	2510
4	3850	3880	2170	2070	1850	1680	33600	28600	8690	5080	3600	2610
5	3780	3780	2170	2070	1850	1690	33900	28700	8400	5090	3460	2580
6	3710	3710	2200	2070	1850	1720	34100	28700	8190	4980	3370	2570
7	3640	3640	2200	2050	1850	1740	34200	28800	8020	4940	3260	2610
8	3640	3570	2200	2030	1860	1770	34000	29000	7730	4870	3150	2600
9	3570	3410	2180	2020	1860	1780	33500	29200	7520	4770	3070	2660
10	3480	3370	2160	2010	1860	1800	32700	29300	7520	4660	2990	2790
11	3460	3020	2130	2020	1860	1830	30800	29200	7560	4730	2930	2920
12	3710	2510	2110	2010	1850	1850	28200	27900	7340	4730	2900	3030
13	4480	2530	2100	2010	1850	1870	26100	26100	7060	4630	2880	3070
14	5400	2620	2100	2000	1840	1900	24700	24800	6990	4590	2840	3060
15	5900	2380	2110	1980	1830	1950	23700	23800	6670	4630	2770	2970
16	6040	2220	2110	1970	1830	2000	23000	23000	6430	4870	2700	2870
17	5930	2180	2120	1970	1810	2070	22600	22300	6290	5300	2640	2770
18	5690	2250	2130	1980	1800	2190	22200	21700	6180	5610	2580	2680
19	5510	2510	2120	1980	1790	2340	22100	21200	6140	5680	2540	2600
20	5330	2450	2110	1980	1780	2510	21800	20600	6210	5680	2500	2560
21	5120	2360	2100	1990	1770	2750	21800	20100	6570	5610	2490	2540
22	4980	2380	2080	2000	1760	3060	21900	19500	7130	5510	2500	2540
23	4870	2390	2070	2050	1760	4940	22200	18700	7520	5330	2500	2550
24	4800	2340	2060	2050	1740	7060	22500	17700	7450	5160	2480	2570
25	4770	2240	2050	2030	1730	9150	22700	16400	7380	5010	2400	2710
26	4700	2150	2030	2020	1720	12200	22900	14900	7340	4870	2340	3000
27	4660	2040	2010	2010	1710	14800	23100	13500	7200	4730	2310	3570
28	4560	2010	1990	1990	1710	18300	23500	12300	6890	4560	2290	4130
29	4410	2040	1970	1970	---	23000	24300	11400	6530	4450	2280	4660
30	4310	2060	1960	1940	---	26900	25100	10700	6180	4410	2270	5090
31	4170	---	1950	1910	---	28900	---	10100	---	4270	2280	---
TOTAL	140520	84230	65040	62420	50740	188820	804500	691500	221020	155420	88180	87520
MEAN	4533	2808	2098	2014	1812	6091	26820	22310	7367	5014	2845	2917
MAX	6040	4130	2200	2090	1890	28900	34200	29300	9600	5830	4130	5090
MIN	3460	2010	1950	1910	1710	1680	21800	10100	6140	4270	2270	2310
AC-FT	278700	167100	129000	123800	100600	374500	1596000	1372000	438400	308300	174900	173600
CAL YR 1985	TOTAL	1934060		MEAN	5299	MAX	16700	MIN	1130	AC-FT	3836000	
WTR YR 1986	TOTAL	2639910		MEAN	7233	MAX	34200	MIN	1680	AC-FT	5236000	

## RED RIVER OF THE NORTH BASIN

05102500 RED RIVER AT EMERSON, MANITOBA--CONTINUED  
(National stream-quality accounting network station)

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 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, 1,200 microsiemens, Sept. 24, 1978, Aug. 30, 1980, and on many days during October 1980 through March 1981; minimum daily mean, 330 microsiemens, Apr. 10, 16, 17, 1978.

WATER TEMPERATURES: Maximum daily mean, 26.0°C July 13, 14, 1981; minimum daily mean, 0.0°C on many days during winter months.

EXTREMES FOR CURRENT YEAR.--

SPECIFIC CONDUCTANCE: Maximum daily mean, 741 microsiemens, July 29; minimum daily mean, 346 microsiemens, Apr. 3.

WATER TEMPERATURES: Maximum daily mean, 24.0°C July 24; minimum daily mean, 0.0°C on many days during winter months.

## WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	TUR- BID- ITY (NTU) (00076)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED SATUR- ATION (00301)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)
NOV 05...	1300	3780	638	7.80	12.0	3.0	--	12.2	95	ND	K10
JAN 23...	1010	2110	655	7.60	-13.0	0.0	10	13.2	91	56	K10
MAR 04...	1000	1680	578	7.30	-2.5	0.0	4.6	14.0	99	30	K4
APR 29...	1340	23400	608	8.10	8.5	9.0	--	10.1	90	20	K56
MAY 27...	1045	13500	742	7.80	28.5	18.0	--	7.9	85	--	--
JUL 16...	1230	4840	680	7.70	24.0	24.5	160	10.0	124	--	53
AUG 22...	1100	2500	602	8.30	20.0	19.5	97	8.8	100	K8	24
SEP 23...	1205	2470	648	8.00	17.5	13.5	--	9.1	91	--	--

DATE	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCARB WAT TOT FLD MG/L AS CACO3 (00902)	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)	PERCENT SODIUM RATIO (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)
NOV 05...	--	--	--	--	--	--	--	--	--	0.8
JAN 23...	270	20	60	30	31	19	0.8	4.5	235	12
MAR 04...	260	6	58	27	24	17	0.7	4.5	235	24
APR 29...	--	--	--	--	--	--	--	--	--	2.8
MAY 27...	--	--	--	--	--	--	--	--	--	7.4
JUL 16...	290	39	63	33	28	17	0.7	6.3	207	9.8
AUG 22...	260	58	58	28	28	19	0.8	6.4	209	2.0
SEP 23...	--	--	--	--	--	--	--	--	--	3.5

K - Results based on colony count outside the acceptable range (non-ideal colony count).

ND - Not detected.



## RED RIVER OF THE NORTH BASIN

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05102500 RED RIVER AT EMERSON, MANITOBA--CONTINUED  
(National stream-quality accounting network station)

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)
JAN 23...	60	36	0.2	17	391	390	0.53	2230	--	--
MAR 04...	51	22	0.2	17	358	350	0.49	1620	<0.01	0.35
APR 29...	--	--	--	--	--	--	--	--	0.02	1.00
JUL 16...	130	23	0.2	15	428	450	0.58	5590	--	--
AUG 22...	92	25	0.2	13	513	370	0.7	3460	<0.01	<0.10
DATE	NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS NH4) (71846)	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)	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)
MAR 04...	0.10	0.09	0.12	0.8	0.07	0.05	0.04	<10	2	90
APR 29...	0.17	0.11	0.14	1.2	0.20	0.16	0.13	--	--	--
JUL 16...	0.11	--	--	1.7	0.31	--	--	--	--	--
AUG 22...	0.04	0.03	0.04	1.8	0.15	0.07	0.08	20	4	100
DATE	BERYL- LIUM, DIS- SOLVED (UG/L AS BE) (01010)	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)
MAR 04...	<1	<1	<1	<3	2	14	5	21	16	<0.1
AUG 22...	<0.5	<1	1	<3	2	9	<5	32	2	0.1
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)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	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)
NOV 05...	--	--	--	--	--	--	--	41	418	100
JAN 23...	--	--	--	--	--	--	--	6	36	100
MAR 04...	<10	<1	<1	<1	190	<6	32	10	46	97
APR 29...	--	--	--	--	--	--	--	150	9450	100
JUL 16...	--	--	--	--	--	--	--	147	1920	100
AUG 22...	<10	2	<1	<1	220	<6	12	163	1100	100

## RED RIVER OF THE NORTH BASIN

05102500 RED RIVER AT EMERSON, MANITOBA--CONTINUED  
(National stream-quality accounting network station)

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	11.5	7.0	.5	.0	.0	.5	2.5	7.5	15.0	22.0	21.5	17.5
2	10.5	6.5	.0	.0	.0	.5	2.5	7.5	15.5	22.0	22.0	17.0
3	10.0	6.5	.5	.0	.0	.5	3.0	7.5	15.5	22.0	22.0	17.0
4	9.0	6.0	.5	.0	.0	.5	3.5	7.5	15.5	22.5	22.0	16.5
5	8.0	5.5	.5	.0	.0	.5	4.0	7.5	16.0	22.5	22.5	16.0
6	7.5	5.5	.5	.0	.0	.5	4.5	8.0	16.0	22.5	23.0	15.0
7	6.5	5.5	.5	.0	.0	.0	4.5	8.0	16.0	23.0	22.5	14.5
8	5.5	5.0	.5	.0	.0	.0	5.0	8.5	17.0	22.5	22.5	14.0
9	5.0	4.5	.5	.0	.0	.5	5.0	9.0	19.0	22.5	22.0	14.5
10	4.5	4.0	.5	.0	.0	.5	5.0	9.5	19.5	23.0	20.5	14.0
11	4.5	3.5	1.0	.0	.0	.5	5.0	9.5	19.5	22.0	20.0	14.0
12	5.5	3.5	.5	.0	.0	.0	5.0	10.5	19.5	21.5	20.5	14.0
13	5.5	3.5	.5	.0	.0	.0	5.0	10.5	19.5	21.5	20.5	14.0
14	5.5	3.5	.5	.0	.0	.0	5.0	11.0	19.5	21.5	21.0	14.0
15	5.5	3.5	.5	.0	.5	.0	5.0	11.0	20.0	21.5	21.5	13.5
16	6.0	3.0	.5	.0	.5	.5	5.0	11.0	20.0	23.0	21.5	13.0
17	6.0	3.0	.5	.0	.5	.5	5.5	11.0	20.0	23.0	21.0	13.0
18	6.5	2.5	.5	.0	.5	.5	5.5	12.0	20.0	23.5	20.5	12.5
19	6.5	2.5	.5	.0	.5	.0	5.5	13.0	20.5	23.5	20.5	12.5
20	6.5	2.5	.5	.0	.5	.0	6.0	13.5	20.5	22.5	20.5	12.5
21	7.0	2.0	.5	.0	.5	.0	6.0	14.5	21.0	22.5	19.5	12.5
22	7.5	1.5	.5	.0	.5	.5	6.0	15.0	21.0	22.5	19.5	12.5
23	7.5	1.5	.5	.5	.5	.5	6.0	15.0	21.5	23.5	19.5	13.0
24	8.0	1.5	.5	.0	.5	.5	6.0	15.0	21.5	24.0	19.0	13.0
25	7.5	1.5	.5	.0	.5	.5	6.5	15.0	21.5	23.5	18.5	13.0
26	7.5	1.5	.0	.0	.5	.5	6.5	15.0	21.5	23.0	18.0	13.0
27	7.5	1.5	.0	.0	.5	.5	7.0	15.0	22.0	22.5	18.0	13.0
28	7.0	1.0	.0	.0	.5	.5	7.0	15.0	22.0	22.5	18.0	13.5
29	7.5	1.0	.0	.0	---	1.0	7.5	15.5	---	21.5	17.5	13.5
30	7.5	1.0	.0	.0	---	1.0	7.5	15.5	---	21.5	18.0	13.0
31	7.5	---	.0	.0	---	2.0	---	15.5	---	21.0	18.0	---
MEAN	7.0	3.5	.5	.0	.5	.5	5.5	11.5	---	22.5	20.5	14.0
MAX	11.5	7.0	1.0	.5	.5	2.0	7.5	15.5	---	24.0	23.0	17.5
MIN	4.5	1.0	.0	.0	.0	.0	2.5	7.5	---	21.0	17.5	12.5

SPECIFIC CONDUCTANCE (MICROSIEMENS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	531	590	617	506	562	544	377	625	677	589	700	619
2	530	598	621	508	557	541	356	618	666	614	702	594
3	536	592	607	511	553	544	346	602	656	635	707	566
4	530	580	597	510	554	543	347	594	652	645	714	575
5	532	573	602	515	549	544	358	602	650	633	709	597
6	521	574	601	556	553	540	360	578	654	658	682	611
7	505	578	596	574	550	541	360	570	652	664	695	589
8	495	563	590	575	552	543	373	600	647	672	699	563
9	492	550	592	574	552	539	417	625	659	675	705	565
10	480	568	603	574	551	538	445	662	655	654	713	574
11	478	568	632	578	551	542	454	690	637	649	672	588
12	507	551	624	581	553	548	468	677	643	650	646	619
13	509	559	615	588	560	548	487	675	664	644	655	615
14	485	583	604	606	560	553	510	704	672	656	627	613
15	491	585	609	604	555	561	523	706	642	669	615	595
16	525	591	587	600	551	561	551	680	652	663	613	597
17	542	619	567	599	551	565	595	660	660	646	617	607
18	545	664	569	599	546	568	640	641	645	655	631	602
19	565	646	595	598	532	566	639	631	642	660	622	617
20	605	648	586	595	537	584	602	633	638	650	618	628
21	676	650	582	590	542	653	598	637	640	629	613	644
22	705	641	576	590	546	644	605	653	644	627	600	673
23	709	638	572	593	550	592	577	661	614	630	571	631
24	687	615	579	595	550	581	532	672	621	642	580	629
25	668	600	582	590	547	545	525	702	576	660	585	608
26	635	617	584	590	548	497	553	732	587	683	584	591
27	625	647	577	590	545	481	580	738	575	691	600	579
28	599	637	556	591	544	480	585	725	583	734	609	565
29	600	633	532	587	---	465	593	723	---	741	604	550
30	585	630	518	583	---	435	610	703	---	716	595	583
31	582	---	507	572	---	403	---	690	---	697	596	---
MEAN	564	603	586	575	550	542	499	658	---	659	641	600
MAX	709	664	632	606	562	653	640	738	---	741	714	673
MIN	478	550	507	506	532	403	346	570	---	589	571	550

05113360 LONG CREEK AT WESTERN CROSSING OF INTERNATIONAL BOUNDARY, SASK.  
(International gaging station)

LOCATION.--Lat 49°00'01", long 103°21'08", in SE¼ sec.1, T.1, R.11 W., 2d meridian, Hydrologic Unit 09010001,  
and on right bank 10 mi south of Outram.

DRAINAGE AREA.--1,320 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

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

GAGE.--Water-stage recorder and artificial control. Datum of gage is 1,894.00 ft above National Geodetic Vertical  
Datum of 1929, international boundary survey.

REMARKS.--Records good.

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

AVERAGE DISCHARGE.--27 years, 37.7 ft<sup>3</sup>/s, 27,310 acre-ft/yr; median of yearly mean discharges, 25 ft<sup>3</sup>/s, 18,100  
acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,690 ft<sup>3</sup>/s, Apr. 1, 1976, gage height, 12.05 ft; maximum gage  
height, 12.70 ft, Mar. 31, 1976 backwater from ice; no flow for several months each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 157 ft<sup>3</sup>/s, Mar. 1; no flow for several months.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.00	139	11	1.2	5.3	.00	91	.07
2	.00	.00	.00	.00	.00	89	11	.85	4.0	.00	61	.07
3	.00	.00	.00	.00	.00	64	9.5	.60	2.8	.00	42	.04
4	.00	.00	.00	.00	.00	72	8.1	.53	1.7	.00	30	.04
5	.00	.00	.00	.00	.00	74	7.1	.74	1.2	.00	22	.04
6	.00	.00	.00	.00	.00	66	5.4	1.7	1.1	.00	18	.00
7	.00	.00	.00	.00	.00	42	4.4	2.7	.64	.00	15	.00
8	.00	.00	.00	.00	.00	37	3.3	6.2	.32	.00	11	.00
9	.00	.00	.00	.00	.00	25	2.5	15	.21	.00	7.5	.00
10	.00	.00	.00	.00	.00	19	2.7	29	.14	.00	4.9	.00
11	.00	.00	.00	.00	.00	15	3.0	31	.14	.56	3.0	.00
12	.00	.00	.00	.00	.00	61	2.7	43	.14	2.3	1.9	.00
13	.00	.00	.00	.00	.00	106	2.2	41	.11	6.0	1.5	.00
14	.00	.00	.00	.00	.00	86	2.1	31	.11	3.5	1.3	.00
15	.00	.00	.00	.00	.00	77	1.5	26	.11	2.4	1.0	.00
16	.00	.00	.00	.00	.00	60	1.3	26	.11	3.7	.92	.00
17	.00	.00	.00	.00	.00	54	1.4	30	.11	3.5	.74	.00
18	.00	.00	.00	.00	.00	55	1.3	34	.11	4.6	.49	.00
19	.00	.00	.00	.00	.00	46	.85	36	.11	2.7	.32	.00
20	.00	.00	.00	.00	.00	44	.60	32	.11	1.4	.21	.04
21	.00	.00	.00	.00	.00	44	.71	29	.11	.92	.14	.04
22	.00	.00	.00	.00	.00	42	.95	28	.04	.46	.11	.04
23	.00	.00	.00	.00	.00	39	1.4	29	.00	.28	.11	.04
24	.00	.00	.00	.00	.00	36	1.2	27	.00	.21	.18	.04
25	.00	.00	.00	.00	.00	33	.85	25	.00	.25	.25	.07
26	.00	.00	.00	.00	.00	26	.64	22	.00	.35	.25	.11
27	.00	.00	.00	.00	58	23	1.3	19	.00	.25	.25	.11
28	.00	.00	.00	.00	79	23	2.2	16	.00	15	.21	.11
29	.00	.00	.00	.00	---	18	1.8	13	.00	16	.18	.07
30	.00	.00	.00	.00	---	16	1.5	9.8	.00	8.4	.14	.07
31	.00	---	.00	.00	---	13	---	7.5	---	51	.11	---
TOTAL	.00	.00	.00	.00	137.00	1544	94.50	613.82	18.72	123.78	315.71	1.00
MEAN	.00	.00	.00	.00	4.89	49.8	3.15	19.8	.62	3.99	10.2	.03
MAX	.00	.00	.00	.00	79	139	11	43	5.3	51	91	.11
MIN	.00	.00	.00	.00	.00	13	.60	.53	.00	.00	.11	.00
CAL YR 1985	TOTAL	1144.10		MEAN	3.13	MAX	120	MIN	.00			
WTR YR 1986	TOTAL	2848.53		MEAN	7.80	MAX	139	MIN	.00			

## RED RIVER OF THE NORTH BASIN

05113600 LONG CREEK NEAR NOONAN, ND  
(International gaging station)

LOCATION.--Lat 48°58'52", long 103°04'34", near north line of NE¼ sec.1, T.163 N., R.96 W., Divide County, Hydrologic Unit 09010001, on right bank 150 ft upstream from county highway bridge, 1.5 mi upstream from international boundary, and 7 mi northwest of Noonan.

DRAINAGE AREA.--1,790 mi<sup>2</sup>, approximately, of which about 1,160 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

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

REVISED RECORDS.--WSP 2113: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 1,840 ft, from topographic map. Prior to Aug. 18, 1960, non-recording gage at same site and datum.

REMARKS.--Estimated daily discharges: Jan. 1 to Mar. 28 and Aug. 25 to Sept. 30, ice effect and beaver activity. Records fair except those for Feb. 27 to Mar. 28, which are poor.

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

AVERAGE DISCHARGE.--27 years, 48.9 ft<sup>3</sup>/s, 35,430 acre-ft/yr; median of yearly mean discharges, 28 ft<sup>3</sup>/s, 20,300 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,310 ft<sup>3</sup>/s, Mar. 31, 1976, gage height, 17.61 ft; no flow at times most years.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 225 ft<sup>3</sup>/s, Mar. 2, gage height, 7.08 ft, backwater from ice; only peak discharge greater than base discharge of 200 ft<sup>3</sup>/s; no flow for many days.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.68	.15	.06	.00	125	17	1.6	7.9	.06	24	.20
2	.00	.64	.14	.06	.00	175	11	1.8	6.7	.05	107	.17
3	.00	.81	.13	.06	.00	155	12	1.6	5.3	.05	116	.14
4	.00	.73	.14	.05	.00	125	13	1.7	4.1	.05	103	.13
5	.00	.58	.13	.05	.00	90	11	2.5	3.3	.71	83	.11
6	.00	.56	.14	.05	.00	85	9.5	3.8	3.3	.42	57	.11
7	.00	.50	.15	.05	.00	70	8.8	9.2	2.6	.22	40	.12
8	.00	.50	.15	.06	.00	55	7.5	15	1.4	.12	30	.14
9	.00	.41	.17	.06	.00	50	5.9	16	1.3	.09	22	.12
10	.00	.31	.16	.06	.00	45	4.8	26	1.4	.08	17	.12
11	.00	.31	.13	.05	.00	40	3.6	42	1.3	1.4	14	.13
12	.00	.37	.12	.05	.00	35	2.9	44	.88	1.3	10	.13
13	.04	.37	.09	.04	.00	100	2.6	57	.69	20	7.7	.11
14	.05	.40	.09	.04	.00	165	2.5	50	.53	8.3	6.2	.11
15	.10	.40	.08	.04	.00	125	2.4	35	.37	7.7	4.5	.11
16	.69	.40	.08	.03	.00	95	3.8	28	.40	8.3	3.2	.08
17	1.2	.38	.08	.03	.00	70	3.6	27	.32	8.2	2.8	.07
18	1.1	.27	.08	.03	.00	55	3.4	29	.18	8.3	1.7	.07
19	.88	.29	.09	.03	.00	50	2.9	35	.14	14	1.0	.18
20	.87	.25	.09	.02	.00	48	2.8	37	.15	10	.71	.22
21	.73	.26	.11	.02	.00	40	3.0	32	.25	9.0	.63	.22
22	.75	.28	.15	.02	.00	35	3.0	27	.26	7.2	.87	.20
23	.49	.30	.18	.02	.00	33	3.3	33	.20	6.0	.81	.20
24	.50	.25	.14	.01	.00	29	2.8	31	.12	4.3	.56	.21
25	.55	.23	.11	.01	.10	27	2.1	28	.07	4.4	.40	.87
26	.61	.23	.12	.01	.40	23	1.7	24	.05	5.5	.37	.59
27	.72	.20	.10	.01	5.0	24	1.3	21	.03	16	.25	.50
28	.98	.20	.08	.01	35	25	1.0	19	.02	29	.26	.63
29	1.0	.20	.08	.00	---	28	.82	16	.01	42	.30	.66
30	.80	.17	.08	.00	---	23	1.2	14	.03	51	.29	.72
31	.73	---	.06	.00	---	16	---	11	---	33	.25	---
TOTAL	12.79	11.48	3.60	1.03	40.50	2061	151.22	719.2	43.30	296.75	655.80	7.37
MEAN	.41	.38	.12	.03	1.45	66.5	5.04	23.2	1.44	9.57	21.2	.25
MAX	1.2	.81	.18	.06	.35	175	17	57	7.9	51	116	.87
MIN	.00	.17	.06	.00	.00	16	.82	1.6	.01	.05	.25	.07
AC-FT	25	23	7.1	2.0	80	4090	300	1430	86	589	1300	15
CAL YR 1985	TOTAL	2394.08		MEAN	6.56	MAX	205	MIN	.00	AC-FT	4750	
WTR YR 1986	TOTAL	4004.04		MEAN	11.0	MAX	175	MIN	.00	AC-FT	7940	



RED RIVER OF THE NORTH BASIN  
05113600 LONG CREEK NEAR NOONAN, ND--CONTINUED

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WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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)
DEC 04...	1335	0.12	--	--	-19.0	0.0	--	--	--	--	--
JAN 07...	1235	0.05	1950	--	-3.5	0.0	--	--	--	--	--
MAR 04...	1235	103	425	7.50	9.5	0.5	110	36	22	13	39
12...	1455	35	--	--	--	--	--	--	--	--	--
18...	1145	55	720	--	1.5	0.5	--	--	--	--	--
APR 08...	1420	7.1	690	--	14.5	12.5	--	--	--	--	--
MAY 06...	1040	3.6	870	--	3.0	6.5	--	--	--	--	--
29...	1200	17	1420	--	30.0	23.5	--	--	--	--	--
JUN 17...	1005	0.36	1290	--	23.5	18.5	--	--	--	--	--
JUL 03...	0935	0.04	--	--	25.0	23.0	--	--	--	--	--
17...	1215	9.0	1290	--	26.0	23.0	--	--	--	--	--
AUG 20...	1105	0.75	1590	8.35	17.0	18.0	410	78	70	57	200
SEP 08...	0915	0.11	--	--	12.0	14.0	--	--	--	--	--
		SODIUM AD- SORP- TION RATIO (00932)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR 04...	41	2	12	72	110	7.0	0.1	6.6	228	250	0.31
AUG 20...	50	4	15	330	490	25	0.2	1.5	1100	1100	1.5
		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 04...	2	40	150	<1	17	180	0.1	1	<1	110	
AUG 20...	7	160	40	<1	78	30	<0.1	1	<1	400	

## RED RIVER OF THE NORTH BASIN

05113750 EAST BRANCH SHORT CREEK RESERVOIR NEAR COLUMBUS, ND

LOCATION.--Lat 48°59'26", long 102°47'07", in SW¼NW¼ sec.32, T.164 N., R.93 W., Burke County, Hydrologic Unit 09010001, on left bank of reservoir on East Branch Short Creek, 0.5 mi south of international boundary, and 6.0 mi north of Columbus.

DRAINAGE AREA.--280 mi<sup>2</sup>, of which 175 mi<sup>2</sup> is probably noncontributing.

## RESERVOIR-GAGE HEIGHT AND CONTENTS RECORDS

PERIOD OF RECORD.--April 1963 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,860.00 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for period of missing record Nov. 27 to Dec. 5. Reservoir is formed by earth-fill dam; storage began April 1963. Outlet of lake is a fixed-crest concrete dam; average crest elevation, 1,886.90 ft National Geodetic Vertical Datum of 1929. Reservoir capacity at crest elevation, 1,200 acre-ft. The reservoir is operated for water supply and recreation. Records of daily reservoir stage and contents are available from files at the Bismarck District office.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 1,850 acre-ft, Mar. 28, 1976, gage height, 32.13 ft; minimum, 890 acre-ft, Dec. 10, 1977, gage height, 23.92 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 1,430 acre-ft, July 29, gage height, 28.89 ft; minimum recorded, 1,100 acre-ft, Feb. 10, gage height, 26.10 ft.

## MONTHEND GAGE HEIGHT AND CONTENTS AT 2400, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

Date	Gage height (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30-----	26.15	1,110	--
Oct. 31-----	26.31	1,120	+10
Nov. 30-----	--	*1,110	-10
Dec. 31-----	26.17	1,110	0
CAL YR 1985-----	--	--	+120
Jan. 31-----	26.18	1,110	0
Feb. 28-----	27.40	1,250	+140
Mar. 31-----	27.37	1,240	-10
Apr. 30-----	26.84	1,180	-60
May 31-----	26.79	1,180	0
June 30-----	27.14	1,220	+40
July 31-----	28.61	1,390	+170
Aug. 31-----	27.11	1,210	-180
Sept. 30-----	27.07	1,210	0
WTR YR 1986-----	--	--	+100

\* - Estimated

05113800 SHORT CREEK BELOW INTERNATIONAL BOUNDARY NEAR ROCHE PERCEE, SASK.  
(International gaging station)

LOCATION.--Lat 49°01'42", long 102°51'00", in SW1/4 sec.14, T.1, R.7 W., 2d meridian, Hydrologic Unit 09010001, 4 mi southwest of Roche Percee, Saskatchewan, and 5 mi upstream from mouth.

DRAINAGE AREA.--480 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

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

GAGE.--Water-stage recorder.

REMARKS.--Records good except those for periods of ice and beaver activity.

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

AVERAGE DISCHARGE.--26 years, 12.6 ft<sup>3</sup>/s, 9,130 acre-ft/yr; median of yearly mean discharges, 4.8 ft<sup>3</sup>/s, 3,480 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,700 ft<sup>3</sup>/s, Apr. 7, 1969, gage height, 14.33 ft; maximum gage height, 14.39 ft, Mar. 28, 1960; no flow on many days each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 243 ft<sup>3</sup>/s, July 28; no flow for many months.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.81	1.2	.14	.04	.04	58	3.4	1.8	.95	1.4	135	.21
2	.78	1.1	.11	.04	.04	60	2.9	1.4	.67	1.1	107	.21
3	1.7	1.1	.04	.04	.04	49	2.8	1.2	.57	1.2	83	.18
4	1.5	.92	.04	.04	.04	39	2.7	.85	.46	1.2	61	.18
5	1.2	.95	.04	.04	.04	35	2.6	.92	.35	10	44	.11
6	.99	.92	.04	.04	.04	28	2.8	1.3	.35	14	35	.07
7	1.1	.88	.04	.04	.04	25	3.0	3.1	.28	11	28	.04
8	1.3	.71	.04	.04	.04	26	2.7	25	.28	7.5	22	.07
9	.99	.53	.04	.04	.04	21	2.4	22	.32	5.9	17	.11
10	1.0	.46	.04	.04	.04	19	2.8	17	.28	7.1	14	.07
11	.99	.46	.04	.04	.04	19	3.1	14	.25	6.5	11	.07
12	1.2	.64	.04	.04	.04	15	2.6	15	.21	11	9.6	.07
13	2.2	.60	.04	.04	.04	16	2.4	12	.14	10	7.7	.11
14	4.3	.49	.04	.04	.04	17	2.7	9.4	.11	9.0	6.2	.11
15	4.0	.46	.04	.04	.04	17	2.4	7.5	.11	7.2	5.1	.11
16	3.0	.42	.04	.04	.04	15	2.2	6.0	.07	11	4.2	.14
17	2.7	.42	.04	.04	.04	12	2.2	4.4	.07	18	3.7	.14
18	2.1	.35	.04	.04	.00	11	2.2	3.6	.07	19	3.1	.14
19	1.9	.32	.04	.04	.00	11	2.4	2.9	.53	17	2.5	.21
20	1.7	.28	.04	.04	.00	9.9	3.4	3.7	8.2	34	1.9	.25
21	1.5	.25	.04	.04	.00	8.3	4.7	6.5	18	29	1.5	.32
22	1.3	.25	.04	.04	.00	7.6	4.1	4.9	9.4	24	1.2	.28
23	1.2	.25	.04	.04	.00	5.9	3.7	4.7	5.2	30	.99	.25
24	.95	.21	.07	.04	.00	6.1	2.9	3.3	3.4	30	.95	.28
25	.85	.18	.04	.04	.14	6.1	2.5	2.5	2.4	28	.71	.57
26	.71	.21	.04	.04	2.7	5.4	2.2	2.1	1.9	37	.57	.35
27	.67	.18	.04	.04	21	5.3	2.1	1.7	1.6	118	.42	.28
28	.88	.18	.04	.04	39	5.8	2.1	1.8	1.4	214	.35	.28
29	1.7	.18	.04	.04	---	4.7	2.9	1.6	1.2	212	.32	.28
30	1.5	.14	.04	.04	---	3.9	2.2	1.3	1.2	188	.32	.25
31	1.5	---	.04	.04	---	3.6	---	1.2	---	163	.25	---
TOTAL	48.22	15.24	1.44	1.24	63.52	565.6	83.1	184.67	59.97	1276.1	608.58	5.74
MEAN	1.56	.51	.05	.04	2.27	18.2	2.77	5.96	2.00	41.2	19.6	.19
MAX	4.3	1.2	.14	.04	.39	60	4.7	.25	.18	214	135	.57
MIN	.67	.14	.04	.04	.00	3.6	2.1	.85	.07	1.1	.25	.04
AC-FT	96	30	2.9	2.5	126	1120	165	366	119	2530	1210	11
CAL YR 1985	TOTAL	1605.51		MEAN	4.40	MAX	131	MIN	.00	AC-FT	3180	
WTR YR 1986	TOTAL	2913.42		MEAN	7.98	MAX	214	MIN	.00	AC-FT	5780	

## RED RIVER OF THE NORTH BASIN

05114000 SOURIS (MOUSE) RIVER NEAR SHERWOOD, ND  
(International gaging station)

LOCATION.--Lat 48°59'24", long 101°57'28", in NW¼SE¼NE¼ sec.33, T.164 N., R.87 W., Renville County, Hydrologic Unit 09010001, on right bank 0.8 mi downstream from international boundary, 16 mi northwest of Sherwood, and at mile 511.4.

DRAINAGE AREA.--8,940 mi<sup>2</sup>, approximately, of which about 5,900 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--March 1930 to current year. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WSP 1308: 1934, 1945. WSP 2113: Drainage area.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 1,603.73 ft above National Geodetic Vertical Datum of 1929. Prior to Apr. 8, 1935, nonrecording gage at same site and datum.

REMARKS.--Estimated daily discharges: Oct. 1 to Mar. 28, Sept. 2-10. Records good except those for periods of estimated daily discharges, which are poor. Some regulation by reservoirs in Canada. Some small diversions for irrigation and municipal supply.

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

AVERAGE DISCHARGE.--56 years, 137 ft<sup>3</sup>/s, 99,260 acre-ft/yr; median of yearly mean discharges, 77 ft<sup>3</sup>/s, 55,800 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 14,800 ft<sup>3</sup>/s, Apr. 10, 1976, gage height, 25.15 ft; no flow at times in some years.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in 1927 reached a stage of about 22 ft and flood in 1904 reached a stage of about 25.8 ft from information by local residents.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 520 ft<sup>3</sup>/s, Mar. 5, gage height, 8.81 ft, backwater from ice; minimum daily, 0.96 ft<sup>3</sup>/s, Feb. 24.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.7	15	3.1	1.7	1.9	150	89	61	90	34	229	5.9
2	3.6	14	3.1	1.7	1.9	300	77	54	76	30	303	5.5
3	3.3	12	3.1	1.6	1.9	400	71	50	67	26	283	5.0
4	3.2	11	3.0	1.6	1.9	450	65	49	59	23	241	4.7
5	3.5	10	3.0	1.6	1.9	500	59	49	52	35	202	4.5
6	3.3	9.0	3.0	1.6	1.9	450	60	62	51	43	168	4.4
7	3.2	8.5	3.0	1.6	1.9	400	74	77	49	36	138	4.3
8	3.2	8.0	3.1	1.8	1.9	350	80	86	43	42	112	4.1
9	3.9	7.5	3.0	2.3	1.9	300	80	78	41	41	94	4.0
10	4.4	6.5	3.0	2.5	1.7	260	80	67	42	32	76	4.8
11	3.8	6.0	3.0	2.6	1.5	230	79	66	41	29	63	4.2
12	3.7	5.5	2.9	2.8	1.5	200	77	66	37	39	55	4.3
13	3.9	5.0	2.5	2.8	1.4	160	79	73	32	45	49	4.4
14	3.6	5.0	2.0	2.8	1.4	150	79	79	30	52	43	3.6
15	3.6	4.5	2.2	2.8	1.3	120	69	83	27	51	37	3.4
16	3.7	4.0	2.3	2.8	1.3	140	63	83	26	54	31	3.5
17	4.2	4.0	2.2	2.7	1.3	100	67	78	24	55	27	3.4
18	30	3.5	2.2	2.7	1.3	75	78	69	22	59	24	3.3
19	22	3.5	2.2	2.7	1.3	70	79	136	23	72	22	3.9
20	20	3.3	2.3	2.7	1.1	85	71	313	30	66	19	4.0
21	18	3.2	2.3	2.7	1.1	100	68	312	26	56	17	4.4
22	19	3.1	2.6	2.5	1.1	95	69	275	23	48	15	4.4
23	22	3.1	2.9	2.5	1.0	85	73	240	74	41	14	4.5
24	20	3.1	2.7	2.4	.96	80	67	212	80	38	13	4.5
25	18	3.1	2.4	2.4	3.0	81	58	185	62	38	12	5.7
26	16	3.1	2.5	2.3	55	65	55	163	52	42	11	6.7
27	15	3.1	2.5	2.0	90	120	61	156	44	64	10	6.2
28	13	3.1	2.3	2.0	50	119	62	140	40	105	9.2	6.5
29	14	3.1	2.0	1.9	---	103	62	128	37	136	7.8	6.8
30	17	3.1	1.9	1.9	---	101	61	116	38	116	6.9	7.6
31	16	---	1.8	1.8	---	102	---	103	---	103	6.4	---
TOTAL	321.8	176.9	80.1	69.8	234.36	5941	2112	3709	1338	1651	2338.3	142.5
MEAN	10.4	5.90	2.58	2.25	8.37	192	70.4	120	44.6	53.3	75.4	4.75
MAX	30	15	3.1	2.8	90	500	89	313	90	136	303	7.6
MIN	3.2	3.1	1.8	1.6	.96	65	55	49	22	23	6.4	3.3
AC-FT	638	351	159	138	465	11780	4190	7360	2650	3270	4640	283
CAL YR 1985	TOTAL	19106.63		MEAN	52.3	MAX	1070	MIN	.00	AC-FT	37900	
WTR YR 1986	TOTAL	18114.76		MEAN	49.6	MAX	500	MIN	.96	AC-FT	35930	



RED RIVER OF THE NORTH BASIN  
05114000 SOURIS RIVER NEAR SHERWOOD, ND--CONTINUED

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WATER-QUALITY RECORD

PERIOD OF RECORD.--Water years 1970, 1972 to current year.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: August 1983 to current year.

SPECIFIC CONDUCTANCE: August 1983 to current year.

INSTRUMENTATION.--Water quality monitor since August 1983.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum, 27.5°C, June 26, 1986; minimum, 0.0°C several days during winter months.

SPECIFIC CONDUCTANCE: Maximum daily, 2,190 micromhos, December 15, 1983; minimum, 350 micromhos, February 26, 1986.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURE: Maximum recorded, 27.5°C, June 26, 1986; minimum 0.0°C on many days during winter months.

SPECIFIC CONDUCTANCE: Maximum recorded, 2,080 micromhos, Feb. 25; minimum, 350 micromhos, Feb. 26.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	COLOR (PLAT- INUM- COBALT UNITS) (00080)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)
DATE	TIME											
OCT 16...	1200	3.6	1030	8.20	1.0	3.0	25	10.2	76	260	0	46
DEC 03...	1605	3.2	1490	7.50	-10.0	0.0	30	2.4	17	370	0	72
JAN 09...	1230	2.3	1760	7.20	3.0	0.0	20	0.4	3	500	0	100
FEB 26...	1035	51	540	7.44	6.5	0.0	70	10.9	75	130	0	29
MAR 27...	1130	92	575	7.76	15.5	0.0	70	11.1	76	140	0	30
APR 29...	1545	61	1090	8.32	18.5	11.0	40	10.9	99	220	0	46
JUN 04...	1430	57	925	8.05	20.5	21.5	45	7.1	80	260	3	51
JUL 16...	1445	55	1050	8.36	25.0	24.0	15	7.1	85	300	28	53
AUG 28...	1440	9.3	1130	8.06	24.0	16.5	50	7.6	77	210	0	43
		MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	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)
DATE												
OCT 16...	35	130		51	4	9.8	285	3.5	160	71	0.2	2.4
DEC 03...	46	200		53	5	15	438	27	280	78	0.4	6.1
JAN 09...	60	240		50	5	16	--	0	290	100	0.3	15
FEB 26...	15	49		41	2	13	--	0	91	22	0.1	7.1
MAR 27...	15	63		48	2	10	145	4.9	120	21	0.2	9.1
APR 29...	26	160		60	5	9.4	273	2.5	240	34	0.3	3.3
JUN 04...	31	100		44	3	14	252	4.3	180	41	0.3	2.8
JUL 16...	41	120		45	3	12	274	2.3	240	42	0.3	4.7
AUG 28...	24	170		63	5	12	318	5.3	250	31	0.2	16

## RED RIVER OF THE NORTH BASIN

05114000 SOURIS RIVER NEAR SHERWOOD, ND--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)	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)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)
OCT 16...	648	630	0.88	6.3	<0.10	--	--	0.09	--	10	4
DEC 03...	962	960	1.3	8.2	<0.10	0.16	0.10	--	0.05	--	--
JAN 09...	1160	--	1.6	7.3	<0.10	0.36	0.18	--	0.03	<10	2
FEB 26...	336	--	0.46	47	0.98	0.61	0.43	--	0.27	--	--
MAR 27...	379	360	0.52	94	0.22	0.25	0.19	--	0.09	--	--
APR 29...	723	680	0.98	119	<0.10	0.05	0.16	--	0.07	10	3
JUN 04...	548	570	0.75	84	<0.10	0.05	0.32	--	0.22	--	--
JUL 16...	689	680	0.94	103	<0.10	0.05	0.31	--	0.19	10	7
AUG 28...	735	740	1.0	19	<0.10	0.06	0.52	--	0.28	--	--

DATE	BARIUM, DIS- SOLVED (UG/L AS BA) (01005)	BORON, DIS- SOLVED (UG/L AS B) (01020)	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)
OCT 16...	44	210	<1	<10	<1	1	27	<1	48	22	<0.1
DEC 03...	--	390	--	--	--	--	--	--	--	--	--
JAN 09...	130	380	<1	<10	1	<1	18	2	87	3200	0.2
FEB 26...	--	70	--	--	--	--	--	--	--	--	--
MAR 27...	--	230	--	--	--	--	--	--	--	--	--
APR 29...	62	400	<1	<10	1	2	58	2	39	3	<0.1
JUN 04...	--	190	--	--	--	--	--	--	--	--	--
JUL 16...	80	220	<1	<10	<1	<1	14	<5	62	22	<0.1
AUG 28...	--	200	--	--	--	--	--	--	--	--	--

DATE	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	NICKEL, TOTAL RECOV- ERABLE (UG/L AS NI) (01067)	NICKEL, SUS- PENDE RECOV- ERABLE (UG/L AS NI) (01066)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG) (01077)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)	VANA- DIUM, DIS- SOLVED (UG/L AS V) (01085)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN) (01092)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	CYANIDE TOTAL (MG/L AS CN) (00720)
OCT 16...	1	17	14	3	<1	<1	270	3	30	4	<0.01
JAN 09...	2	5	--	3	<1	<1	690	1	20	4	<0.01
APR 29...	2	<1	--	2	<1	<1	390	2	70	<3	<0.01
JUL 16...	1	6	--	4	<1	<1	380	6	<10	7	<0.01

05114000 SOURIS RIVER NEAR SHERWOOD, ND--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCTOBER			NOVEMBER			DECEMBER			JANUARY		
1	6.5	5.0	5.5	4.0	3.0	3.5	.0	.0	.0	.0	.0	.0
2	7.5	5.5	6.5	3.0	2.5	3.0	.0	.0	.0	.0	.0	.0
3	7.5	7.0	7.0	3.5	3.0	3.5	.0	.0	.0	.0	.0	.0
4	7.0	6.5	7.0	4.0	3.0	3.5	.0	.0	.0	.0	.0	.0
5	7.0	6.0	6.5	3.5	3.0	3.5	.0	.0	.0	.0	.0	.0
6	6.5	5.5	6.0	3.0	1.5	2.0	.0	.0	.0	.0	.0	.0
7	5.5	3.5	5.0	1.5	.5	1.0	.0	.0	.0	.0	.0	.0
8	3.5	2.5	2.5	.5	.0	.0	.0	.0	.0	.0	.0	.0
9	2.5	2.0	2.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
10	2.5	2.0	2.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
11	3.5	2.0	2.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
12	4.0	3.0	3.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
13	5.5	4.0	4.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
14	5.5	4.5	5.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
15	4.5	4.0	4.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
16	4.0	3.5	3.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
17	5.0	3.5	4.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
18	5.5	4.0	4.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
19	6.0	4.0	5.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
20	6.5	5.0	6.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
21	7.0	5.0	6.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
22	8.0	6.5	7.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
23	8.0	7.0	7.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
24	7.0	5.5	6.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
25	7.0	5.0	6.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
26	6.5	5.0	5.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
27	5.5	4.0	5.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
28	6.0	4.5	5.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
29	5.5	4.0	4.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
30	4.0	2.5	3.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
31	4.0	3.5	3.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
MONTH	8.0	2.0	5.0	4.0	.0	.5	.0	.0	.0	.0	.0	.0

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	FEBRUARY			MARCH			APRIL			MAY		
1	.0	.0	.0	.0	.0	.0	8.0	5.5	6.5	12.0	9.5	10.5
2	.0	.0	.0	.0	.0	.0	6.5	5.5	6.0	13.0	9.5	11.5
3	.0	.0	.0	.0	.0	.0	7.0	5.0	6.0	15.0	10.5	12.5
4	.0	.0	.0	.0	.0	.0	7.5	5.0	6.0	17.5	12.5	15.0
5	.0	.0	.0	.0	.0	.0	7.5	6.5	7.0	15.5	11.0	13.5
6	.0	.0	.0	.0	.0	.0	9.0	6.0	7.5	10.5	9.0	9.5
7	.0	.0	.0	.0	.0	.0	10.0	7.0	8.5	9.5	7.5	8.5
8	.0	.0	.0	.0	.0	.0	10.0	7.0	8.5	10.0	8.5	9.0
9	.0	.0	.0	.0	.0	.0	11.0	7.5	9.0	9.5	8.5	9.0
10	.0	.0	.0	.0	.0	.0	12.0	8.5	10.5	12.0	8.0	10.0
11	.0	.0	.0	.0	.0	.0	10.5	8.0	9.5	15.0	10.5	12.5
12	.0	.0	.0	.0	.0	.0	8.0	6.0	7.0	15.0	13.0	14.0
13	.0	.0	.0	.0	.0	.0	6.0	3.0	4.5	16.0	12.5	14.0
14	.0	.0	.0	.0	.0	.0	3.0	1.0	2.0	15.0	14.0	14.5
15	.0	.0	.0	.0	.0	.0	4.0	.5	2.0	14.0	12.0	13.0
16	.0	.0	.0	.0	.0	.0	5.5	2.0	3.5	12.0	11.0	11.5
17	.0	.0	.0	.0	.0	.0	6.5	4.5	5.5	14.0	10.0	11.5
18	.0	.0	.0	.0	.0	.0	7.0	6.0	6.5	16.0	12.5	14.0
19	.0	.0	.0	.0	.0	.0	8.0	6.0	7.0	16.5	14.5	15.5
20	.0	.0	.0	.0	.0	.0	8.0	6.5	7.0	17.5	16.0	17.0
21	.0	.0	.0	.0	.0	.0	9.5	6.0	7.5	18.0	16.0	17.0
22	.0	.0	.0	.0	.0	.0	11.5	8.0	9.5	17.0	15.5	16.0
23	.0	.0	.0	.0	.0	.0	12.0	10.5	11.0	15.5	15.0	15.0
24	.0	.0	.0	.0	.0	.0	11.5	9.5	10.5	17.5	14.5	16.0
25	.0	.0	.0	.0	.0	.0	10.0	9.5	9.5	18.5	16.0	17.5
26	.0	.0	.0	.0	.0	.0	9.0	8.0	9.0	20.5	17.5	19.0
27	.0	.0	.0	1.0	.0	.5	8.0	7.5	8.0	21.5	19.0	20.0
28	.0	.0	.0	2.5	.0	1.5	10.0	6.5	8.0	22.5	20.0	21.5
29				4.5	2.0	3.0	12.0	8.0	10.0	24.0	21.0	22.5
30				5.5	3.0	4.5	11.5	10.0	11.0	25.5	22.0	23.5
31				7.5	5.0	6.0				26.0	23.0	24.0
MONTH	.0	.0	.0	7.5	.0	.5	12.0	.5	7.5	26.0	7.5	15.0

## RED RIVER OF THE NORTH BASIN

05114000 SOURIS RIVER NEAR SHERWOOD, ND--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	JUNE			JULY			AUGUST			SEPTEMBER		
1	23.5	22.0	22.5	21.5	18.5	20.0	21.5	20.5	21.0	19.5	17.0	18.0
2	24.0	20.5	22.0	22.5	18.5	20.5	21.5	20.0	21.0	17.5	16.0	16.5
3	23.5	21.5	22.5	23.0	21.0	22.0	22.5	20.5	21.5	17.5	16.5	17.0
4	23.0	20.0	21.5	22.5	21.0	21.5	23.5	21.5	22.5	16.5	14.5	15.5
5	21.5	19.0	20.5	21.0	19.0	20.0	24.5	23.0	23.5	15.0	14.0	14.5
6	20.0	18.5	19.5	20.5	17.5	19.0	24.0	23.0	23.5	13.5	12.5	13.0
7	21.0	17.0	19.0	22.0	17.5	19.5	23.5	21.5	22.5	13.0	11.5	12.0
8	20.5	17.5	19.0	23.5	18.5	21.0	24.0	21.0	22.5	13.5	11.0	12.0
9	19.5	18.0	18.5	23.0	20.5	22.0	23.0	21.5	22.5	13.5	12.0	12.5
10	21.5	17.5	19.5	22.5	20.5	21.5	21.5	19.5	20.5	12.5	12.5	12.5
11	23.0	17.5	20.5	21.5	20.0	20.5	22.0	18.5	20.0	14.0	12.0	13.0
12	22.0	18.5	20.0	21.0	19.5	20.0	23.5	19.5	21.0	13.0	11.0	12.0
13	20.0	17.5	18.5	23.0	18.5	20.5	23.0	21.0	22.0	11.0	9.5	10.0
14	19.0	16.0	17.5	24.0	19.5	22.0	23.5	20.5	22.0	10.0	9.5	9.5
15	18.0	15.0	16.0	25.5	21.5	23.5	23.5	20.5	22.0	10.0	9.5	10.0
16	18.0	13.5	15.5	25.0	23.0	24.0	22.5	19.5	21.0	10.0	9.5	10.0
17	20.5	16.5	18.5	25.0	22.5	24.0	20.5	17.5	19.0	11.0	10.0	10.5
18	23.0	19.0	21.0	25.0	22.0	23.0	21.5	17.5	19.5	11.5	10.5	11.0
19	23.5	22.0	23.0	23.0	22.0	22.5	22.0	19.5	21.0	11.5	10.5	11.0
20	22.0	20.0	21.0	23.5	20.5	22.0	21.5	19.0	20.0	11.0	10.5	10.5
21	23.0	20.0	21.5	24.5	21.0	22.5	19.0	17.0	18.5	12.5	11.0	11.5
22	22.5	20.0	21.5	25.5	21.5	23.5	19.5	18.0	18.5	12.5	10.5	11.5
23	23.0	19.5	21.5	26.5	22.5	24.5	19.5	16.5	18.0	13.0	11.0	12.0
24	24.5	21.0	22.5	25.5	22.5	24.0	21.0	18.5	19.5	14.5	10.5	12.0
25	26.5	22.5	24.5	24.5	21.5	23.0	20.0	18.5	19.5	14.5	13.0	14.0
26	27.5	24.0	25.5	24.0	21.5	22.5	18.5	16.5	17.0	14.0	12.0	13.0
27	25.5	22.5	24.0	24.0	21.0	22.5	17.5	15.0	16.0	13.5	11.5	12.5
28	25.5	22.0	24.0	23.5	21.5	22.5	18.0	14.5	16.0	13.0	11.0	12.0
29	24.0	20.5	21.5	24.0	22.5	23.0	19.5	15.5	17.0	13.0	11.5	12.5
30	20.5	19.5	20.0	23.5	21.5	22.5	20.5	16.5	18.0	13.0	10.5	11.5
31				22.5	20.5	21.5	20.5	18.5	19.5			
MONTH	27.5	13.5	21.0	26.5	17.5	22.0	24.5	14.5	20.0	19.5	9.5	12.5
YEAR	27.5	.0	8.5									

SPECIFIC CONDUCTANCE (MICROSIEMENS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCTOBER			NOVEMBER			DECEMBER			JANUARY		
1	990	980	982	1130	1110	1120	1470	1450	1460	1720	1720	1720
2	1010	980	993	1100	1050	1080	1480	1470	1480	1730	1710	1720
3	1000	980	995	1050	1010	1030	1500	1480	1490	1730	1720	1730
4	1000	990	992	1020	990	1010	1500	1490	1500	1730	1720	1730
5	1000	990	998	1000	990	995	1510	1490	1500	1730	1720	1720
6	1010	990	1000	1000	990	994	1540	1510	1520	1730	1720	1730
7	1000	970	991	1000	990	993	1530	1520	1530	1740	1730	1740
8	980	960	965	1030	990	1010	1540	1520	1530	1770	1740	1750
9	970	950	960	1060	1030	1050	1530	1510	1520	1770	1760	1770
10	980	960	972	1090	1060	1080	1520	1510	1520	1780	1760	1770
11	980	970	977	1130	1090	1110	1530	1520	1520	1780	1770	1770
12	990	970	986	1130	1120	1120	1530	1510	1520	1780	1760	1770
13	1010	990	1000	1140	1120	1130	1530	1510	1520	1780	1760	1770
14	1020	1010	1010	1170	1130	1150	1540	1530	1530	1770	1740	1760
15	1030	1020	1020	1180	1160	1170	1540	1530	1540	1800	1770	1780
16	1040	1020	1030	1180	1160	1170	1550	1540	1540	1800	1790	1800
17	1040	1010	1030	1180	1160	1170	1560	1550	1560	1800	1780	1790
18	1100	1020	1050	1200	1170	1190	1570	1550	1560	1780	1760	1770
19	1240	1100	1170	1220	1200	1210	1570	1560	1570	1770	1750	1760
20	1400	1250	1340	1240	1220	1240	1580	1570	1570	1770	1760	1760
21	1400	1280	1360	1260	1240	1250	1590	1570	1590	1770	1750	1760
22	1270	1120	1200	1270	1250	1260	1600	1590	1590	1760	1750	1750
23	1110	1020	1060	1290	1270	1280	1600	1580	1590	1770	1750	1760
24	1020	1010	1020	1310	1280	1300	1620	1580	1600	1780	1760	1770
25	1050	1020	1040	1340	1310	1320	1650	1610	1630	1790	1770	1780
26	1060	1040	1050	1340	1330	1340	1670	1650	1660	1800	1780	1790
27	1050	1040	1050	1350	1340	1350	1660	1650	1660	1820	1790	1810
28	1070	1050	1060	1390	1360	1370	1680	1660	1670	1830	1820	1830
29	1090	1060	1080	1420	1390	1400	1700	1670	1690	1850	1830	1840
30	1120	1090	1110	1450	1420	1430	1720	1700	1710	1850	1840	1850
31	1130	1120	1130				1720	1700	1710	1860	1840	1850
MONTH	1400	950	1050	1450	990	1180	1720	1450	1570	1860	1710	1770





## RED RIVER OF THE NORTH BASIN

05114700 LAKE DARLING NEAR GRANO, ND

LOCATION.--Lat 48°36'49", long 101°37'01", in NW¼ sec.11, T.159 N., R.85 W., Renville County, Hydrologic Unit Unit 09010001, at highway bridge 1.3 mi west of Grano.

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--October 1985 to September 1986.

## WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	COLOR (PLAT- INUM- COBALT UNITS) (00080)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	
DATE	TIME											
DEC 03...	1045	815	8.20	-13.0	1.5	10	11.5	82	240	1	50	
JAN 09...	1630	915	8.00	1.5	1.5	--	11.8	84	--	--	--	
FEB 26...	1415	710	<7.84	5.5	2.5	20	10.3	76	220	0	46	
MAR 27...	1600	880	7.84	19.0	6.0	15	13.4	107	260	0	53	
APR 29...	1900	720	8.42	13.0	9.0	10	11.6	100	210	0	44	
JUN 04...	1705	730	8.56	22.5	20.5	10	8.4	93	210	0	43	
JUL 16...	1030	755	8.53	19.0	21.5	10	6.8	77	230	0	48	
AUG 26...	1850	775	9.11	17.5	19.0	20	16.2	172	220	0	45	
DATE		MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	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)
DEC 03...	29	86	42	2	14	243		2.9	160	23	0.3	17
FEB 26...	25	72	40	2	13	--	--	--	140	18	0.2	13
MAR 27...	30	91	42	3	11	274		7.6	160	28	0.3	10
APR 29...	25	74	42	2	10	217		1.6	140	19	0.2	8.6
JUN 04...	24	72	41	2	12	220		1.2	130	22	0.2	4.9
JUL 16...	26	80	42	2	12	228		1.3	150	22	0.2	2.2
AUG 26...	26	83	43	3	13	234		0.3	150	24	0.2	7.4
DATE		SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)	PHOS- PHORUS, TOTAL (MG/L AS P) (00665)	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)
DEC 03...	530	530	0.72	0.0	0.31	0.17	0.15	0.11	--	--	--	--
FEB 26...	477	--	0.65	0.0	0.31	0.27	0.21	0.14	--	--	--	--
MAR 27...	585	550	0.8	0.0	<0.10	0.08	0.16	0.10	--	--	--	--
APR 29...	463	450	0.63	0.0	<0.10	0.06	0.11	0.06	20	3	63	63
JUN 04...	474	440	0.64	0.0	<0.10	0.03	0.12	0.09	--	--	--	--
JUL 16...	471	480	0.64	0.0	<0.10	0.07	0.30	0.23	10	9	70	70
AUG 26...	484	490	0.66	0.0	<0.10	0.13	0.39	0.25	--	--	--	--

## RED RIVER OF THE NORTH BASIN

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05114700 LAKE DARLING NEAR GRANO, ND--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	BORON, DIS- SOLVED (UG/L AS B) (01020)	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)
DEC 03...	290	--	--	--	--	--	--	--	--	--
FEB 26...	230	--	--	--	--	--	--	--	--	--
MAR 27...	260	--	--	--	--	--	--	--	--	--
APR 29...	220	<1	<10	1	1	5	<1	29	11	<0.1
JUN 04...	230	--	--	--	--	--	--	--	--	--
JUL 16...	240	<1	<10	<1	1	8	<5	35	91	<0.1
AUG 26...	270	--	--	--	--	--	--	--	--	--
DATE	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	NICKEL, TOTAL RECOV- ERABLE (UG/L AS NI) (01067)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG) (01077)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)	VANA- DIUM, DIS- SOLVED (UG/L AS V) (01085)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN) (01092)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	CYANIDE TOTAL (MG/L AS CN) (00720)
APR 29...	2	7	2	<1	<1	260	1	30	<3	<0.01
JUL 16...	2	5	3	<1	1	290	4	20	<3	<0.01

## RED RIVER OF THE NORTH BASIN

05115500 LAKE DARLING NEAR FOXHOLM, ND

LOCATION.--Lat 48°27'27", long 101°35'14", in NE1/4NE1/4 sec.1, T.157 N., R.85 W., Ward County, Hydrologic Unit 09010001, on control structure of Lake Darling Dam, reservoir of Fish and Wildlife Service, on Souris River about 6 mi north of Foxholm, and at mile 430.0.

DRAINAGE AREA.--9,450 mi<sup>2</sup>, approximately, of which about 6,200 mi<sup>2</sup> is probably noncontributing.

## RESERVOIR-GAGE HEIGHT AND CONTENTS RECORDS

PERIOD OF RECORD.--April 1936 to current year (no winter records 1936-39).

REVISED RECORDS.--WSP 1338: 1942. WSP 2113: Drainage area.

GAGE.--Non-recording gage. Datum of gage is 1,577.00 ft National Geodetic Vertical Datum of 1929. April 1936 to Aug. 8, 1963, nonrecording gages at same site and datum.

REMARKS.--Gage heights frequently affected by wind. Reservoir is formed by earth dam; storage began in April 1936; dam completed in July 1936. Usable capacity, 108,500 acre-ft between gage heights of 0.0 ft, sill of control gages, and 21.0 ft, crest of spillway. Dead storage, 3,500 acre-ft. Figures given herein represent total contents based on capacity table dated June 7, 1943. Water is used during periods of low flow at wildlife refuge downstream.

COOPERATION.--Gage readings furnished by Fish and Wildlife Service.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 145,400 acre-ft Apr. 17, 1976, gage height, 24.24 ft; minimum observed since April 1943 when reservoir was first filled to spillway level, 31,200 acre-ft Feb. 18, 25, 1963, gage height, 10.04 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents observed, 98,400 acre-ft, June 6, gage height, 19.60 ft; minimum observed, 77,400 acre-ft, Feb. 21, gage height, 17.22.

## MONTHEND GAGE HEIGHT AND CONTENTS AT 2400, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

Date	Gage height (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30-----	18.15	85,400	--
Oct. 31-----	18.00	84,000	-1,400
Nov. 30-----	17.85	82,700	-1,300
Dec. 31-----	17.59	80,500	-2,200
CAL YR 1985-----	--	--	+10,900
Jan. 31-----	17.30	78,000	-2,500
Feb. 28-----	17.30	78,000	0
Mar. 31-----	18.69	90,200	+12,200
Apr. 30-----	19.10	93,900	+3,700
May 31-----	19.57	98,100	+4,200
June 30-----	19.45	97,000	-1,100
July 31-----	19.45	97,000	0
Aug. 31-----	18.46	88,100	-8,900
Sept. 30-----	18.25	86,200	-1,900
WTR YR 1986-----	--	--	+800



## RED RIVER OF THE NORTH BASIN

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## 05116000 SOURIS (MOUSE) RIVER NEAR FOXHOLM, ND

LOCATION.--Lat 48°22'20", long 101°30'18", in SW¼SE¼ sec.34, T.157 N., R.84 W., Ward County, Hydrologic Unit 09010001, on left bank 30 ft upstream from county highway bridge, 3 mi east of Foxholm, 19 mi upstream from Des Lacs River, and at mile 414.5.

DRAINAGE AREA.--9,470 mi<sup>2</sup>, approximately, of which about 6,200 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--June 1904 to November 1905, March to July 1906 (gage heights only), October 1936 to current year. Monthly discharge only for some periods, published in WSP 1308. Published as Mouse River near Foxholm, 1904-6.

REVISED RECORDS.--WSP 1308: 1905. WSP 2113: Drainage area.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 1,560.73 ft above National Geodetic Vertical Datum of 1929. June 23, 1904, to July 31, 1906, nonrecording gage at site 3.2 mi upstream at different datum. Apr. 1, 1937, to Mar. 25, 1938, nonrecording gage at site 600 ft downstream at datum about 0.5 ft higher.

REMARKS.--Estimated daily discharges: Oct. 11 to Dec. 9, Dec. 2-15, 19-21, Dec. 25 to Jan. 1, Feb. 11-21, and Aug. 28 to Sept. 30. Records good except those for periods of estimated daily discharges, which are fair. Flow almost completely regulated since 1936 by Lake Darling (station 05115500) 15 mi upstream and several small reservoirs, combined capacity, about 184,000 acre-ft. Some small diversions for irrigation and municipal supply.

AVERAGE DISCHARGE.--51 years, 142 ft<sup>3</sup>/s, 102,900 acre-ft/yr; median of yearly mean discharges, 60 ft<sup>3</sup>/s, 43,500 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,600 ft<sup>3</sup>/s, Apr. 17, 1976, gage height, 17.17 ft; maximum reverse flow, 25 ft<sup>3</sup>/s, Apr. 4, 1949 caused by backwater from the Des Lacs River; no flow at times in many years.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 240 ft<sup>3</sup>/s, Aug. 10, gage height, 6.31 ft; no flow June 8-12.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	34	8.0	60	57	43	6.3	72	1.7	.38	19	22	40
2	34	8.0	60	56	43	6.9	72	10	.31	17	22	40
3	34	8.0	60	56	43	5.8	71	53	.30	18	22	30
4	32	8.0	60	55	36	1.5	71	37	.25	27	23	25
5	29	20	60	57	23	1.2	53	41	.18	27	24	25
6	29	28	60	57	23	.95	13	40	.18	27	24	25
7	29	28	60	57	23	.80	21	40	.22	29	65	25
8	29	28	60	57	23	.74	54	33	.00	27	213	25
9	29	28	60	57	22	.74	43	6.0	.00	27	233	25
10	29	28	60	56	22	.74	18	4.8	.00	29	239	25
11	30	28	60	54	10	.74	7.4	4.3	.00	27	229	25
12	30	28	59	54	8.0	.74	9.6	2.0	.00	30	184	25
13	30	28	58	53	8.0	.81	9.6	4.9	15	30	180	25
14	30	28	58	54	8.0	1.0	9.5	29	30	29	181	25
15	30	40	58	50	8.0	.91	9.0	26	54	29	181	15
16	30	50	60	43	8.0	.82	9.1	23	56	28	181	3.5
17	30	50	60	43	8.0	.76	9.1	23	54	27	181	3.0
18	30	50	60	43	8.0	.74	5.4	24	54	26	183	2.2
19	30	50	59	43	8.0	.74	4.3	56	55	26	183	10
20	30	55	59	43	8.0	.79	3.6	80	56	25	183	30
21	30	60	59	43	8.0	.83	3.3	49	58	25	184	30
22	30	60	60	43	8.0	.91	3.3	2.3	59	25	185	30
23	30	60	59	43	8.0	.81	3.0	1.3	60	25	186	30
24	30	60	59	43	8.0	.74	2.1	1.1	60	25	187	30
25	70	60	59	43	8.0	.78	1.6	.98	61	25	135	30
26	95	60	59	43	8.0	.76	1.6	.87	61	25	25	30
27	95	60	59	43	7.8	12	1.5	.78	16	24	25	30
28	95	60	59	43	6.2	86	1.6	.70	31	24	25	30
29	95	60	58	43	---	88	1.5	.62	37	23	25	28
30	50	60	57	43	---	97	2.0	.59	31	22	25	25
31	8.0	---	57	43	---	83	---	.51	---	22	30	---
TOTAL	1236.0	1199.0	1836	1518	445.0	394.55	586.1	597.45	849.82	789	3785	741.7
MEAN	39.9	40.0	59.2	49.0	15.9	12.7	19.5	19.3	28.3	25.5	122	24.7
MAX	95	60	60	57	43	88	72	80	61	30	239	40
MIN	8.0	8.0	57	43	6.2	.74	1.5	.51	.00	17	22	2.2
AC-FT	2450	2380	3640	3010	883	783	1160	1190	1690	1560	7510	1470
CAL YR 1985	TOTAL	12420.42		MEAN	34.0	MAX	188	MIN	.08	AC-FT	24640	
WTR YR 1986	TOTAL	13977.62		MEAN	38.3	MAX	239	MIN	.00	AC-FT	27720	

## RED RIVER OF THE NORTH BASIN

05116000 SOURIS RIVER NEAR FOXHOLM, ND--CONTINUED

## WATER-QUALITY RECORD

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	COLOR (PLAT- INUM- COBALT UNITS) (00080)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	
OCT												
10...	1825	30	750	--	4.0	3.5	--	--	--	--	--	
DEC												
09...	1530	60	830	8.00	-6.0	0.0	10	9.5	64	250	0	
JAN												
14...	1100	54	865	7.86	-4.5	0.0	10	9.2	63	270	0	
FEB												
27...	1550	7.8	810	7.86	0.0	1.5	30	12.4	87	240	0	
APR												
07...	1800	37	625	8.47	13.0	10.0	30	12.4	108	170	0	
28...	1630	1.6	730	8.33	18.0	9.5	20	12.0	105	230	1	
JUN												
16...	1500	55	870	8.53	21.0	19.0	30	7.9	84	260	0	
JUL												
15...	1440	29	765	8.65	29.5	22.5	10	7.7	89	220	0	
AUG												
26...	1350	26	780	8.36	17.0	19.0	10	6.9	73	220	0	
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)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	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)
DEC												
09...	51	30	89	42	3	13	251		4.8	160	23	0.3
JAN												
14...	56	32	94	41	3	14	--	0	180	21	0.3	
FEB												
27...	49	28	80	40	2	15	--	0	160	21	0.2	
APR												
07...	37	20	58	40	2	11	--	0	100	16	0.2	
28...	46	27	74	40	2	11	225	2.0	140	19	0.2	
JUN												
16...	49	33	92	42	3	13	274	1.5	160	19	0.2	
JUL												
15...	43	28	83	43	2	11	243	1.0	150	21	0.2	
AUG												
26...	45	27	80	42	2	13	232	1.9	160	22	0.2	
DATE		SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)	PHOS- PHORUS, TOTAL (MG/L AS P) (00665)	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)
DEC												
09...	15	528	530	0.72	86	0.24	0.25	0.14	0.11	--	--	--
JAN												
14...	16	559	--	0.76	81	0.27	0.24	0.16	0.11	20	4	4
FEB												
27...	13	533	--	0.72	11	0.21	0.15	0.24	0.17	--	--	--
APR												
07...	5.9	393	--	0.53	39	<0.10	0.03	0.22	0.07	--	--	--
28...	4.7	476	460	0.65	2.0	<0.10	0.11	0.17	0.07	30	4	4
JUN												
16...	5.4	584	540	0.79	86	<0.10	0.08	0.44	0.33	--	--	--
JUL												
15...	1.6	484	490	0.66	37	<0.10	0.06	0.53	0.37	<10	10	10
AUG												
26...	6.0	480	490	0.65	34	<0.10	0.10	0.20	0.13	--	--	--

## RED RIVER OF THE NORTH BASIN

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05116000 SOURIS RIVER NEAR FOXHOLM, ND--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

	BARIUM, DIS- SOLVED (UG/L AS BA) (01005)	BORON, DIS- SOLVED (UG/L AS B) (01020)	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)
DEC 09...	--	300	--	--	--	--	--	--	--	--	--
JAN 14...	100	300	<1	<10	1	3	<3	1	42	200	<0.1
FEB 27...	--	280	--	--	--	--	--	--	--	--	--
APR 07...	--	190	--	--	--	--	--	--	--	--	--
28...	75	210	<1	<10	1	1	13	1	30	360	<0.1
JUN 16...	--	290	--	--	--	--	--	--	--	--	--
JUL 15...	59	270	<1	<10	<1	1	20	<5	39	20	<0.1
AUG 26...	--	270	--	--	--	--	--	--	--	--	--
	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	NICKEL, TOTAL RECOV- ERABLE (UG/L AS NI) (01067)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG) (01077)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)	VANA- DIUM, DIS- SOLVED (UG/L AS V) (01085)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN) (01092)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	CYANIDE TOTAL (MG/L AS CN) (00720)	
JAN 14...	3	3	4	<1	<1	390	6	30	13	<0.01	
APR 28...	2	3	2	<1	<1	250	1	20	<3	<0.01	
JUL 15...	2	6	4	<1	<1	280	3	<10	13	<0.01	

## RED RIVER OF THE NORTH BASIN

05116500 DES LACS RIVER AT FOXHOLM, ND

LOCATION.--Lat 49°22'14", long 101°34'11", in NW¼NE¼NW¼ sec.2, T.156 N., R.85 W., Ward County, Hydrologic Unit 09010002, on left bank 200 ft upstream from county highway bridge in Foxholm, and at mile 23.0.

DRAINAGE AREA.--939 mi<sup>2</sup>, of which about 400 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--June 1904 to July 1906, October 1945 to current year. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WSP 1728: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,632.98 ft above National Geodetic Vertical Datum of 1929. June 14 to Oct. 23, 1955, nonrecording gage at site 200 ft downstream from present gage at same datum. See WSP 1728 or 1913 for history of changes prior to June 14, 1955.

REMARKS.--Estimated daily discharges: Dec. 23-26, Feb. 25 to Mar. 9, Mar. 15-17, Apr. 15-28, July 12-14, and July 24 to Sept. 30. Records good except those for periods of estimated daily discharges, which are fair. Some regulation at low flow by a series of wildlife refuge ponds, beginning about 53 mi upstream, combined capacity about 64,000 acre-ft. Some small diversions for irrigation above station.

AVERAGE.--43 years (water years 1905-06, 1946-86), 30.4 ft<sup>3</sup>/s, 22,020 acre-ft/yr; median of yearly mean discharges, 17 ft<sup>3</sup>/s, 12,300 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,260 ft<sup>3</sup>/s, Apr. 19, 1979, gage height, 21.23 ft, from highwater mark; no flow at times in some years.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 450 ft<sup>3</sup>/s, Feb. 27, gage height, 9.97 ft, backwater from ice; minimum daily discharge, 0.21 ft<sup>3</sup>/s, Feb. 19-24.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.7	3.5	1.2	.40	.51	120	30	15	9.5	2.8	2.4	1.1
2	6.7	3.7	1.1	.38	.52	160	28	13	8.9	2.8	2.2	1.2
3	8.4	4.1	.98	.35	.57	210	27	12	8.8	2.8	2.0	1.3
4	9.5	4.1	.93	.39	.59	200	29	13	9.0	2.7	2.0	1.2
5	9.2	4.0	.92	.37	.58	140	31	18	8.1	2.7	2.0	1.2
6	10	3.8	.91	.34	.55	100	29	27	7.8	2.7	1.8	1.1
7	9.1	3.4	1.0	.26	.53	42	26	63	7.8	2.6	2.6	1.1
8	7.2	3.1	1.1	.26	.50	40	25	58	7.6	2.5	1.6	1.1
9	7.2	3.0	1.2	.33	.47	38	23	47	7.3	2.3	1.5	1.1
10	6.3	2.8	1.2	.35	.44	35	22	59	7.2	2.2	1.3	1.1
11	6.4	2.6	1.1	.70	.36	37	21	77	6.7	2.2	1.3	1.1
12	6.8	2.7	1.0	.93	.31	34	20	51	5.6	4.0	1.3	1.1
13	9.2	2.6	.84	.88	.27	38	19	38	4.8	8.0	1.3	1.1
14	13	2.5	.69	.92	.24	51	13	31	4.4	6.0	1.4	1.1
15	14	2.4	.60	1.0	.23	100	15	26	4.2	4.1	1.3	1.1
16	11	2.3	.65	1.1	.23	220	16	23	4.1	4.2	1.3	1.1
17	9.8	2.5	.65	1.0	.23	145	17	21	4.0	4.1	1.2	1.2
18	8.6	2.5	.71	1.0	.23	92	23	20	3.8	4.0	1.1	1.3
19	7.1	2.1	.72	1.1	.21	57	26	19	3.6	3.4	1.1	1.5
20	6.4	2.1	.68	1.8	.21	40	32	17	3.5	2.9	1.1	1.6
21	5.8	1.9	.66	2.2	.21	44	28	16	3.4	2.9	1.1	1.8
22	5.4	1.9	.74	1.7	.21	60	24	14	3.3	3.2	1.1	1.9
23	5.0	2.0	.73	1.5	.21	72	21	15	3.3	3.3	1.1	2.1
24	4.7	1.7	.72	1.2	.21	83	19	14	3.2	3.2	1.2	2.2
25	4.5	1.6	.71	.98	4.2	71	17	14	3.2	3.0	1.3	3.0
26	5.2	1.6	.70	.77	110	59	17	13	3.2	2.8	1.2	3.1
27	5.0	1.6	.69	.50	370	45	18	12	3.2	2.6	1.1	3.3
28	3.9	1.5	.56	.47	344	36	15	12	3.1	9.0	1.1	3.0
29	3.7	1.3	.40	.50	---	36	15	11	2.9	3.1	1.0	2.9
30	3.7	1.2	.43	.50	---	35	17	10	2.9	2.8	1.0	2.8
31	3.5	---	.43	.51	---	32	---	10	---	2.6	1.0	---
TOTAL	223.0	76.1	24.95	24.69	836.82	2472	663	789	158.4	107.5	44.0	49.8
MEAN	7.19	2.54	.80	.80	29.9	79.7	22.1	25.5	5.28	3.47	1.42	1.66
MAX	14	4.1	1.2	2.2	370	220	32	77	9.5	9.0	2.6	3.3
MIN	3.5	1.2	.40	.26	.21	32	13	10	2.9	2.2	1.0	1.1
AC-FT	442	151	49	49	1660	4900	1320	1560	314	213	87	99
CAL YR 1985	TOTAL	7422.25		MEAN	20.3	MAX	243	MIN	.00	AC-FT	14720	
WTR YR 1986	TOTAL	5469.26		MEAN	15.0	MAX	370	MIN	.21	AC-FT	10850	



## RED RIVER OF THE NORTH BASIN

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05116500 DES LACS RIVER AT FOXHOLM, ND--CONTINUED

## WATER-QUALITY RECORD

PERIOD OF RECORD.--Water years 1950-51, 1969-70, 1972 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	COLOR (PLAT- INUM- COBALT UNITS) (00080)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)
OCT 10...	1635	5.9	1810	--	15.5	2.5	--	--	--	--	--
DEC 09...	1715	1.3	2500	7.60	-9.0	0.0	30	4.9	33	770	130
JAN 14...	1300	0.9	1650	7.58	-4.0	0.0	40	4.8	33	580	0
FEB 27...	1800	444	300	7.76	-1.0	0.0	70	11.8	79	73	0
APR 09...	1045	24	1450	8.36	17.0	8.0	50	10.5	88	370	13
JUN 28...	1810	15	1700	8.55	16.5	8.5	45	13.0	112	500	110
JUL 16...	1650	4.2	1770	8.47	21.0	20.5	50	11.1	123	480	11
AUG 15...	1130	4.1	1680	8.31	25.5	22.0	15	7.7	88	470	48
AUG 26...	1650	1.2	1850	8.59	17.5	19.5	40	10.2	110	450	4
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)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	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)
DEC 09...	150	96	340	49	5	9.7	638	31	810	43	0.4
JAN 14...	120	68	180	40	3	10	--	0	450	18	0.3
FEB 27...	16	8.0	24	35	1	18	--	0	67	6.9	0.1
APR 09...	74	44	190	52	4	13	353	3.0	440	23	0.2
JUN 28...	100	60	210	47	4	12	392	2.1	470	25	0.3
JUL 16...	93	60	230	50	5	14	468	3.0	480	27	0.3
AUG 15...	88	61	230	51	5	11	424	4.0	510	40	0.4
AUG 26...	79	61	250	54	5	11	444	2.2	560	37	0.3
DATE	SILICA, DIS- SOLVED (MG/L AS SiO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)	PHOS- PHORUS, TOTAL (MG/L AS P) (00665)	PHOS- PHORUS, ORTHOPHOSPHATE, DIS- SOLVED (MG/L AS P) (00671)	ALUM- INUM, DIS- SOLVED (UG/L AS AL) (01106)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)
DEC 09...	21	1850	1900	2.5	6.5	0.16	1.10	0.17	0.06	--	--
JAN 14...	23	1160	--	1.6	2.8	0.43	1.00	0.16	0.11	<10	2
FEB 27...	7.2	215	--	0.29	258	0.82	0.48	0.72	0.53	--	--
APR 09...	11	1050	1000	1.4	67	<0.10	0.04	0.14	0.09	--	--
JUN 28...	13	1220	1100	1.7	51	<0.10	0.09	0.24	0.05	20	3
JUL 16...	16	1280	1200	1.7	15	<0.10	0.05	0.46	0.17	--	--
AUG 15...	18	1210	1200	1.6	13	<0.10	0.08	0.54	0.26	20	9
AUG 26...	10	1310	1300	1.8	4.2	<0.10	0.04	0.68	0.34	--	--

## RED RIVER OF THE NORTH BASIN

05116500 DES LACS RIVER AT FOXHOLM, ND--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	BARIUM, DIS- SOLVED (UG/L AS BA) (01005)	BORON, DIS- SOLVED (UG/L AS B) (01020)	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)
DEC 09...	--	140	--	--	--	--	--	--	--	--	--
JAN 14...	78	90	<1	<10	7	1	140	6	78	940	0.1
FEB 27...	--	20	--	--	--	--	--	--	--	--	--
APR 09...	--	90	--	--	--	--	--	--	--	--	--
JUN 28...	69	90	<1	<10	1	2	12	<1	67	150	<0.1
JUL 16...	--	150	--	--	--	--	--	--	--	--	--
AUG 15...	66	150	<1	<10	<1	1	9	<5	80	110	<0.1
AUG 26...	--	170	--	--	--	--	--	--	--	--	--
DATE	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	NICKEL, TOTAL RECOV- ERABLE (UG/L AS NI) (01067)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG) (01077)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)	VANA- DIUM, DIS- SOLVED (UG/L AS V) (01085)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN) (01092)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	CYANIDE TOTAL (MG/L AS CN) (00720)	
JAN 14...	3	4	4	1	<1	620	<1	40	19	<0.01	
APR 28...	1	<1	3	1	<1	490	1	50	9	<0.01	
JUL 15...	2	11	4	1	<1	520	4	30	<3	<0.01	

## 05117500 SOURIS (MOUSE) RIVER ABOVE MINOT, ND

LOCATION.--Lat 48°14'45", long 101°22'15", in NW1/4NW1/4SE1/4 sec.17, T.155 N., R.83 W., Ward County, Hydrologic Unit 09010001, on right bank 180 ft downstream from county highway bridge, 3.5 mi west of Minot, 7 mi downstream from Des Lacs River, and at mile 388.5.

DRAINAGE AREA.--10,600 mi<sup>2</sup>, approximately, of which about 6,700 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--May 1903 to current year. Monthly discharge only for some periods, published in WSP 1308. Published as Mouse River at Minot, 1903-24, Souris River at Minot, 1927-28, 1929-34, and Souris River near Minot, 1928-29.

REVISED RECORDS.--WSP 1308: 1905, 1909-14, 1918, 1924-25, 1927. WSP 1338: 1903-4, 1906, 1917, 1928, 1929(M). WSP 2113: Drainage area.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 1,545.75 ft above National Geodetic Vertical Datum of 1929. May 5, 1903, to Sept. 30, 1928; Oct. 1, 1929, to Sept. 30, 1934; nonrecording gages at mile 377.6 in Minot, at datum 12.5 ft lower, Oct. 1, 1928, to Sept. 30, 1929, nonrecording gages at Saugstad bridge at mile 366.8, 5 mi southeast of Minot and at datum 19.2 ft lower than present datum. Records equivalent except those for periods of extreme low flow, as some industrial and sanitary waste enters river between the sites.

REMARKS.--Estimated daily discharges: Nov. 5 to Mar. 7, Mar. 16-19. Records good except those for periods of estimated discharges, which are fair. Flow almost completely regulated by Lake Darling (station 05115500), 41 mi upstream and several smaller reservoirs; combined capacity, about 248,000 acre-ft. Some small diversions for irrigation and municipal supply.

AVERAGE DISCHARGE.--83 years, 166 ft<sup>3</sup>/s, 120,300 acre-ft/yr; median of yearly mean discharges, 89 ft<sup>3</sup>/s, 64,500 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 12,000 ft<sup>3</sup>/s, Apr. 20, 1904, gage height, 21.9 ft at site in Minot, from rating curve extended above 8,100 ft<sup>3</sup>/s; no flow at times in some years. Maximum stage at present site, about 23 ft in April 1904.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage in Minot at least 3 ft higher than 1904 peak, in 1881, according to Apr. 20, 1904 issue of Minot Daily Optic. This peak probably occurred in 1882.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 480 ft<sup>3</sup>/s, Feb. 28, gage height, 8.58 ft, backwater from ice; minimum discharge, 3.7 ft<sup>3</sup>/s, June 13, 14.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	37	88	54	44	50	410	116	35	10	55	25	53
2	37	41	56	45	47	300	108	28	8.9	39	24	53
3	38	19	58	46	44	290	118	25	8.0	25	24	51
4	38	12	60	47	41	330	113	73	7.3	20	23	48
5	38	10	62	50	36	320	110	75	6.0	25	22	44
6	34	10	64	52	26	210	102	100	4.8	29	23	29
7	36	16	64	53	21	150	61	94	5.0	29	24	20
8	45	31	62	52	19	77	43	116	4.5	27	30	20
9	44	33	58	50	18	77	65	126	5.2	27	141	19
10	39	33	58	47	17	68	70	101	4.9	28	185	20
11	37	33	57	45	16	64	57	94	4.4	29	195	21
12	37	33	54	44	19	59	44	105	3.8	46	195	20
13	38	32	52	42	22	61	34	81	3.7	48	184	21
14	39	25	50	39	23	72	32	64	3.7	46	181	24
15	40	21	52	38	22	85	31	65	4.4	36	177	18
16	43	22	54	36	20	140	30	73	47	34	178	17
17	43	38	58	34	18	210	35	67	69	40	178	15
18	42	45	60	31	16	150	64	59	68	39	179	9.4
19	41	47	54	29	15	107	75	59	63	32	179	7.5
20	40	55	52	28	14	75	62	81	60	30	180	5.4
21	40	61	52	27	13	63	59	112	68	28	182	4.8
22	39	64	48	26	13	73	51	85	66	28	184	24
23	38	64	48	29	12	75	44	55	65	27	185	30
24	38	62	46	32	12	84	36	36	63	25	186	31
25	37	60	45	34	13	95	32	27	67	25	187	35
26	44	58	44	36	90	79	31	21	67	24	170	22
27	89	56	43	45	300	67	28	17	66	24	93	22
28	100	54	43	45	410	62	25	16	51	26	44	59
29	101	52	43	47	---	118	24	15	26	24	31	60
30	100	52	43	49	---	122	32	14	36	24	43	54
31	99	---	43	50	---	123	---	12	---	24	51	---
TOTAL	1511	1227	1637	1272	1367	4216	1732	1931	966.6	963	3703	857.1
MEAN	48.7	40.9	52.8	41.0	48.8	136	57.7	62.3	32.2	31.1	119	28.6
MAX	101	88	64	53	410	410	118	126	69	55	195	60
MIN	34	10	43	26	12	59	24	12	3.7	20	22	4.8
AC-FT	3000	2430	3250	2520	2710	8360	3440	3830	1920	1910	7340	1700
CAL YR 1985	TOTAL	20873.5		MEAN	57.2	MAX	367	MIN	1.5	AC-FT	41400	
WTR YR 1986	TOTAL	21382.7		MEAN	58.6	MAX	410	MIN	3.7	AC-FT	42410	

## RED RIVER OF THE NORTH BASIN

05117500 SOURIS RIVER ABOVE MINOT, ND--CONTINUED

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1969 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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											
10...	1425	38	980	--	5.5	3.0	--	--	--	--	--
DEC											
10...	1255	58	763	--	-11.5	0.0	--	--	--	--	--
JAN											
10...	1220	47	945	--	4.0	0.0	--	--	--	--	--
MAR											
07...	1005	148	380	--	-6.5	0.0	--	--	--	--	--
APR											
07...	1550	50	720	8.00	13.5	9.5	210	6	45	24	75
28...	1350	25	1350	--	11.0	8.0	--	--	--	--	--
JUN											
06...	1250	4.6	1650	--	21.5	20.5	--	--	--	--	--
JUL											
18...	1125	40	980	--	21.5	24.0	--	--	--	--	--
AUG											
*26...	0945	181	805	7.99	10.5	18.5	240	240	47	29	85
26...	0946	181	805	7.99	10.5	18.5	220	220	44	27	79
DATE	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINIT LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
APR											
07...	42	2	11	210	150	16	0.2	8.4	482	450	0.66
AUG											
*26...	42	2	13	236	160	22	0.2	5.9	531	500	0.72
26...	42	2	14	235	160	23	0.2	5.8	484	500	0.66
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											
07...	2	190	40	<1	30	130	0.2	3	<1	260	
AUG											
*26...	6	350	10	<1	36	60	<1.0	7	1	320	
26...	6	280	10	<5	38	46	--	5	<1	290	

\*Split sample - analysis by North Dakota State Water Commission Laboratory.



## 05120000 SOURIS (MOUSE) RIVER NEAR VERENDRYE, ND

LOCATION.--Lat 48°09'35", long 100°43'45", in NW1/4SW1/4 sec.17, T.154 N., R.78 W., McHenry County, Hydrologic Unit 09010003, on left bank 2.7 mi north of Verendrye, 19 mi upstream from mouth of Wintering River and at mile 302.0.

DRAINAGE AREA.--11,300 mi<sup>2</sup>, approximately, of which about 6,900 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--February to June 1933 (gage heights only), April 1937 to current year. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WSP 2113: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,464.87 ft above National Geodetic Vertical Datum of 1929.

February to June 1933, at site 4 mi upstream at datum 1.65 ft higher. April 1, 1937, to Mar. 3, 1938, non-recording gage at present site, at datum 1.97 ft higher.

REMARKS.--Estimated daily discharges: Nov. 20 to Mar. 16, Apr. 15. Records good except those for periods of estimated daily discharges, which are poor. Flow regulated by reservoirs on Souris and Des Lacs Rivers, the largest of which is Lake Darling (station 05115500), 128 mi upstream, combined capacity about 248,000 acre-ft. Some small diversions for irrigation and municipal supply.

AVERAGE DISCHARGE.--49 years, 212 ft<sup>3</sup>/s, 153,600 acre-ft/yr; median of yearly mean discharges, 110 ft<sup>3</sup>/s, 86,900 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9,900 ft<sup>3</sup>/s, Apr. 19, 1976, gage height, 17.84 ft; minimum daily flows of 0.3 ft<sup>3</sup>/s or less occurred in Aug., Sept. 1937, Oct. 1939 and Feb. 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 900 ft<sup>3</sup>/s, Mar. 5, gage height, 12.12 ft, backwater from ice; minimum daily discharge, 14.0 ft<sup>3</sup>/s, Feb. 21, 22.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	53	119	56	64	48	760	146	91	38	45	37	68
2	51	120	55	64	50	800	163	90	31	42	35	51
3	52	112	55	62	49	820	171	102	26	40	35	44
4	55	102	55	62	46	880	177	95	23	41	35	41
5	55	79	55	60	43	890	207	89	23	42	34	42
6	57	53	55	60	40	850	202	87	25	37	33	43
7	58	37	55	60	40	730	181	92	21	33	32	44
8	58	26	52	60	40	590	169	140	20	27	30	44
9	60	19	52	55	37	525	159	167	19	23	29	41
10	66	19	50	54	31	387	138	173	19	26	29	40
11	70	16	50	55	26	243	114	197	19	27	32	38
12	70	15	50	56	22	200	100	219	18	29	30	36
13	72	17	50	57	21	170	102	197	17	30	100	33
14	78	23	50	58	20	150	95	176	17	34	162	30
15	83	27	50	60	20	140	90	165	17	45	182	28
16	82	28	52	61	19	300	111	152	18	69	189	27
17	75	28	54	62	18	342	99	134	18	76	185	27
18	70	26	56	60	17	298	111	127	26	87	176	26
19	67	24	58	56	16	283	170	147	35	93	172	26
20	67	25	60	50	15	348	332	131	34	105	171	26
21	67	30	60	40	14	381	388	120	36	100	170	27
22	65	40	60	35	14	348	295	104	51	70	172	26
23	63	50	60	36	20	263	202	101	61	52	172	24
24	59	60	58	40	24	176	157	124	61	43	174	22
25	59	65	50	40	23	170	134	125	68	37	176	21
26	59	65	52	42	37	155	118	108	68	33	178	19
27	57	63	54	47	120	140	106	92	64	31	180	27
28	56	61	56	48	540	139	99	77	63	34	180	40
29	55	59	58	48	---	141	92	61	53	33	172	61
30	77	57	60	48	---	133	95	51	46	31	137	60
31	112	---	62	48	---	126	---	44	---	34	93	---
TOTAL	2028	1465	1700	1648	1410	11878	4723	3778	1035	1449	3532	1082
MEAN	65.4	48.8	54.8	53.2	50.4	383	157	122	34.5	46.7	114	36.1
MAX	112	120	62	64	540	890	388	219	68	105	189	68
MIN	51	15	50	35	14	126	90	44	17	23	29	19
AC-FT	4020	2910	3370	3270	2800	23560	9370	7490	2050	2870	7010	2150
CAL YR 1985	TOTAL	33280.5		MEAN	91.2	MAX	590	MIN	2.0	AC-FT	66010	
WTR YR 1986	TOTAL	35728		MEAN	97.9	MAX	890	MIN	14	AC-FT	70870	

## RED RIVER OF THE NORTH BASIN

05120000 SOURIS RIVER NEAR VERENDRYE, ND--CONTINUED

## WATER-QUALITY RECORD

PERIOD OF RECORD.--Water years 1950-51, 1957 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	COLOR (PLAT- INUM- COBALT UNITS) (00080)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED SATUR- ATION (MG/L) (00301)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	
DATE	TIME												
OCT													
15...	1730	85	1350	8.40	3.0	5.0	20	10.2	79	330	5	64	
DEC													
06...	1345	55	1130	7.50	1.0	0.0	15	5.2	35	360	20	74	
JAN													
13...	1200	57	1070	7.47	3.0	0.0	15	5.8	40	350	35	74	
FEB													
24...	1315	24	1120	7.38	7.5	0.0	20	3.6	24	360	0	80	
MAR													
24...	1645	164	640	7.80	10.5	1.5	70	11.0	78	190	29	42	
MAY													
05...	1415	87	1400	8.26	10.5	15.5	40	7.8	81	430	84	86	
JUN													
02...	1630	30	1600	8.23	31.0	22.5	45	9.8	114	490	82	100	
JUL													
21...	1615	95	1060	8.10	25.5	24.0	15	7.0	82	300	7	59	
AUG													
25...	1830	178	840	8.10	20.5	20.0	10	7.2	78	230	0	46	
DATE		MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	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)
OCT													
15...	42	180	53	4	11	328	2.5	310	60	0.4	3.4	901	
DEC													
06...	42	120	41	3	13	338	21	250	32	0.3	11	760	
JAN													
13...	41	120	41	3	14	319	21	230	25	0.3	19	711	
FEB													
24...	40	120	41	3	12	--	0	250	29	0.2	20	758	
MAR													
24...	21	55	37	2	11	162	5.0	150	11	0.2	11	423	
MAY													
05...	51	160	44	3	11	341	3.6	420	25	0.1	5.7	997	
JUN													
02...	58	180	44	4	14	407	4.6	480	31	0.2	13	1160	
JUL													
21...	37	130	48	3	9.8	293	4.5	260	25	0.2	11	721	
AUG													
25...	29	86	42	3	15	244	3.7	170	23	0.2	5.2	484	
DATE		SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)	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)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BARIUM, DIS- SOLVED (UG/L AS BA) (01005)	
OCT													
15...		870	1.2	206	<0.10	--	--	0.50	--	--	--	--	
DEC													
06...		750	1.0	112	0.20	0.28	0.17	--	0.10	--	--	--	
JAN													
13...		720	0.97	110	0.55	0.23	0.16	--	0.10	<10	3	83	
FEB													
24...		--	1.0	50	0.58	0.15	0.13	--	0.06	--	--	--	
MAR													
24...		400	0.58	187	0.23	0.13	0.26	--	0.11	--	--	--	
MAY													
05...		960	1.4	234	<0.10	0.06	0.28	--	0.15	30	3	77	
JUN													
02...		1100	1.6	93	<0.10	0.06	0.64	--	0.41	--	--	--	
JUL													
21...		710	0.98	185	0.18	0.09	0.62	--	0.43	<10	8	64	
AUG													
25...		520	0.66	233	<0.10	0.09	0.62	--	0.20	--	--	--	



## RED RIVER OF THE NORTH BASIN

05120500 WINTERING RIVER NEAR KARLSRUHE, ND

LOCATION.--Lat 48°10'14", long 100°32'20", on line between secs.10 and 11, T.154 N., R.77 W., McHenry County, Hydrologic Unit 09010003, on left bank 30 ft upstream from county highway bridge, 4 mi upstream from mouth, and 7 mi northeast of Karlsruhe.

DRAINAGE AREA.--705 mi<sup>2</sup>, of which about 420 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--March 1937 to current year. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WSP 1728: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 1,480 ft, from river-profile map.

REMARKS.--Estimated daily discharges: Oct. 1 to Mar. 26 and June 30 to Sept. 30. Records good except those for periods of estimated daily discharges, which are fair. Some regulation by Fish and Wildlife Service dams on Cottonwood and Wintering Lakes; controlled capacity, about 850 acre-ft.

AVERAGE DISCHARGE.--49 years, 13.2 ft<sup>3</sup>/s, 9,560 acre-ft/yr; median of yearly mean discharges, 12 ft<sup>3</sup>/s, 8,700 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,000 ft<sup>3</sup>/s, Apr. 7, 1949, by velocity-area studies; maximum gage height, 12.0 ft, Apr. 7, 1949, channel choked by packed snow; no flow at times in many years.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 125 ft<sup>3</sup>/s, Mar. 9, gage height, 7.36 ft, backwater from ice; minimum daily, 0.66 ft<sup>3</sup>/s, Aug. 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.5	12	3.4	3.1	2.6	8.0	27	75	13	4.8	3.8	2.3
2	3.0	12	3.4	3.0	2.6	30	28	62	13	5.2	3.3	2.2
3	3.5	12	3.4	3.0	2.6	80	35	58	12	5.0	2.8	2.6
4	4.5	12	3.4	3.0	2.5	60	33	52	13	4.3	2.6	2.7
5	5.0	12	3.4	3.0	2.5	50	31	48	12	6.0	1.7	3.5
6	5.0	12	3.4	3.0	2.5	50	30	47	11	6.0	1.4	3.5
7	5.0	12	3.3	3.0	2.5	55	27	45	10	5.4	1.7	3.1
8	4.0	11	3.3	3.0	2.5	50	25	40	9.8	5.4	1.3	3.0
9	3.0	10	3.3	3.0	2.4	110	23	45	9.8	4.8	1.5	3.2
10	2.5	9.0	3.2	3.0	2.3	105	21	44	9.9	6.0	1.4	3.2
11	3.0	8.0	3.2	3.0	2.2	100	21	41	9.8	5.4	1.4	3.6
12	3.5	7.0	3.2	3.0	2.2	91	20	37	8.7	6.0	1.2	4.0
13	4.5	6.0	3.1	3.0	2.2	90	19	34	8.3	6.6	1.7	4.5
14	6.0	6.0	3.1	3.0	2.3	89	16	30	7.6	7.1	3.2	4.6
15	7.3	6.0	3.1	3.0	2.3	88	14	28	9.1	6.6	3.8	4.4
16	5.0	6.5	3.0	3.0	2.3	85	19	27	9.3	7.5	4.8	4.2
17	4.2	7.0	2.9	3.0	2.2	80	30	25	8.0	7.7	4.1	4.7
18	3.8	7.0	2.8	3.0	2.1	78	46	23	7.7	7.5	3.0	5.0
19	5.3	6.5	2.6	3.0	2.0	77	48	23	7.1	6.7	2.5	5.1
20	6.9	6.0	2.6	3.0	2.0	75	50	23	6.8	6.9	1.8	4.9
21	8.4	5.5	2.6	3.0	2.0	73	47	22	6.5	6.6	1.6	5.1
22	10	5.0	2.7	2.9	2.0	68	40	21	6.8	6.0	1.3	5.6
23	13	5.0	2.7	2.9	2.2	59	38	20	6.8	6.2	1.1	5.7
24	14	5.0	2.8	2.9	2.4	48	37	19	6.4	6.5	2.2	6.1
25	14	4.5	3.0	2.8	4.0	47	66	19	6.4	5.6	.81	6.1
26	13	4.0	2.9	2.8	10	45	115	18	5.9	4.8	.66	7.1
27	14	3.5	2.9	2.8	15	42	114	16	5.3	4.7	.72	6.0
28	13	3.5	3.2	2.7	8.0	37	106	15	4.9	5.2	.91	5.8
29	12	3.5	3.4	2.7	---	40	92	15	4.8	5.3	1.2	6.8
30	12	3.5	3.3	2.7	---	35	85	15	4.8	5.4	1.3	6.9
31	12	---	3.2	2.6	---	31	---	14	---	4.4	2.0	---
TOTAL	222.9	223.0	95.8	90.9	92.4	1976.0	1303	1001	254.5	181.6	62.80	135.5
MEAN	7.19	7.43	3.09	2.93	3.30	63.7	43.4	32.3	8.48	5.86	2.03	4.52
MAX	14	12	3.4	3.1	15	110	115	75	13	7.7	4.8	7.1
MIN	2.5	3.5	2.6	2.6	2.0	8.0	14	14	4.8	4.3	.66	2.2
AC-FT	442	442	190	180	183	3920	2580	1990	505	360	125	269
CAL YR 1985	TOTAL	3354.24		MEAN	9.19	MAX	60	MIN	.05	AC-FT	6650	
WTR YR 1986	TOTAL	5639.40		MEAN	15.5	MAX	115	MIN	.66	AC-FT	11190	



## RED RIVER OF THE NORTH BASIN

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05120500 WINTERING RIVER NEAR KARLSRUHE, ND--CONTINUED

## WATER-QUALITY RECORD

PERIOD OF RECORD.--Water years 1954-56, 1972 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	COLOR (PLAT- INUM- COBALT UNITS) (00080)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	
OCT 15...	1320	7.5	655	--	4.0	5.0	--	--	--	--	--	
DEC 02...	1545	3.4	915	7.30	-21.0	0.0	30	4.6	31	330	0	
JAN 06...	1745	3.1	715	7.30	-23.0	0.0	10	5.0	33	300	0	
FEB 24...	1715	2.6	635	7.64	-6.5	0.0	20	8.5	58	290	0	
MAR 25...	1000	47	660	7.83	7.5	5.0	70	9.6	75	140	0	
MAY 05...	1745	48	1480	8.19	11.5	14.0	70	6.9	69	270	0	
JUN 02...	2000	12	1650	8.24	29.5	23.0	150	7.9	92	--	--	
JUL 14...	1630	6.8	960	8.03	26.0	24.0	30	7.9	93	270	0	
AUG 29...	0920	0.97	750	7.84	17.5	16.5	30	6.5	66	260	0	
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)	PERCENT SODIUM (00932)	SODIUM- AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	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)
DEC 02...	77	33	87	36	2	5.5	398		39	100	16	0.2
JAN 06...	74	28	50	26	1	4.1	--		0	58	9.4	0.2
FEB 24...	72	26	37	22	1	3.3	--		0	55	7.6	0.2
MAR 25...	29	16	87	56	3	10	224		6.4	120	12	0.2
MAY 05...	44	38	240	65	7	9.3	472		5.9	310	22	0.1
JUL 14...	56	31	120	49	3	4.9	407		7.3	130	12	0.2
AUG 29...	57	29	67	35	2	4.5	326		9.1	65	9.4	0.2
DATE		SILICA, DIS- SOLVED (MG/L AS SiO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)	PHOS- PHORUS, TOTAL (MG/L AS P) (00665)	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)
DEC 02...	25	580	580	0.79	5.3	0.24	0.19	0.04	0.02	--	--	--
JAN 06...	24	437	--	0.59	3.6	0.13	0.25	0.22	0.01	<10	<1	--
FEB 24...	25	398	--	0.54	2.8	0.22	0.25	0.03	0.01	--	--	--
MAR 25...	13	436	420	0.59	55	<0.10	0.05	0.11	0.03	--	--	--
MAY 05...	8.7	1020	960	1.4	132	<0.10	0.05	0.12	0.06	20	3	--
JUN 02...	--	--	--	--	--	<0.10	0.07	0.38	0.26	--	--	--
JUL 14...	17	622	620	0.85	11	<0.10	0.07	0.21	0.14	10	5	--
AUG 29...	13	432	440	0.59	1.1	<0.10	0.10	0.12	0.04	--	--	--

## RED RIVER OF THE NORTH BASIN

05120500 WINTERING RIVER NEAR KARLSRUHE, ND--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	BARIUM, DIS- SOLVED (UG/L AS BA) (01005)	BORON, DIS- SOLVED (UG/L AS B) (01020)	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)
DEC 02...	--	160	--	--	--	--	--	--	--	--	--
JAN 06...	200	110	<1	<10	<1	<1	43	<1	28	480	<0.1
FEB 24...	--	100	--	--	--	--	--	--	--	--	--
MAR 25...	--	170	--	--	--	--	--	--	--	--	--
MAY 05...	94	350	<1	<10	<1	1	200	1	73	43	<0.1
JUN 02...	--	460	--	--	--	--	--	--	--	--	--
JUL 14...	150	220	<1	<10	<1	1	78	<5	42	56	<0.1
AUG 29...	--	150	--	--	--	--	--	--	--	--	--
DATE	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	NICKEL, TOTAL RECOV- ERABLE (UG/L AS NI) (01067)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG) (01077)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)	VANA- DIUM, DIS- SOLVED (UG/L AS V) (01085)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN) (01092)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	CYANIDE TOTAL (MG/L AS CN) (00720)	
JAN 06...	1	1	<1	<1	<1	190	<1	60	27	<0.01	
MAY 05...	18	13	3	<1	<1	230	5	70	4	<0.01	
JUL 14...	<1	48	2	<1	<1	190	4	<10	6	<0.01	

## RED RIVER OF THE NORTH BASIN

179

05122000 SOURIS (MOUSE) RIVER NEAR BANTRY, ND

LOCATION.--Lat 48°30'20", long 100°26'04", in SE1/4NW1/4SE1/4 sec.14, T.158 N., R.76 W., McHenry County, Hydrologic Unit 09010003, on left bank 200 ft upstream from Nelson bridge, 8 mi east of Bantry, 18 mi upstream from Willow Creek, and at mile 228.0.

DRAINAGE AREA.--12,300 mi<sup>2</sup> approximately, of which about 7,600 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--March 1937 to current year. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WSP 2113: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,427.56 ft above National Geodetic Vertical Datum of 1929. Prior to Mar. 16, 1938, nonrecording gage at same site at datum 0.17 ft lower.

REMARKS.--Estimated daily discharges: Nov. 3, 4 and Nov. 6-29. Records good except those for periods of estimated daily discharges, which are fair. Flow regulated by reservoirs on Souris, Des Lacs, and Wintering Rivers, total capacity, about 249,000 acre-ft. Diversions for irrigation of about 7,600 acres at Eaton Dam about 42 mi above station and other small diversions for irrigation and municipal supply.

AVERAGE DISCHARGE.--49 years, 230 ft<sup>3</sup>/s, 166,600 acre-ft/yr; median of yearly mean discharges, 130 ft<sup>3</sup>/s, 94,200 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9,330 ft<sup>3</sup>/s, Apr. 23, 1976, gage height, 14.59 ft; no flow at times each year 1937-40, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 700 ft<sup>3</sup>/s, Mar. 9, gage height, 9.75 ft, backwater from ice; minimum daily discharge, 22 ft<sup>3</sup>/s, Aug. 12, 13.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	57	68	48	50	52	39	186	515	111	59	61	180
2	54	66	48	50	52	43	175	543	100	63	53	177
3	53	60	50	50	52	50	178	558	95	65	46	169
4	53	70	52	50	52	180	177	565	94	65	41	159
5	54	85	52	50	52	400	179	543	85	66	36	142
6	56	100	52	50	52	500	183	497	78	62	33	124
7	61	105	51	50	55	600	186	422	71	58	32	110
8	67	100	51	51	57	650	180	397	63	54	33	97
9	69	100	51	53	58	680	176	381	59	50	30	81
10	73	95	51	53	60	600	173	375	53	51	25	69
11	75	90	51	53	60	500	166	377	48	51	23	61
12	76	85	51	54	60	450	156	376	45	57	22	55
13	78	75	50	56	60	400	136	381	41	59	22	51
14	82	60	49	57	58	390	147	393	39	67	25	48
15	88	55	50	58	56	380	145	406	37	61	24	46
16	95	50	49	59	52	380	149	409	35	67	24	43
17	102	45	48	60	48	375	164	407	33	69	25	42
18	105	40	47	60	40	360	202	390	33	69	44	40
19	106	40	46	61	37	350	240	365	30	70	84	37
20	106	38	45	62	34	340	255	334	28	73	121	35
21	102	38	45	61	33	320	274	297	29	82	144	33
22	97	40	46	60	31	290	314	262	29	94	158	31
23	94	42	48	64	31	285	346	235	28	105	162	30
24	90	46	48	66	31	280	353	212	28	115	166	28
25	86	50	49	68	31	275	347	192	30	119	169	29
26	83	52	49	68	32	270	340	171	33	120	169	30
27	80	54	50	62	34	265	341	154	37	116	169	30
28	79	52	50	60	35	260	364	142	42	111	171	31
29	75	50	50	58	---	220	408	135	47	99	182	34
30	72	50	50	55	---	215	470	127	53	91	181	35
31	71	---	50	52	---	205	---	123	---	74	181	---
TOTAL	2439	1901	1527	1761	1305	10552	7110	10684	1534	2362	2656	2077
MEAN	78.7	63.4	49.3	56.8	46.6	340	237	345	51.1	76.2	85.7	69.2
MAX	106	105	52	68	60	680	470	565	111	120	182	180
MIN	53	38	45	50	31	39	136	123	28	50	22	28
AC-FT	4840	3770	3030	3490	2590	20930	14100	21190	3040	4690	5270	4120
CAL YR 1985	TOTAL	36867.6		MEAN	101	MAX	516	MIN	5.0	AC-FT	73130	
WTR YR 1986	TOTAL	45908		MEAN	126	MAX	680	MIN	22	AC-FT	91060	

## RED RIVER OF THE NORTH BASIN

05122000 SOURIS (MOUSE) RIVER NEAR BANTRY, ND--CONTINUED

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1971 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	OXYGEN, DIS- SOLVED (MG/L) (00300)	HARD- NESS (MG/L AS CACO3) (00900)	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 18...	1240	105	1040	--	11.5	5.5	--	--	--	--	--
DEC 05...	1720	52	1220	7.70	-14.0	0.0	--	--	--	--	--
JAN 07...	1200	50	1040	7.50	-14.0	0.0	2.1	--	--	--	--
FEB 25...	1235	31	1050	7.40	7.0	0.0	1.2	--	--	--	--
MAR 23...	1020	264	425	--	--	0.5	--	--	--	--	--
MAR 29...	1245	220	550	7.90	21.0	4.0	10.8	170	38	18	49
MAY 06...	1330	499	965	8.10	5.5	10.5	7.5	--	--	--	--
JUN 03...	1320	99	1430	8.30	18.5	22.5	--	--	--	--	--
JUL 17...	1745	69	1060	8.42	26.5	25.5	8.9	320	63	39	120
AUG 27...	1805	169	905	8.40	16.0	19.5	7.7	--	--	--	--
DATE	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR 29...	37	2	11	170	110	14	0.1	12	374	360	0.51
JUL 17...	44	3	11	290	230	37	0.3	19	698	700	0.95
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)	
MAR 29...	1	90	150	<1	21	70	0.4	2	<1	240	
JUL 17...	11	210	10	<1	47	30	0.1	2	<1	340	



05122000 SOURIS RIVER NEAR BANTRY, ND--CONTINUED

## WATER-QUALITY RECORDS

INSTANTANEOUS SUSPENDED SEDIMENT AND PARTICLE SIZE, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	TEMPER- ATURE (DEG C) (00010)	DIS- CHARGE, IN CUBIC FEET PER SECOND (00060)	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	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)
DEC							
05...	1720	0.0	--	52	44	6.1	--
JAN							
07...	1200	0.0	--	50	26	3.5	--
FEB							
25...	1235	0.0	--	31	9	0.74	--
MAR							
15...	1130	2.0	389	--	20	21	--
16...	1130	1.0	386	--	22	23	--
17...	1130	1.0	374	--	14	14	--
18...	1115	1.5	359	--	18	17	--
19...	1110	1.0	337	--	18	16	--
20...	1330	1.0	309	--	17	14	--
21...	1500	3.0	287	--	13	10	--
22...	1100	2.0	277	--	13	10	--
23...	1020	0.5	--	264	13	9.0	--
24...	1050	2.0	256	--	17	12	--
25...	1130	2.0	254	--	18	12	--
26...	1100	1.0	251	--	19	13	--
27...	1040	2.0	240	--	24	15	--
28...	1037	4.0	230	--	31	19	--
29...	1030	4.0	220	--	38	22	--
29...	1245	4.0	--	220	35	21	93
30...	1035	4.0	215	--	44	25	--
31...	1050	7.5	204	--	35	19	--
APR							
01...	1105	8.0	185	--	46	23	--
02...	1050	8.0	174	--	52	24	--
03...	1045	7.0	176	--	45	21	--
04...	1115	8.0	175	--	40	19	--
05...	1100	8.0	176	--	35	16	--
06...	1045	8.5	180	--	27	13	--
07...	1130	9.5	183	--	27	13	--
08...	1055	9.5	176	--	21	9.9	--
09...	1045	10.0	172	--	32	15	--
10...	1100	11.5	168	--	25	11	--
11...	1100	12.0	161	--	28	12	--
12...	1104	7.0	151	--	19	7.9	--
13...	1415	6.5	131	--	21	7.4	--
15...	1120	3.0	139	--	44	17	--
16...	1125	4.5	142	--	24	9.1	--
17...	1030	5.5	157	--	19	8.0	--
18...	1035	6.0	194	--	18	9.5	--
19...	1030	6.0	232	--	28	18	--
20...	1015	6.5	248	--	39	26	--
21...	1030	7.0	267	--	42	30	--
22...	1020	8.0	307	--	30	25	--
23...	1045	10.5	340	--	37	34	--
24...	1005	10.5	346	--	31	29	--
25...	1021	10.5	341	--	21	20	--
26...	1010	10.0	335	--	20	18	--
27...	1050	9.0	335	--	17	15	--
28...	1040	8.0	359	--	20	19	--
29...	1000	9.0	403	--	21	23	--
30...	1035	10.0	464	--	27	33	--
MAY							
06...	1330	10.5	--	499	59	79	92
JUN							
03...	1320	22.5	--	99	122	33	98
JUL							
17...	1745	25.5	--	69	21	3.9	100
AUG							
27...	1805	19.5	--	169	23	10	100

## RED RIVER OF THE NORTH BASIN

05123000 LAKE METIGOSHE NEAR BOTTINEAU, ND

LOCATION.--Lat 48°59'05", long 100°20'52", in SE1/4SW1/4 sec.35, T.164 N., R.75 W., Bottineau County, Hydrologic Unit 09010004, 25 ft east from northeast corner of bridge over Lake Metigoshe, and 11.7 mi northeast of Bottineau.

DRAINAGE AREA.--59 mi<sup>2</sup>.

## GAGE-HEIGHT RECORDS

PERIOD OF RECORD.--June 1931 to September 1932, September 1953 to September 1986 (discontinued).

GAGE.--Water-stage recorder. Datum of gage is 2,130.00 ft above National Geodetic Vertical Datum of 1929. 1931-32, nonrecording gage on north abutment of bridge at datum 6.32 ft lower (reduced to elevations NGVD). Sept. 4, 1953, to Jan. 19, 1955, nonrecording gage at present datum on east end of south abutment of bridge.

REMARKS.--Outlet of lake is a concrete dam with removable stoplogs; average crest elevation without stoplogs about 2,138.00 ft National Geodetic Vertical Datum of 1929. Lake level regulated since 1959 by dam and control works in the outlet of Sharpe Lake located on the principal tributary in Manitoba.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 9.70 ft, May 3, 1975; minimum, 4.28 ft, Sept. 17, 1932, present datum.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 8.94 ft, May 13; minimum, 7.89 ft, Oct. 5.

## MONTHEND GAGE HEIGHT, IN FEET, AT 2400, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

Oct. 31-----	7.92	Jan. 31-----	8.05	Apr. 30-----	8.75	July 31-----	8.47
Nov. 30-----	7.98	Feb. 28-----	8.08	May 31-----	8.73	Aug. 31-----	8.12
Dec. 31-----	8.03	Mar. 31-----	8.33	June 30-----	8.51	Sept. 30-----	8.05

## RED RIVER OF THE NORTH BASIN

183

05123400 WILLOW CREEK NEAR WILLOW CITY, ND

LOCATION.--Lat 48°35'20", long 100°26'30", in NE1/4NW1/4 sec.23, T.159 N., R.76 W., McHenry County, Hydrologic Unit 09010004, on left bank 50 ft downstream from bridge on county road, 1.5 mi upstream from Snake Creek, and 7 mi west of Willow City.

DRAINAGE AREA.--1,160 mi<sup>2</sup>, approximately, of which about 430 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

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

GAGE.--Water-stage recorder. Altitude of gage is 1,430 ft, from topographic map. Prior to Oct. 5, 1956, non-recording gage at site 50 ft upstream at same datum.

REMARKS.--Estimated daily discharges: Mar. 10-30 and Apr. 14-16. Records poor.

AVERAGE DISCHARGE.--30 years, 43.5 ft<sup>3</sup>/s, 31,520 acre-ft/yr; median of yearly mean discharges, 21 ft<sup>3</sup>/s, 15,200 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,900 ft<sup>3</sup>/s, Apr. 12, 1969, gage height, 16.76 ft; no flow at times each year.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 50 ft<sup>3</sup>/s and maximum (\*):

Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)	Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)
Mar. 23	1100	*192	*9.04	Apr. 25	1800	109	7.94

No flow for many days.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.00	.00	85	99	30	.00	2.8	.00
2	.00	.00	.00	.00	.00	.00	84	97	27	.00	1.8	.00
3	.00	.00	.00	.00	.00	.00	84	93	26	.00	1.0	.00
4	.00	.00	.00	.00	.00	.00	84	92	22	.00	.40	.00
5	.00	.00	.00	.00	.00	.00	83	88	19	.00	.20	.00
6	.00	.00	.00	.00	.00	.00	82	83	18	.00	.10	.00
7	.00	.00	.00	.00	.00	.00	78	94	17	.00	.10	.00
8	.00	.00	.00	.00	.00	.00	77	96	15	.00	.10	.00
9	.00	.00	.00	.00	.00	.00	75	98	12	.00	.20	.00
10	.00	.00	.00	.00	.00	.00	76	101	10	.00	.15	.00
11	.00	.00	.00	.00	.00	.00	76	104	7.0	.00	.10	.00
12	.00	.00	.00	.00	.00	.08	75	104	5.6	.00	.05	.00
13	.00	.00	.00	.00	.00	.20	72	99	3.6	.00	.00	.00
14	.00	.00	.00	.00	.00	.20	60	96	1.8	.00	.00	.00
15	.00	.00	.00	.00	.00	1.0	50	92	1.8	.00	.00	.00
16	.00	.00	.00	.00	.00	1.0	55	87	1.6	.00	.00	.00
17	.00	.00	.00	.00	.00	17	68	85	.60	.40	.00	.00
18	.00	.00	.00	.00	.00	38	75	83	.30	3.6	.00	.00
19	.00	.00	.00	.00	.00	62	90	79	.10	6.5	.00	.00
20	.00	.00	.00	.00	.00	120	99	68	.00	8.5	.00	.00
21	.00	.00	.00	.00	.00	125	102	63	.00	10	.00	.00
22	.00	.00	.00	.00	.00	135	96	59	.00	9.0	.00	.00
23	.00	.00	.00	.00	.00	150	96	57	.00	7.5	.00	.00
24	.00	.00	.00	.00	.00	120	102	57	.00	6.5	.00	.00
25	.00	.00	.00	.00	.00	104	109	56	.00	5.2	.00	.00
26	.00	.00	.00	.00	.00	98	106	52	.00	5.2	.00	.00
27	.00	.00	.00	.00	.00	94	97	49	.00	4.4	.00	.00
28	.00	.00	.00	.00	.00	90	99	44	.00	5.6	.00	.00
29	.00	.00	.00	.00	---	89	93	40	.00	4.8	.00	.00
30	.00	.00	.00	.00	---	87	97	36	.00	4.4	.00	.00
31	.00	---	.00	.00	---	79	---	33	---	4.4	.00	---
TOTAL	.00	.00	.00	.00	.00	1410.48	2525	2384	218.40	86.00	7.00	.00
MEAN	.00	.00	.00	.00	.00	45.5	84.2	76.9	7.28	2.77	.23	.00
MAX	.00	.00	.00	.00	.00	150	109	104	30	10	2.8	.00
MIN	.00	.00	.00	.00	.00	.00	50	33	.00	.00	.00	.00
AC-FT	.00	.00	.00	.00	.00	2800	5010	4730	433	171	14	.00
CAL YR 1985	TOTAL	4269.10		MEAN	11.7	MAX	250	MIN	.00	AC-FT	8470	
WTR YR 1986	TOTAL	6630.88		MEAN	18.2	MAX	150	MIN	.00	AC-FT	13150	

RED RIVER OF THE NORTH BASIN  
05123400 WILLOW CREEK NEAR WILLOW CITY, ND--CONTINUED

WATER-QUALITY RECORD

PERIOD OF RECORD.--Water years 1960-62, 1964-65, 1972 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	COLOR (PLAT- INUM- COBALT UNITS) (00080)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	
MAR 25...	1730	106	550	7.85	-1.5	3.5	70	10.0	75	150	12	
MAY 08...	1530	96	965	8.29	9.0	9.0	50	9.9	84	350	61	
JUN 03...	1050	26	930	8.05	25.0	21.0	50	5.7	64	390	48	
JUL 17...	1300	1.3	630	8.80	24.0	24.0	30	9.2	109	240	26	
DATE	TIME	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)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	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)
MAR 25...	30	18	55	42	2	12	137	3.7	130	18	0.1	
MAY 08...	61	47	74	31	2	12	285	2.8	230	18	0.1	
JUN 03...	66	54	64	26	1	12	339	5.8	160	25	0.2	
JUL 17...	30	41	45	28	1	9.1	218	0.6	120	15	0.2	
DATE		SILICA, DIS- SOLVED (MG/L AS SiO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)	PHOS- PHORUS, TOTAL (MG/L AS P) (00665)	PHOS- PHORUS, ORTHO, DIS- SOLVED (MG/L AS P) (00671)	ALUM- INUM, DIS- SOLVED (MG/L AS AL) (01106)	ARSENIC DIS- SOLVED (MG/L AS AS) (01000)
MAR 25...	17	378	360	0.51	108	<0.10	0.09	0.31	0.18	60	3	
MAY 08...	12	668	630	0.91	173	<0.10	0.06	0.09	0.05	--	--	
JUN 03...	11	636	600	0.86	44	<0.10	0.06	0.27	0.20	--	--	
JUL 17...	1.6	416	390	0.57	1.5	<0.10	0.06	0.13	0.08	10	5	
DATE		BARIUM, DIS- SOLVED (UG/L AS BA) (01005)	BORON, DIS- SOLVED (UG/L AS B) (01020)	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)
MAR 25...	43	100	<1	<10	1	2	130	<1	40	51	<0.1	
MAY 08...	--	130	--	--	--	--	--	--	--	--	--	
JUN 03...	--	140	--	--	--	--	--	--	--	--	--	
JUL 17...	38	90	<1	<10	1	<1	11	<5	59	16	<0.1	
DATE		MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	NICKEL, TOTAL RECOV- ERABLE (UG/L AS NI) (01067)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG) (01077)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)	VANA- DIUM, DIS- SOLVED (UG/L AS V) (01085)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN) (01092)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	CYANIDE TOTAL (MG/L AS CN) (00720)	
MAR 25...	2	10	1	<1	<1	140	5	30	8	<0.01		
JUL 17...	1	--	2	<1	--	170	5	--	11	<0.01		



05123400 WILLOW CREEK NEAR WILLOW CITY, ND--CONTINUED

## WATER-QUALITY RECORDS

INSTANTANEOUS SUSPENDED SEDIMENT AND PARTICLE SIZE, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	TEMPER- ATURE (DEG C) (00010)	DIS- CHARGE, IN CUBIC FEET PER SECOND (00060)	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	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)
MAR							
13...	1145	2.0	0.2	--	12	0.01	--
14...	1145	2.0	0.2	--	12	0.01	--
15...	1230	2.0	1.0	--	15	0.04	--
16...	1215	1.0	1.0	--	15	0.04	--
17...	1200	1.0	17	--	15	0.67	--
18...	1200	2.0	38	--	11	1.1	--
19...	1215	1.0	62	--	13	2.2	--
20...	0230	1.0	120	--	14	4.6	--
21...	0215	2.0	125	--	17	5.8	--
22...	1141	3.0	135	--	16	5.7	--
23...	1115	2.0	150	--	38	15	--
24...	1115	2.5	120	--	12	3.8	--
25...	1200	4.0	104	--	15	4.1	--
25...	1730	3.5	--	106	39	11	81
26...	1140	3.0	98	--	10	2.7	--
27...	1110	4.0	94	--	8	2.1	--
28...	1115	8.0	90	--	11	2.6	--
29...	1100	9.0	89	--	11	2.5	--
30...	1115	8.5	87	--	13	3.2	--
31...	1125	9.0	79	--	12	2.6	--
APR							
01...	1140	9.0	85	--	15	3.5	--
02...	1130	7.5	84	--	11	2.4	--
03...	1130	7.0	84	--	14	3.1	--
04...	1145	7.5	84	--	17	3.8	--
05...	1135	8.0	83	--	16	3.5	--
06...	1135	8.5	82	--	7	1.6	--
07...	1205	10.0	78	--	9	2.0	--
08...	1135	10.0	77	--	6	1.2	--
09...	1130	10.5	75	--	3	0.61	--
10...	1130	12.0	76	--	7	1.5	--
11...	1142	12.0	76	--	4	0.9	--
12...	1142	6.0	75	--	5	0.93	--
13...	1500	4.0	72	--	2	0.45	--
15...	1200	1.5	50	--	80	11	--
16...	1205	3.0	55	--	7	1.1	--
17...	1110	4.5	68	--	6	1.0	--
18...	1110	5.5	75	--	4	0.73	--
19...	1115	6.5	90	--	6	1.3	--
20...	1045	6.5	99	--	6	1.7	--
21...	1107	7.0	102	--	9	2.2	--
22...	1050	8.0	96	--	6	1.5	--
23...	1120	12.0	96	--	17	4.4	--
24...	1045	12.0	102	--	5	1.5	--
25...	1100	10.5	109	--	7	2.0	--
26...	1045	9.5	106	--	6	1.7	--
27...	1130	8.0	97	--	7	1.7	--
28...	1115	7.5	99	--	9	2.5	--
29...	1045	10.0	93	--	9	2.2	--
30...	1109	12.0	97	--	10	2.6	--
MAY							
08...	1530	9.0	--	96	10	2.5	88
JUN							
03...	1050	21.0	--	26	19	1.3	83
JUL							
17...	1300	24.0	--	1.3	3	0.01	100

## RED RIVER OF THE NORTH BASIN

05123500 STONE CREEK NEAR KRAMER, ND

LOCATION.--Lat 48°40'42", long 100°42'40", in NW1/4NW1/4NW1/4 sec.23, T.160 N., R.78 W., Bottineau County, Hydrologic Unit 09010003, on left bank 60 ft upstream from bridge on State Highway 14, 1.0 mi south of Kramer.

DRAINAGE AREA.--168 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--March to September 1986 (seasonal record only).

GAGE.--Water-stage recorder. Datum of gage is 1,425 ft above National Geodetic Vertical Datum of 1929, from topographic map. Prior to September 16, 1986, nonrecording gage at same site and datum.

REMARKS.--Estimated daily discharges: Mar. 3-21 and Apr. 15, 16. Records fair except those for periods of estimated daily discharges, which are poor.

EXTREMES FOR CURRENT PERIOD.--Maximum discharge, 49 ft<sup>3</sup>/s, Mar. 24, gage height, 2.47 ft; no flow most of the time.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1						.00	2.9	5.2	.36	.00	.00	.00
2						.00	1.3	5.7	.33	.00	.00	.00
3						1.0	3.0	4.6	.27	.00	.00	.00
4						13	4.6	4.1	.13	.00	.00	.00
5						7.5	4.4	4.1	.08	.00	.00	.00
6						3.0	6.6	4.1	.03	.00	.00	.00
7						1.0	3.3	3.2	.03	.00	.00	.00
8						.50	3.7	2.6	.00	.00	.00	.00
9						.00	3.5	3.0	.00	.00	.00	.00
10						.00	2.4	3.9	.00	.00	.00	.00
11						.05	3.7	4.1	.00	.00	.00	.00
12						1.0	3.9	3.5	.00	.00	.00	.00
13						10	3.9	3.0	.00	.00	.00	.00
14						15	2.0	1.9	.00	.00	.00	.00
15						25	1.8	3.0	.00	.00	.00	.00
16						35	2.0	3.3	.00	.00	.00	.00
17						30	2.3	4.2	.00	.00	.00	.00
18						21	5.5	4.1	.00	.00	.00	.00
19						17	9.7	3.5	.00	.00	.00	.00
20						20	12	2.9	.00	.00	.00	.00
21						25	6.6	2.6	.00	.00	.00	.00
22						28	26	2.5	.00	.00	.00	.00
23						35	28	2.1	.00	.00	.00	.00
24						49	20	1.8	.00	.00	.00	.00
25						23	12	1.5	.00	.00	.00	.00
26						17	9.7	1.5	.00	.00	.00	.00
27						11	7.1	1.3	.00	.00	.00	.00
28						7.9	5.2	1.1	.00	.00	.00	.00
29						7.1	5.7	.83	.00	.00	.00	.00
30						7.6	6.0	.73	.00	.00	.00	.00
31						5.2	---	.49	---	.00	.00	---
TOTAL						415.85	208.8	90.45	1.23	.00	.00	.00
MEAN						13.4	6.96	2.92	.04	.00	.00	.00
MAX						49	28	5.7	.36	.00	.00	.00
MIN						.00	1.3	.49	.00	.00	.00	.00

05123500 STONE CREEK NEAR KRAMER, ND--CONTINUED

## WATER-QUALITY RECORD

PERIOD OF RECORD.--March to September 1986 (seasonal record only).

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	COLOR (PLAT- INUM- COBALT UNITS) (00080)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (MG/L) (00301)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)
MAR 28...	1100	9.5	515	7.72	13.0	6.0	70	9.0	71	180	14	37
MAY 08...	1015	2.4	2280	8.12	8.0	8.0	70	9.9	82	780	390	130
JUN 05...	1525	0.05	3130	8.04	23.5	19.0	100	5.8	63	1100	520	170

DATE	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	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)
MAR 28...	20	38	30	1	14	161	5.9	99	8.3	0.1	24	364
MAY 08...	110	250	40	4	19	391	5.7	850	37	<0.1	12	1750
JUN 05...	170	380	42	5	21	605	11	1300	41	0.2	11	2550

DATE	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)	PHOS- PHORUS, TOTAL (MG/L AS P) (00665)	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)
MAR 28...	340	0.5	9.3	<0.10	0.05	0.28	0.19	50	4	54	100
MAY 08...	1600	2.4	11	<0.10	0.10	0.30	0.22	--	--	--	370
JUN 05...	2500	3.5	0.0	<0.10	0.36	0.91	0.75	--	--	--	550

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)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	NICKEL, TOTAL RECOV- ERABLE (UG/L AS NI) (01067)
MAR 28...	<1	<10	<1	3	62	<1	40	9	<0.1	<5	6

DATE	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG) (01077)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)	VANA- DIUM, DIS- SOLVED (UG/L AS V) (01085)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN) (01092)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	CYANIDE TOTAL (MG/L AS CN) (00720)
MAR 28...	2	<1	<1	190	9	20	4	<0.01

## RED RIVER OF THE NORTH BASIN

05123500 STONE CREEK NEAR KRAMER, ND--CONTINUED

## WATER-QUALITY RECORDS

INSTANTANEOUS SUSPENDED SEDIMENT AND PARTICLE SIZE, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	TEMPER- ATURE (DEG C) (00010)	DIS- CHARGE, IN CUBIC FEET PER SECOND (00060)	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	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)
MAR							
04...	1215	1.0	13	--	22	0.78	--
05...	0900	0.5	7.5	--	38	0.77	--
06...	0930	0.5	3.0	--	34	0.27	--
07...	1030	0.5	1.0	--	37	0.1	--
08...	0945	0.5	0.5	--	17	0.02	--
09...	0930	0.5	0.0	--	16	--	--
10...	0900	0.5	0.0	--	18	--	--
11...	0915	0.5	0.05	--	12	0.0	--
12...	0915	0.5	1.0	--	10	0.03	--
13...	1000	1.0	10	--	12	0.34	--
14...	0930	1.0	15	--	33	1.3	--
15...	0945	1.0	25	--	16	1.1	--
16...	0915	1.0	35	--	22	2.1	--
17...	0900	0.5	30	--	17	1.4	--
18...	0915	1.0	21	--	17	0.99	--
19...	0930	0.5	17	--	8	0.38	--
20...	0945	0.5	20	--	5	0.28	--
21...	0950	1.5	25	--	6	0.39	--
22...	0945	4.0	28	--	8	0.6	--
23...	0845	1.0	35	--	7	0.69	--
24...	0915	3.0	49	--	9	1.2	--
25...	0945	5.0	23	--	18	1.1	--
26...	0920	1.0	17	--	28	1.3	--
27...	0900	3.0	11	--	27	0.8	--
28...	0904	6.0	7.9	--	26	0.55	--
28...	1100	6.0	--	9.5	10	0.26	95
29...	0840	9.0	7.1	--	10	0.2	--
30...	0846	7.0	7.6	--	21	0.42	--
31...	0850	8.5	5.2	--	5	0.08	--
APR							
01...	0855	7.0	2.9	--	6	0.05	--
02...	0910	7.0	1.3	--	5	0.02	--
03...	0900	5.0	3.0	--	3	0.02	--
04...	0935	7.0	4.6	--	3	0.03	--
05...	0915	8.0	4.4	--	3	0.03	--
06...	0915	7.5	6.6	--	5	0.1	--
07...	0950	9.0	3.3	--	5	0.05	--
08...	0900	8.5	3.7	--	2	0.02	--
09...	0850	9.0	3.5	--	2	0.02	--
10...	0850	10.5	2.4	--	3	0.02	--
11...	0900	11.5	3.7	--	3	0.03	--
12...	0905	2.0	3.9	--	2	0.02	--
13...	0845	1.5	3.9	--	4	0.04	--
15...	0930	1.0	1.8	--	3	0.01	--
16...	0920	1.0	2.0	--	2	0.01	--
17...	0845	3.5	2.3	--	7	0.04	--
18...	0845	5.5	5.5	--	3	0.05	--
19...	0845	5.0	9.7	--	7	0.17	--
20...	0830	5.5	12	--	11	0.35	--
21...	0855	4.5	6.6	--	14	0.25	--
22...	0840	7.5	26	--	15	1.0	--
23...	0850	12.0	28	--	11	0.84	--
24...	0830	10.0	20	--	5	0.29	--
25...	0830	9.0	12	--	13	0.41	--
26...	0830	8.5	9.7	--	6	0.15	--
27...	0915	7.0	7.1	--	4	0.08	--
28...	0846	6.0	5.2	--	4	0.06	--
29...	0830	9.0	5.7	--	4	0.06	--
30...	0845	11.0	6.0	--	5	0.08	--
MAY							
08...	1015	8.0	2.6	2.4	100	0.63	97
JUN							
05...	1525	19.0	--	80.05	37	--	97



05123510 DEEP RIVER NEAR UPHAM, ND

LOCATION.--Lat 48°35'03", long 100°51'44", in SW1/4NW1/4 sec.22, T.159 N., R.79 W., McHenry County, Hydrologic Unit 09010005, 60 ft downstream from county highway bridge, 0.8 mi downstream from Little Deep River, and 6.3 mi west of Upham.

DRAINAGE AREA.--975 mi<sup>2</sup>, of which about 605 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--September 1957 to September 1980, March 1985 to September 1985 (seasonal records only since 1985).

GAGE.--Water-stage recorder. Elevation of gage is 1,430 ft, from topographic map.

REMARKS.--Estimated daily discharges: Mar. 1-11, June 7 to July 20. Records good except those for periods of estimated daily discharges, which are fair.

AVERAGE DISCHARGE.--23 years (water years 1958-80), 20.4 ft<sup>3</sup>/s, 14,780 acre-ft/yr; median of yearly mean discharges, 0.90 ft<sup>3</sup>/s, 650 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,760 ft<sup>3</sup>/s, Apr. 12, 1969, gage height, 18.18 ft; no flow at times each year.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in April 1951 reached a stage of about 16 ft, discharge, 2,700 ft<sup>3</sup>/s, from information by local residents.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, about 120 ft<sup>3</sup>/s, Mar. 13, gage height, 8.81 ft; no flow for several months.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1						.00	21	44	13	.02	.00	.00
2						10	20	42	12	.02	.00	.00
3						10	23	39	11	.02	.00	.00
4						11	23	38	11	.02	.00	.00
5						6.0	23	39	8.9	.03	.00	.00
6						8.0	21	43	8.1	.03	.00	.00
7						50	21	45	7.5	.02	.00	.00
8						40	20	46	6.0	.01	.00	.00
9						40	20	62	5.5	.00	.00	.00
10						35	20	106	4.5	.00	.00	.00
11						40	20	103	3.0	.00	.00	.00
12						67	19	99	2.5	.01	.00	.00
13						91	18	93	1.5	.05	.00	.00
14						111	18	84	1.5	.05	.00	.00
15						100	17	78	1.0	.05	.00	.00
16						90	19	70	.80	.01	.00	.00
17						77	20	63	.60	.00	.00	.00
18						68	28	59	.40	.00	.00	.00
19						62	50	55	.30	.00	.00	.00
20						57	51	51	.25	.00	.00	.00
21						51	48	47	.25	.00	.00	.00
22						45	51	42	.25	.00	.00	.00
23						41	52	38	.20	.00	.00	.00
24						37	51	35	.10	.00	.00	.00
25						37	48	31	.07	.00	.00	.00
26						33	46	28	.05	.00	.00	.00
27						29	44	24	.05	.00	.00	.00
28						28	44	21	.05	.00	.00	.00
29						26	42	19	.05	.00	.00	.00
30						24	43	16	.03	.00	.00	.00
31						24	---	15	---	.00	.00	---
TOTAL						1348.00	941	1575	100.45	.34	.00	.00
MEAN						43.5	31.4	50.8	3.35	.01	.00	.00
MAX						111	52	106	13	.05	.00	.00
MIN						.00	17	15	.03	.00	.00	.00
AC-FT						2670	1870	3120	199	.7	.00	.00

## RED RIVER OF THE NORTH BASIN

05123510 DEEP RIVER NEAR UPHAM, ND--CONTINUED

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1972-80, 1985 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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)
APR											
*08...	1550	20	720	7.77	15.0	10.5	280	81	53	37	38
08...	1551	20	720	7.77	15.0	10.5	290	290	54	37	37
DATE	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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 SI02) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
APR											
*08...	21	1	15	200	100	51	0.1	9.3	456	430	0.62
08...	21	1	16	208	100	50	0.1	9.2	456	430	0.62
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...	1	60	40	<1	28	20	0.1	2	1	190	
08...	2	40	37	1	30	9	--	<5	<1	170	

\*Split sample - analysis by North Dakota State Water Commission Laboratory.

## RED RIVER OF THE NORTH BASIN

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05123750 CUT BANK CREEK AT UPHAM, ND

LOCATION.--Lat 48°34'29", long 100°44'39", in SE $\frac{1}{4}$ SE $\frac{1}{4}$ SW $\frac{1}{4}$  sec.21, T.159 N., R.78 W., McHenry County, Hydrologic Unit 09010005, on left bank 50 ft downstream from county highway bridge, and 0.5 mi southwest of Upham.

DRAINAGE AREA.--722 mi<sup>2</sup>, of which about 450 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1974 to September 1980. March to September 1986.

GAGE.--Water-stage recorder. Datum of gage is 1,422.77 ft above National Geodetic Vertical Datum of 1929. From March to September 1986 nonrecording gage at same site and datum.

REMARKS.--Estimated daily discharges: Mar. 1-20, Aug. 6-31. Records poor.

AVERAGE DISCHARGE.--6 years (1975-80), 13.8 ft<sup>3</sup>/s, 10,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 820 ft<sup>3</sup>/s, Apr. 1, 1976, gage height, 7.24 ft from high water mark; no flow for several months each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 41 ft<sup>3</sup>/s, Apr. 21, gage height, 3.61 ft; no flow much of the time.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1						.00	28	24	15	.00	.40	.00
2						.10	25	24	14	.00	.30	.00
3						.40	30	24	13	.00	.20	.00
4						.25	30	24	12	.00	.15	.00
5						2.2	31	23	11	.00	.02	.00
6						2.6	31	27	10	.00	.00	.00
7						2.4	30	30	10	.00	.00	.00
8						2.2	28	32	9.1	.00	.00	.00
9						2.0	27	35	8.2	.00	.00	.00
10						1.9	25	33	7.4	.00	.00	.00
11						1.7	23	33	6.8	.00	.00	.00
12						1.6	22	32	5.8	.00	.00	.00
13						1.6	18	32	4.7	.00	.00	.00
14						2.0	17	30	4.1	.00	.00	.00
15						2.5	16	30	3.4	.00	.00	.00
16						2.5	15	28	3.3	.00	.00	.00
17						3.0	19	28	3.0	.32	.00	.00
18						4.0	25	27	2.5	.50	.00	.00
19						8.0	35	26	2.0	.70	.00	.00
20						3.0	40	26	1.6	.82	.00	.00
21						13	41	24	1.7	.96	.00	.00
22						17	39	23	1.3	.96	.00	.00
23						18	36	22	1.0	1.0	.00	.00
24						21	33	20	.86	.92	.22	.00
25						26	31	20	.55	.82	.18	.00
26						29	27	19	.32	.86	.15	.00
27						31	26	19	.22	.75	.12	.00
28						31	24	19	.02	.82	.10	.00
29						30	23	18	.00	.70	.08	.00
30						30	24	17	.00	.62	.05	.00
31						28	---	16	---	.50	.02	---
TOTAL						317.95	819	785	152.87	11.25	1.99	.00
MEAN						10.3	27.3	25.3	5.10	.36	.06	.00
MAX						31	41	35	15	1.0	.40	.00
MIN						.00	15	16	.00	.00	.00	.00

## RED RIVER OF THE NORTH BASIN

05123750 CUT BANK CREEK AT UPHAM, ND--CONTINUED

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1974-80, 1986.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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)
MAR 05...	1600	2.2	230	--	4.5	0.0	--	--	--	--	--
APR 08...	1820	28	790	7.84	14.5	11.0	280	59	46	40	63
MAY 07...	1705	31	1180	--	12.0	9.5	--	--	--	--	--
JUN 05...	1200	11	1400	--	22.5	19.5	--	--	--	--	--
JUL 22...	0930	1.0	1400	7.53	23.5	19.5	490	69	66	80	140
DATE	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
APR 08...	31	2	16	220	160	24	0.1	11	535	490	0.73
JUL 22...	37	3	15	430	330	42	0.2	16	980	950	1.3
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...	1	130	50	<1	42	10	0.2	3	1	220	
JUL 22...	2	190	30	<1	84	40	0.1	<1	<1	350	



## RED RIVER OF THE NORTH BASIN

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05123760 DEEP RIVER BELOW CUT BANK CREEK NEAR UPHAM, ND

LOCATION.--Lat 48°36'14", long 100°47'41", in SW1/4SW1/4SW1/4 sec.7, T.159 N., R.78 W., McHenry County, Hydrologic Unit 09010005, at bridge 0.5 mi below Cut Bank Creek, and about 3.5 mi northwest of Upham at bridge on county highway.

DRAINAGE AREA.--1,722 mi<sup>2</sup>, of which about 1,070 mi<sup>2</sup> is probably noncontributing.

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1975 to September 1980, March 1986 to September 1986.

REMARKS.--Discharge computed from records at stations 05123510 Deep River near Upham and 05123750 Cut Bank Creek at Upham.

## WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	COLOR (PLAT- INUM- COBALT UNITS) (00080)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED SATUR- ATION (00301)	HARD- NESS (MG/L AS CAC03) (00900)	HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CAC03 (00902)	CALCIUM DIS- SOLVED AS CA (00915)	MAGNE- SIUM, DIS- SOLVED AS MG (00925)
MAR 28...	1500	500	8.10	18.5	4.0	70	11.4	86	190	40	38	24
MAY 08...	1130	1050	8.15	12.0	9.0	50	9.0	76	360	80	60	52
JUN 05...	1335	1450	7.93	23.0	19.0	65	5.8	62	510	130	78	77
JUL 22...	1015	1500	8.12	23.5	21.5	50	6.3	71	520	82	72	82
AUG 28...	1845	1500	8.46	23.5	18.5	50	8.8	93	490	51	63	80

DATE	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB AS CAC03 (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	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 AS SIO2 (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)
MAR 28...	27	22	0.9	12	154	2.4	70	24	0.1	9.6	309
MAY 08...	73	29	2	15	284	3.9	210	65	<0.1	4.3	691
JUN 05...	130	35	3	19	380	8.6	270	110	0.2	12	989
JUL 22...	140	36	3	15	436	6.4	300	78	0.2	8.2	1030
AUG 28...	140	38	3	16	436	2.9	330	70	0.2	5.5	1050

DATE	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)	PHOS- PHORUS, TOTAL (MG/L AS P) (00665)	PHOS- PHORUS, ORTHOPHOSPHATE, 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)
MAR 28...	300	0.42	49	<0.10	0.04	0.15	0.04	10	1	58	30
MAY 08...	650	0.94	146	<0.10	0.05	0.09	0.04	--	--	--	60
JUN 05...	920	1.3	53	<0.10	0.09	0.26	0.15	--	--	--	120
JUL 22...	960	1.4	2.8	0.10	0.38	0.43	0.33	10	3	130	100
AUG 28...	970	1.4	0.28	<0.10	0.07	0.33	0.18	--	--	--	60

## RED RIVER OF THE NORTH BASIN

05123760 DEEP RIVER BELOW CUT BANK CREEK NEAR UPHAM, ND--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

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)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	NICKEL, TOTAL RECOV- ERABLE (UG/L AS NI) (01067)
MAR 28...	<1	<10	1	1	65	<1	22	20	<0.1	1	2
JUL 22...	<1	<10	<1	<1	18	<5	87	180	0.1	<1	5
DATE	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG) (01077)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)	VANA- DIUM, DIS- SOLVED (UG/L AS V) (01085)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN) (01092)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	CYANIDE TOTAL (MG/L AS CN) (00720)			
MAR 28...		1	<1	<1	120	2	<10	8	<0.01		
JUL 22...		1	<1	<1	330	3	30	12	<0.01		

INSTANTANEOUS SUSPENDED SEDIMENT AND PARTICLE SIZE, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	TEMPER- ATURE (DEG C) (00010)	DIS- CHARGE, IN CUBIC FEET PER SECOND (00060)	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)
MAR						
14...	0952	1.0	113	12	3.8	--
15...	1000	1.0	103	15	4.2	--
16...	0945	1.0	92	10	2.4	--
17...	0930	1.0	80	15	3.3	--
18...	0950	1.0	72	9	1.7	--
28...	1500	4.0	59	5	0.8	80
29...	0915	6.0	56	7	1.1	--
30...	0915	6.0	54	22	3.1	--
31...	0930	7.5	52	19	2.7	--
APR						
01...	0945	8.0	49	22	2.8	--
02...	0946	8.0	45	23	2.8	--
03...	0936	6.5	53	29	4.1	--
04...	1000	7.0	53	15	2.2	--
05...	0950	8.0	54	9	1.4	--
06...	0945	8.0	52	13	1.9	--
07...	1015	9.0	51	13	1.7	--
08...	0940	9.5	48	9	1.2	--
09...	0920	10.0	47	11	1.4	--
10...	0945	11.0	45	16	2.0	--
11...	0936	12.0	43	6	0.71	--
12...	0944	6.0	41	8	0.83	--
13...	0917	3.5	36	10	0.97	--
15...	1012	0.5	33	8	0.73	--
16...	0950	2.5	34	22	2.0	--
17...	0915	4.0	39	15	1.6	--
18...	0920	5.0	53	44	6.3	--
19...	0915	5.5	85	37	8.5	--
20...	0900	6.5	91	13	3.1	--
21...	0925	6.0	89	11	2.5	--
22...	0910	8.0	90	13	3.1	--
23...	0930	11.5	88	8	1.8	--
24...	0900	10.5	84	10	2.2	--
25...	0902	10.0	79	6	1.3	--
26...	0900	9.5	73	19	3.7	--
27...	0945	8.5	70	7	1.3	--
29...	0854	9.0	65	21	3.7	--
30...	0925	11.0	67	6	1.2	--
MAY						
08...	1130	9.0	78	12	2.5	--
JUN						
05...	1335	19.0	20	73	3.9	76
JUL						
22...	1015	21.5	1.0	56	0.15	79
AUG						
28...	1845	18.5	0.1	48	0.01	62

## RED RIVER OF THE NORTH BASIN

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05123900 BOUNDARY CREEK NEAR LANDA, ND

LOCATION.--Lat 48°48'46", long 100°51'46", at east line sec.35, T.162 N., R.79 W., Bottineau County, Hydrologic Unit 09010002, on right bank 80 ft downstream from bridge on county road, 5 mi upstream from mouth, and 6 mi southeast of Landa.

DRAINAGE AREA.--230 mi<sup>2</sup>, of which about 60 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--September 1957 to September 1981, March 1985 to September 1985 (seasonal records only since 1985).

REVISED RECORDS.--WSP 1728: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,420.03 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Feb. 1 to Mar. 16, Apr. 15-17, and May 12 to June 6. Records fair except those for periods of estimated daily discharges, which are poor.

AVERAGE DISCHARGE.--24 years (1958-1981), 12.3 ft<sup>3</sup>/s, 8,910 acre-ft/yr; median of yearly mean discharges, 5.5 ft<sup>3</sup>/s, 4,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,580 ft<sup>3</sup>/s, Apr. 9, 1969, gage height, 12.70 ft; maximum gage height, 12.90 ft, Apr. 1, 1976, backwater from ice and snow; no flow for several months each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 237 ft<sup>3</sup>/s, Mar. 17, gage height, 8.83 ft; no flow for several months.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1					.00	13	18	23	4.0	.36	51	.00
2					.00	23	16	23	4.0	.35	50	.00
3					.00	25	17	21	3.0	.40	37	.00
4					.00	22	13	20	3.0	.36	25	.00
5					.00	12	12	26	2.5	.30	18	.00
6					.00	5.7	11	24	1.9	.20	15	.00
7					.00	8.9	10	59	1.2	.12	13	.00
8					.00	30	10	58	.73	.05	10	.00
9					.00	20	9.5	49	.52	.00	8.8	.00
10					.00	10	8.8	39	.71	.00	6.6	.00
11					.00	35	8.4	42	.60	.00	6.5	.00
12					.00	30	8.9	40	.45	.00	6.5	.00
13					.00	22	7.4	37	.35	.00	6.2	.00
14					.00	27	4.1	33	.27	.00	5.4	.00
15					.00	47	3.0	30	.25	.00	4.4	.00
16					.00	135	4.0	27	.28	.00	3.9	.00
17					.00	212	5.0	24	.23	.00	4.0	.00
18					.00	175	21	20	.14	.00	2.9	.00
19					.00	138	40	18	.05	.00	1.9	.00
20					.00	114	71	16	.00	.00	1.1	.00
21					.00	95	61	14	.48	.00	.64	.00
22					.00	64	44	12	.36	.00	.44	.00
23					.00	76	34	10	4.1	.00	.34	.00
24					.00	69	29	10	12	.00	.23	.00
25					.00	56	27	9.0	7.0	.00	.13	.00
26					2.5	53	25	9.0	3.4	.00	.08	.00
27					6.0	34	23	8.0	1.4	.00	.03	.00
28					1.0	31	22	8.0	.75	.94	.00	.00
29					---	31	20	7.0	.56	.35	.00	.00
30					---	27	24	6.0	.42	.29	.00	.00
31					---	21	---	5.0	---	25	.00	---
TOTAL					9.50	1661.6	607.1	727.0	54.65	28.72	279.09	.00
MEAN					.34	53.6	20.2	23.5	1.82	.93	9.00	.00
MAX					6.0	212	71	59	12	25	51	.00
MIN					.00	5.7	3.0	5.0	.00	.00	.00	.00
AC-FT					19	3300	1200	1440	108	57	554	.00

RED RIVER OF THE NORTH BASIN  
05123900 BOUNDARY CREEK NEAR LANDA, ND--CONTINUED  
WATER-QUALITY RECORD

PERIOD OF RECORD.--Water years 1972-81, 1985 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

HARD-												
		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	COLOR (PLAT- INUM- COBALT UNITS) (00080)	OXYGEN, DIS- SOLVED (MG/L) (00300)	HARD- NESS (MG/L AS CACO3) (00900)	NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	
MAR												
06...	1525	6.0	305	--	-10.0	0.0	--	--	--	--	--	
11...	1440	38	580	--	2.0	0.0	--	--	--	--	--	
26...	1530	45	640	7.80	7.5	3.5	70	10.9	190	40	39	
APR												
29...	0745	20	1600	--	--	8.0	--	--	--	--	--	
30...	0800	24	1500	--	--	10.5	--	--	--	--	--	
MAY												
07...	1140	74	1570	8.03	12.5	7.5	50	9.5	540	180	91	
JUN												
05...	2015	2.4	1500	8.11	22.0	20.0	70	9.4	600	170	100	
DATE	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	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)
MAR												
26...	23	59	38	2	11	152	4.7	170	9.3	0.1	16	440
MAY												
07...	76	150	37	3	11	365	6.6	490	17	0.1	9.4	1150
JUN												
05...	86	120	30	2	11	436	6.5	450	13	0.2	9.7	1130
DATE	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L AS CD) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)	PHOS- PHORUS, TOTAL (MG/L AS P) (00665)	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)	
MAR												
26...	420	0.6	53	<0.10	0.05	0.22	0.15	40	3	49	80	
MAY												
07...	1100	1.6	228	<0.10	0.09	0.11	0.07	--	--	--	160	
JUN												
05...	1100	1.5	7.4	<0.10	0.06	0.36	0.29	--	--	--	180	
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)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	NICKEL, TOTAL RECOV- ERABLE (UG/L AS NI) (01067)	
MAR												
26...	<1	<10	<1	2	63	<1	43	9	<0.1	1	4	
DATE	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG) (01077)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)	VANA- DIUM, DIS- SOLVED (UG/L AS V) (01085)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN) (01092)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	CYANIDE TOTAL (MG/L AS CN) (00720)				
MAR												
26...	2	<1	<1	170	8	20	7	<0.01				



05123900 BOUNDARY CREEK NEAR LANDA, ND--CONTINUED

## WATER-QUALITY RECORDS

INSTANTANEOUS SUSPENDED SEDIMENT AND PARTICLE SIZE, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	TEMPER- ATURE (DEG C) (00010)	DIS- CHARGE, IN CUBIC FEET PER SECOND (00060)	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	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)
MAR							
04...	1250	1.0	19	--	17	0.86	--
05...	0815	0.5	11	--	18	0.54	--
06...	0830	0.5	5.7	--	16	0.24	--
07...	0915	0.5	8.9	--	16	0.39	--
08...	0830	0.5	66	--	23	4.2	--
09...	0830	0.5	25	--	15	0.98	--
10...	0745	0.5	14	--	13	0.5	--
11...	0815	0.5	35	--	12	1.2	--
12...	0800	0.5	30	--	10	0.79	--
13...	0830	0.5	22	--	15	0.89	--
14...	0815	0.5	25	--	7	0.44	--
15...	0815	0.5	40	--	7	0.75	--
16...	0815	1.0	116	--	11	3.4	--
17...	0815	0.5	182	--	12	5.7	--
18...	0815	1.0	153	--	10	4.0	--
19...	0830	0.5	122	--	9	3.0	--
20...	0850	0.5	102	--	10	2.7	--
21...	0815	0.5	86	--	7	1.6	--
22...	0840	2.0	58	--	6	1.0	--
23...	0752	1.0	71	--	5	0.9	--
24...	0810	1.5	66	--	7	1.2	--
25...	0830	4.0	54	--	11	1.6	--
26...	0830	0.5	52	--	7	1.0	--
27...	0810	2.0	34	--	5	0.45	--
28...	0810	5.0	31	--	8	0.7	--
29...	0750	8.0	31	--	5	0.44	--
30...	0800	7.0	27	--	6	0.47	--
31...	0820	8.0	21	--	4	0.22	--
APR							
01...	0820	7.0	18	--	4	0.21	--
02...	0825	6.0	16	--	29	1.2	--
03...	0815	4.5	17	--	4	0.19	--
04...	0832	5.5	13	--	2	0.06	--
05...	0812	7.0	12	--	3	0.09	--
06...	0825	6.5	11	--	5	0.15	--
07...	0900	8.0	10	--	3	0.09	--
08...	0815	7.0	10	--	2	0.04	--
09...	0805	7.5	9.5	--	10	0.26	--
10...	0810	9.0	8.8	--	1	0.03	--
11...	0817	10.5	8.4	--	2	0.04	--
12...	0824	3.0	8.9	--	2	0.04	--
13...	0806	1.5	7.4	--	3	0.07	--
15...	0845	1.0	3.6	--	19	0.19	--
16...	0840	1.0	6.4	--	5	0.08	--
17...	0800	3.0	7.0	--	7	0.13	--
18...	0805	5.0	21	--	7	0.42	--
19...	0800	4.5	40	--	7	0.76	--
20...	0745	5.5	71	--	9	1.6	--
21...	0810	4.5	61	--	6	1.1	--
22...	0800	7.5	44	--	4	0.51	--
23...	0801	12.0	34	--	4	0.35	--
24...	0752	9.5	29	--	3	0.26	--
25...	0752	9.5	27	--	2	0.12	--
26...	0745	8.5	25	--	5	0.34	--
27...	0830	7.0	23	--	8	0.5	--
28...	0805	6.0	22	--	15	0.91	--
29...	0745	8.0	--	20	11	0.58	--
30...	0800	10.5	--	24	17	1.1	--
MAY							
07...	1140	7.5	--	74	68	13	99
JUN							
05...	2015	20.0	--	2.4	45	0.29	96

## RED RIVER OF THE NORTH BASIN

05124000 SOURIS (MOUSE) RIVER NEAR WESTHOPE, ND  
(International gaging station)

(National stream quality accounting network station and radiochemical program station)

LOCATION.--Lat 48°59'47", long 100°57'29", in SW¼SE¼ sec.30, T.164 N., R.79 W., Bottineau County, Hydrologic Unit 09010003, on left bank 1,200 ft upstream from second crossing of international boundary, 1 mi downstream from Fish and Wildlife Service Dam 357, 7 mi northeast of Westhope, 11 mi downstream from Boundary Creek, and at mile 154.5.

DRAINAGE AREA.--16,900 mi<sup>2</sup>, approximately, of which about 10,300 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--July to October 1929, April 1930 to current year. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WSP 1338: 1932. WSP 2113: Drainage area.

GAGE.--Water-stage recorder and control. Datum of gage is 1,402.45 ft above National Geodetic Vertical Datum of 1929. Prior to Mar. 28, 1938, nonrecording gage at site 6.3 mi upstream at datum 2.52 ft higher.

REMARKS.--Estimated daily discharges: Nov. 7 to Mar. 29. Records good except those for Nov. 7 to Mar. 29 and July 8-11, which are poor. Flow regulated by dams on Souris River and tributaries, combined capacity, about 321,000 acre-ft. Diversion at Eaton Dam for irrigation of about 7,600 acres and other small diversions for irrigation and municipal supply upstream from station.

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

AVERAGE DISCHARGE.--56 years (water years 1931-86), 257 ft<sup>3</sup>/s, 186,200 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 12,600 ft<sup>3</sup>/s, Apr. 26, 1976, gage height, 19.16 ft; maximum daily reverse flow, 35 ft<sup>3</sup>/s, Apr. 8, 1943, caused by backwater from downstream tributary inflow; no flow at times in some years.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 904 ft<sup>3</sup>/s, May 5, gage height, 7.16 ft; minimum daily 2.0 ft<sup>3</sup>/s, Mar. 14.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	22	12	49	44	40	30	345	624	529	68	49	25
2	22	17	49	44	40	55	358	592	495	63	45	24
3	22	31	49	44	40	90	396	546	487	71	43	24
4	23	41	50	42	40	125	376	614	215	75	38	23
5	21	43	50	42	40	155	315	771	68	76	46	23
6	20	37	50	42	39	170	291	786	89	74	96	23
7	28	35	50	42	38	150	298	682	160	54	96	24
8	52	30	50	42	37	135	288	687	172	17	101	25
9	24	32	50	42	36	130	275	645	183	11	107	26
10	19	34	50	42	34	110	270	609	206	10	58	24
11	17	40	49	42	34	9.0	296	618	206	22	38	25
12	18	50	48	42	34	8.0	299	638	200	33	34	26
13	18	60	48	42	34	4.0	318	644	126	38	27	26
14	19	65	48	42	34	2.0	446	680	100	42	6.9	24
15	103	70	49	42	34	2.5	484	686	104	40	23	22
16	217	70	49	42	34	3.0	373	723	95	44	29	24
17	226	65	48	42	34	3.0	398	721	94	49	31	28
18	226	56	48	42	34	3.0	470	692	134	45	30	17
19	218	55	47	41	34	3.0	485	668	159	42	26	19
20	210	54	47	40	34	3.0	500	650	170	37	27	22
21	201	54	46	39	34	3.0	525	628	186	34	31	22
22	185	54	46	38	35	3.0	518	612	196	32	31	55
23	182	52	46	37	35	3.0	580	634	207	30	30	167
24	169	50	46	36	40	5.0	636	646	142	32	30	160
25	148	49	46	36	45	10	645	652	110	28	27	166
26	120	49	45	36	50	40	644	648	104	27	26	160
27	76	49	45	36	32	35	626	651	116	25	26	160
28	44	49	45	38	25	25	620	655	93	28	26	161
29	20	49	45	39	---	60	603	662	78	26	26	169
30	12	49	45	40	---	88	623	654	68	42	26	183
31	12	---	45	40	---	193	---	567	---	44	25	---
TOTAL	2694	1401	1478	1258	1020	1655.5	13301	20285	5292	1259	1254.9	1877
MEAN	86.9	46.7	47.7	40.6	36.4	53.4	443	654	176	40.6	40.5	62.6
MAX	226	70	50	44	50	193	645	786	529	76	107	183
MIN	12	12	45	36	25	2.0	270	546	68	10	6.9	17
AC-FT	5340	2780	2930	2500	2020	3280	26380	40240	10500	2500	2490	3720
CAL YR 1985	TOTAL	45929.0		MEAN	126	MAX	627	MIN	1.0	AC-FT	91100	
WTR YR 1986	TOTAL	52775.4		MEAN	145	MAX	786	MIN	2.0	AC-FT	104700	

05124000 SOURIS RIVER NR WESTHOPE, ND--CONTINUED

## WATER-QUALITY RECORD

PERIOD OF RECORD.--Water years 1954-64, 1966 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	COLOR (PLAT- INUM- COBALT UNITS) (00080)	TUR- BID- ITY (NTU) (00076)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	COLI- FORM, FECAL, O.7 UM-MF (COLS./ 100 ML) (31625)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	
OCT	17...	1500	229	1080	8.90	10.0	4.5	--	11	15.0	115	--	1100
DEC	04...	1630	50	1650	7.50	-10.0	0.0	--	--	5.5	37	--	--
JAN	08...	1500	42	1550	7.20	0.0	0.0	50	4.0	0.4	3	K2	K12
FEB	27...	1110	32	1270	7.49	-3.0	0.0	--	--	13.5	90	--	--
MAR	26...	1150	42	940	8.38	2.0	2.0	--	--	12.6	89	--	--
APR	08...	1230	287	620	--	--	8.5	--	--	--	--	--	--
	29...	0700	603	670	--	--	8.5	--	--	--	--	--	--
	30...	1345	605	670	8.56	13.5	11.0	40	10	10.2	92	K5	K4
JUN	17...	1020	85	1100	8.50	21.0	18.0	--	--	9.3	97	--	--
JUL	22...	1720	28	1040	9.19	29.5	27.0	--	--	18.4	229	--	--
AUG	27...	1230	26	1120	8.29	16.0	16.5	40	5.3	5.0	50	K26	100

DATE	HARD- NESS (MG/L AS CAC03) (00900)	HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CAC03 (00902)	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)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CAC03) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)
OCT 17...	330	0	61	43	130	45	3	11	368	0.9	220	32
DEC 04...	--	--	--	--	--	--	--	--	--	32	--	--
JAN 08...	610	1	120	74	220	43	4	19	--	74	360	64
FEB 27...	--	--	--	--	--	--	--	--	--	26	--	--
MAR 26...	--	--	--	--	--	--	--	--	--	2.3	--	--
APR 30...	220	0	45	26	62	37	2	11	206	11	140	17
JUL 22...	--	--	--	--	--	--	--	--	--	0.2	--	--
AUG 27...	340	4	59	47	130	44	3	17	353	3.3	250	39

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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS NH4) (71846)
OCT 17...	0.2	4.9	755	1400	1.0	467	<0.01	<0.10	0.08	0.07	0.09
JAN 08...	0.4	18	1260	1200	1.7	143	<0.01	<0.10	0.82	0.83	1.1
APR 30...	0.2	6.3	443	1500	0.6	724	<0.01	<0.10	0.05	0.05	0.06
AUG 27...	0.3	21	810	770	1.1	57	0.05	0.10	0.48	0.46	0.59

K - Results based on colony count outside the acceptable range (non-ideal colony count).

## RED RIVER OF THE NORTH BASIN

05124000 SOURIS RIVER NR WESTHOPE, ND--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

	NITRO- GEN, AM- MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS- PHORUS, TOTAL (MG/L AS P) (00665)	PHOS- PHORUS TOTAL (MG/L AS PO4) (71886)	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)	BERYL- LIUM, DIS- SOLVED (UG/L AS BE) (01010)	BORON, DIS- SOLVED (UG/L AS B) (01020)	CADMIUM DIS- SOLVED (UG/L AS CD) (01025)
OCT 17...	3.0	0.28	0.86	0.09	0.04	<10	4	97	<0.5	--	<1
JAN 08...	2.5	0.90	--	0.82	0.77	<10	6	190	0.7	320	<1
APR 30...	1.2	0.19	--	0.12	0.07	10	3	60	<0.5	110	<1
AUG 27...	3.7	0.51	--	0.37	0.32	80	5	110	<0.5	200	2
	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)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	NICKEL, TOTAL RECOV- ERABLE (UG/L AS NI) (01067)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)
OCT 17...	4	<3	<1	7	<1	61	2	<0.1	<10	--	3
JAN 08...	<1	<3	4	370	3	95	2300	0.1	<10	3	6
APR 30...	<1	<3	2	28	1	30	3	<0.1	<10	--	2
AUG 27...	<1	<3	1	41	<5	69	210	0.1	<10	3	2
	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG) (01077)	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, TOTAL RECOV- ERABLE (UG/L AS ZN) (01092)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	CYANIDE TOTAL (MG/L AS CN) (00720)			
OCT 17...	<1	--	<1	300	<6	--	4	--			
JAN 08...	<1	<1	<1	640	<6	20	6	<0.01			
APR 30...	<1	--	<1	190	<6	--	<3	--			
AUG 27...	<1	<1	<1	310	<6	20	13	<0.01			
	SAMPLE LOC- ATION, CROSS SECTION (FT FM L BANK) (00009)	TEMPER- ATURE (DEG C) (00010)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	OXYGEN, DIS- SOLVED (MG/L) (00300)						
OCT 17...	1430	10.0	4.5	1080	8.90	15.0					
17...	1432	20.0	5.0	1050	8.90	15.0					
17...	1435	30.0	4.5	1100	8.90	15.0					
17...	1437	40.0	4.0	1100	8.90	15.0					
17...	1440	50.0	4.0	1080	8.90	15.0					
17...	1445	60.0	4.0	1080	8.90	15.0					
17...	1450	70.0	4.0	1080	8.90	15.1					
17...	1455	80.0	4.0	1080	8.90	15.0					
17...	1500	90.0	4.5	1080	8.90	15.2					
JAN 08...	1400	10.0	0.0	1640	7.20	--					
08...	1410	20.0	0.0	1600	7.20	0.5					
08...	1420	30.0	0.0	1550	7.20	--					
08...	1430	40.0	0.0	1500	7.21	0.4					
08...	1440	50.0	0.0	1550	7.21	--					
08...	1450	60.0	0.0	1600	7.21	0.3					
08...	1500	70.0	0.0	1550	7.20	0.4					
APR 30...	1300	10.0	11.0	680	8.56	--					
30...	1305	20.0	11.0	670	8.56	--					
30...	1308	30.0	11.0	670	8.56	10.6					
30...	1310	40.0	11.0	670	8.56	--					
30...	1315	50.0	10.5	670	8.56	--					
30...	1318	60.0	10.5	670	8.55	10.2					
30...	1320	70.0	10.5	680	8.55	--					
30...	1325	80.0	10.5	670	8.55	--					
30...	1328	90.0	10.5	670	8.55	10.7					
30...	1345	100	11.0	670	8.56	10.2					



05124000 SOURIS RIVER NEAR WESTHOPE, ND--CONTINUED

## WATER-QUALITY RECORDS

INSTANTANEOUS SUSPENDED SEDIMENT AND PARTICLE SIZE, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	TEMPER- ATURE (DEG C) (00010)	DIS- CHARGE, IN CUBIC FEET PER SECOND (00060)	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	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							
17...	1500	4.5		229	43	27	97
JAN							
08...	1500	0.0	--	42	67	7.6	--
MAR							
04...	1515	1.0	125	--	62	21	--
05...	0715	0.5	155	--	20	8.2	--
06...	0720	0.5	170	--	22	10	--
07...	0815	0.5	150	--	12	5.0	--
08...	0730	0.5	135	--	22	8.0	--
09...	0740	0.5	130	--	51	18	--
10...	0700	0.5	110	--	49	15	--
11...	0715	0.5	9.0	--	11	0.26	--
12...	0715	0.5	8.0	--	22	0.48	--
13...	0745	1.0	4.0	--	13	0.14	--
14...	0730	0.5	17	--	17	0.76	--
15...	0730	0.5	2.5	--	14	0.1	--
16...	0730	1.0	3.0	--	30	0.25	--
17...	0730	0.5	3.0	--	20	0.16	--
18...	0730	1.0	3.0	--	14	0.11	--
19...	0730	0.5	3.0	--	13	0.11	--
20...	0800	0.5	3.0	--	11	0.09	--
21...	0715	1.0	3.0	--	10	0.08	--
22...	0800	2.0	3.0	--	17	0.14	--
23...	0715	0.5	3.0	--	28	0.23	--
24...	0730	1.0	5.0	--	25	0.33	--
25...	0756	2.0	10	--	27	0.73	--
26...	0745	0.5	40	--	34	3.7	--
27...	0730	2.0	35	--	17	1.6	--
28...	0730	4.0	25	--	53	3.6	--
29...	0712	6.0	60	--	14	2.3	--
30...	0710	6.0	88	--	36	8.5	--
31...	0730	8.0	193	--	33	17	--
APR							
01...	0730	7.0	345	--	153	143	--
02...	0730	7.0	358	--	132	127	--
03...	0730	5.5	396	--	39	42	--
04...	0730	6.0	376	--	33	33	--
05...	0730	7.0	315	--	21	18	--
06...	0735	6.5	291	--	16	12	--
07...	0731	6.5	298	--	24	19	--
08...	0732	8.0	288	--	20	16	--
08...	1230	8.5	--	287	27	21	97
09...	0720	8.5	275	--	26	19	--
10...	0725	9.0	270	--	24	17	--
11...	0725	9.0	296	--	27	21	--
12...	0733	5.0	299	--	24	19	--
13...	0715	2.5	318	--	53	46	--
15...	0745	1.0	484	--	12	15	--
16...	0750	1.5	373	--	59	59	--
17...	0715	3.0	398	--	28	30	--
18...	0720	4.0	470	--	13	16	--
19...	0705	4.0	485	--	9	11	--
20...	0700	5.0	500	--	10	14	--
21...	0725	4.5	525	--	22	31	--
22...	0715	6.0	518	--	19	27	--
23...	0715	8.5	580	--	23	35	--
24...	0707	8.5	636	--	17	29	--
25...	0710	9.5	645	--	18	32	--
26...	0700	8.5	644	--	16	28	--
27...	0745	7.5	626	--	13	22	--
28...	0715	6.5	620	--	9	16	--
29...	0700	8.5	--	603	13	22	--
30...	0710	10.0	--	619	14	23	--
30...	1345	11.0	--	605	22	36	96
JUN							
17...	1020	18.0	--	85	3	0.58	100
JUL							
22...	1720	27.0	--	28	5	0.38	100
AUG							
27...	1230	16.5	--	26	8	0.54	100

## MISSOURI RIVER MAIN STEM

06185500 MISSOURI RIVER NEAR CULBERTSON, MT  
(National stream-quality accounting network station)

LOCATION.--Lat 48°07'30", long 104°28'20", in SE1/4NW1/4 sec.3, T.27 N., R.56 E., Richland County, Hydrologic Unit 10060005, on right bank at downstream side of bridge on State Highway 16, 2.5 mi southeast of Culbertson, 10 mi downstream from Big Muddy Creek, and at mile 1,620.76.

DRAINAGE AREA.--91,557 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--July 1941 to December 1951, April 1958 to current year.

REVISED RECORDS.--WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,883.4 ft above National Geodetic Vertical Datum of 1929 (U.S. Army Corps of Engineers bench mark). July 1 to Nov. 6, 1941, water-stage recorder at site 400 ft upstream at datum 0.11 ft. Nov. 7, 1941, to Aug. 17, 1950, water-stage recorder at site 580 ft downstream at present datum. Aug. 18, 1950, to Dec. 31, 1951, nonrecording gage on bridge at present datum. Apr. 1, 1958, to Nov. 1, 1967, water-stage recorder at site 580 ft downstream at present datum.

REMARKS.--Estimated daily discharges: Nov. 14 to Mar. 12. Water-discharge records good except those for estimated daily discharges, which are poor. Flow partly regulated by Fort Peck Lake (station number 06131500) and many other reservoirs upstream from station. Diversions for irrigation of about 1,030,400 acres upstream from station. Water quality records for the current year are also available. These records which have been published in U.S. Geological Survey Report MT-86-1, can also be accessed through the U.S. Geological WATSTORE data system.

AVERAGE DISCHARGE.--36 years (1943-51, 1958-86, after operational level at Fort Peck Lake was reached), 10,940 ft<sup>3</sup>/s, 7,926,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 78,200 ft<sup>3</sup>/s, Mar. 26, 1943, gage height, 14.80 ft, from rating curve extended above 30,000 ft<sup>3</sup>/s; maximum gage height observed, 19.66 ft, Apr. 14, 1979, backwater from ice jam; minimum daily discharge, 575 ft<sup>3</sup>/s, Nov. 22, 1941.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 22,000 ft<sup>3</sup>/s, Mar. 10; maximum gage height, 14.52 ft, Mar. 12, backwater from ice; minimum daily discharge, 5,500 ft<sup>3</sup>/s, Nov. 20.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6290	6570	9500	14000	14000	14500	8390	7200	9540	8350	8200	7250
2	6120	6560	9500	14000	14500	15000	8170	7120	9820	9950	8210	7250
3	6210	6520	9500	14000	14500	16000	8110	7090	9720	9020	8270	7240
4	6040	6550	9500	14500	14500	17000	8040	7070	9430	8410	8170	6830
5	6140	6350	9500	14500	14500	19000	7950	7380	9100	8530	7620	6630
6	6240	6290	9500	14000	14500	20000	7850	7630	8920	8510	7390	6830
7	6430	6210	9500	14500	14500	20000	7780	8030	9290	8800	7270	6780
8	6470	6340	9500	14500	14500	20000	7850	8270	10000	8740	7160	6790
9	6600	6490	9500	14500	14500	21000	7650	8050	9810	8650	7590	6740
10	6840	6730	9500	14500	14500	22000	7570	8300	9500	8750	7910	6710
11	6740	5810	10500	14500	14500	21500	7560	9150	9360	8960	7900	7030
12	6590	6070	10500	14500	14000	21500	7480	9710	8960	9070	7810	6700
13	6520	6160	11500	14500	14500	15100	7550	9610	8490	8970	8120	6750
14	6570	6500	11500	14000	14500	13200	7590	10000	8260	8950	8270	6960
15	6620	6500	11500	14000	14500	12700	7740	11000	8290	9040	8210	7040
16	6750	6500	12500	14500	14500	12600	7720	11600	8390	9030	8210	6970
17	6720	6500	12500	14500	14500	12400	7620	12100	8440	9050	8180	6890
18	6670	6000	12500	14500	14500	12400	7750	12300	8350	9190	8170	7140
19	6750	6000	13000	14500	14500	12600	8030	12300	8520	9940	8150	7180
20	6630	5500	13500	14500	14500	12200	7960	12500	8470	9110	7980	7310
21	6560	6000	13500	14500	14500	11500	7780	12600	8710	8790	8020	7640
22	6670	8000	13500	14500	14500	10300	7720	12600	8420	8620	8090	7660
23	6740	9500	13500	14500	14500	9470	7710	12500	8320	8540	8210	7460
24	7370	10000	13500	14500	14500	9230	7620	12200	8350	8390	7600	7500
25	11100	10000	13500	14500	14500	9140	7600	11600	8410	8410	7260	8000
26	11500	9500	14000	14500	14500	9250	7400	10800	8460	8420	7200	8380
27	8580	9500	13500	14500	14500	8890	7320	10300	8320	8380	7210	9450
28	7230	9500	14000	14500	14000	9090	7260	10000	8080	8400	7310	10600
29	6920	9500	14000	14500	---	8880	7240	9760	8020	8510	7300	10100
30	6800	9500	14000	14500	---	8430	7290	9540	8070	8270	7340	11100
31	6680	---	13500	14500	---	8690	---	9800	---	8120	7320	---
TOTAL	216090	217150	365000	446500	404500	433570	231300	308110	263820	271870	241650	226910
MEAN	6971	7238	11770	14400	14450	13990	7710	9939	8794	8770	7795	7564
MAX	11500	10000	14000	14500	14500	22000	8390	12600	10000	9950	8270	11100
MIN	6040	5500	9500	14000	14000	8430	7240	7070	8020	8120	7160	6630
AC-FT	428600	430700	724000	885600	802300	860000	458800	611100	523300	539300	479300	450100
CAL YR 1985	TOTAL	3743490		MEAN	10260	MAX	15000	MIN	5500	AC-FT	7425000	
WTR YR 1986	TOTAL	3626470		MEAN	9936	MAX	22000	MIN	5500	AC-FT	7193000	

## MISSOURI RIVER MAIN STEM

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06185600 MISSOURI RIVER STAGE GAGE NO. 4 NEAR NOHLY, MT

LOCATION.--Lat 48°02'10", long 104°09'40", in NE¼ sec.1, T.26 N., R.58 E., Richland County, Hydrologic Unit 10060005, on right bank 4.5 mi northwest of Nohly, and at mile 1,595.7.

DRAINAGE AREA.--93,000 mi<sup>2</sup>, approximately.

## GAGE-HEIGHT RECORDS

PERIOD OF RECORD.--March 1959 to current year (seasonal).

GAGE.--Water-stage recorder. Datum of gage is 1,860.00 ft above National Geodetic Vertical Datum of 1929. Prior to Apr. 18, 1962 at datum 60.00 ft lower.

REMARKS.--Stage regulated by Fort Peck Reservoir.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily gage height recorded, 21.20 ft, Mar. 23, 1960, present datum; minimum daily recorded, 6.87 ft, Apr. 18, 1963.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10.58							---	11.99	11.35	11.30	10.64
2	10.45							---	11.99	11.86	11.31	10.63
3	10.51							---	12.08	12.00	11.30	10.60
4	10.47							---	11.97	11.58	11.31	10.49
5	10.45							---	11.84	11.52	11.12	10.35
6	10.55							---	11.75	11.51	10.85	10.40
7	10.74							---	11.78	11.57	10.82	10.38
8	10.78							---	12.09	11.69	10.71	10.36
9	---							---	12.23	11.55	10.84	10.33
10	---							---	12.08	11.61	11.06	10.28
11	---							---	12.01	11.67	11.11	10.41
12	---							---	11.88	11.79	11.06	10.41
13	---							---	11.67	11.76	11.09	10.26
14	---							---	11.51	11.72	11.24	10.39
15	---							---	11.48	11.74	11.24	10.43
16	---							---	11.52	11.75	11.22	10.44
17	---							---	11.54	11.75	11.21	10.41
18	---							---	11.47	11.75	11.20	10.52
19	---							---	11.54	12.09	11.21	10.58
20	---							---	11.57	11.92	11.11	10.55
21	---							---	11.64	11.66	11.07	10.68
22	---							---	11.61	11.54	11.11	10.81
23	---							---	11.47	11.51	11.12	10.71
24	---							---	11.50	11.42	11.08	10.68
25	---							---	11.49	11.40	10.69	10.90
26	---							---	11.49	11.41	10.63	11.04
27	---							---	11.49	11.41	10.64	11.43
28	---							12.22	11.37	11.40	10.68	12.05
29	---							12.11	11.31	11.44	10.68	12.18
30	---							11.99	11.29	11.41	10.69	12.21
31	---							12.01	---	11.31	10.68	---
MEAN	---							---	11.69	11.62	11.01	10.72
MAX	---							---	12.23	12.09	11.31	12.21
MIN	---							---	11.29	11.31	10.63	10.26

## MISSOURI RIVER MAIN STEM

06185650 MISSOURI RIVER STAGE GAGE NO. 5 AT NOHLY, MT

LOCATION.--Lat 48°00'10", long 104°05'30", in SE¼ sec.16, T.26 N., R.59 E., Richland County, Hydrologic Unit 10060005, at downstream side of bridge, 0.2 mi northwest of Nohly, and at mile 1,587.7.

DRAINAGE AREA.--93,000 mi<sup>2</sup>, approximately.

## GAGE-HEIGHT RECORDS

PERIOD OF RECORD.--April 1959 to current year (seasonal).

GAGE.--Water-stage recorder. Datum of gage is 1,800.00 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Stage regulated by Fort Peck Reservoir.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily gage height recorded, 77.22 ft, Mar. 15, 1972; minimum daily recorded, 59.12 ft, Nov. 22, 1964.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	62.80	63.10					---	63.56	65.55	65.03	64.25	63.70
2	62.96	63.08					---	63.51	65.85	65.17	64.28	63.68
3	62.94	63.03					---	63.46	66.11	65.33	64.25	63.69
4	62.90	63.02					---	63.42	66.24	64.93	64.27	63.60
5	62.91	63.04					---	63.49	66.50	64.72	64.12	63.43
6	62.94	62.94					---	64.77	66.72	64.67	63.86	63.46
7	63.11	62.90					---	63.76	66.94	64.70	63.82	63.43
8	63.13	62.87					---	64.05	67.29	64.86	63.72	63.42
9	63.09	62.96					---	64.18	67.65	64.75	63.79	63.39
10	63.21	63.00					---	64.61	67.81	64.70	64.00	63.34
11	63.24	62.82					---	64.94	67.63	64.67	64.07	63.44
12	63.18	62.51					---	65.09	67.19	64.75	64.04	63.48
13	63.08	63.88					---	65.18	67.14	64.73	64.04	63.31
14	63.10	---					---	65.07	66.91	64.69	64.20	63.42
15	63.11	---					---	65.24	66.65	64.71	64.21	63.49
16	63.14	---					---	65.51	66.78	64.74	64.20	63.49
17	63.17	---					---	65.67	66.79	64.82	64.21	63.46
18	63.16	---					---	65.79	66.64	64.99	64.19	63.56
19	63.14	---					---	65.83	66.76	64.97	64.20	63.64
20	63.19	---					---	65.80	66.82	64.98	64.13	63.63
21	63.08	---					---	65.90	66.65	64.68	64.09	63.72
22	63.10	---					---	65.93	66.47	64.56	64.11	63.86
23	63.15	---					63.77	65.91	66.09	64.49	64.13	63.81
24	63.18	---					63.73	65.84	65.84	64.41	64.13	63.76
25	64.16	---					63.72	65.74	65.53	64.36	63.74	63.93
26	65.48	---					63.67	65.54	65.25	64.37	63.67	64.16
27	65.02	---					63.58	65.31	65.07	64.36	63.67	64.99
28	63.87	---					63.56	65.14	64.87	64.36	63.70	65.54
29	63.39	---					63.56	65.03	64.86	64.38	63.72	65.46
30	63.23	---					63.58	64.93	65.33	64.37	63.73	65.26
31	63.20	---					---	65.11	---	64.27	63.72	---
MEAN	63.30	---					---	64.95	66.40	64.69	64.01	63.82
MAX	65.48	---					---	65.93	67.81	65.33	64.28	65.54
MIN	62.80	---					---	63.42	64.86	64.27	63.67	63.31



## 06329500 YELLOWSTONE RIVER NEAR SIDNEY, MT

LOCATION.--Lat 47°40'42", long 104°09'22", in SW1/4NE1/4SW1/4 sec.9, T.22 N., R.59 E., Richland County, Hydrologic Unit 10100004, on left bank at Montana-Dakota Utilities Company powerplant, 0.2 mi downstream from bridge on State Highway 23, 2.5 mi south of Sidney, 3.0 mi downstream from Fox Creek, and at mile 29.2.

DRAINAGE AREA.--69,103 mi<sup>2</sup>. Area at site 4.5 mi upstream, 68,812 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1910 to September 1931 (published as "at Intake"), October 1933 to current year. If monthly figures of diversions to Lower Yellowstone Canal at Intake are added to records at this site, records equivalent to those published as Yellowstone River at Glendive (1898-1910, 1931-34) can be obtained. Monthly discharge only for some periods, published in WSP 1309. Monthly figures of diversions into Lower Yellowstone Canal prior to 1951 published in WSP 1309, 1951-60 published in WSP 1729, 1961-65 published in WSP 1916, 1966-70 published in WSP 2116, and 1971 to current year are published in annual reports.

GAGE.--Water-stage recorder. Datum of gage is 1,881.3 ft National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). Jan. 1, 1911, to Sept. 30, 1931, nonrecording gage at site 32 miles upstream at different datum. Apr. 9, 1934, water-stage recorder at two sites within 500 ft of highway bridge 0.2 mi upstream and May 17, 1945, to Apr. 3, 1952, nonrecording gage on same bridge at datum 1.36 ft higher. Apr. 4, 1952 to Nov. 19, 1967, water-stage recorder at site 4.5 mi upstream at different datum.

REMARKS.--Estimated daily discharges: Nov. 17 to Mar. 13. Water-discharge records good except those for period of estimated daily discharges, which are poor. Some regulation on tributary streams. Diversion for irrigation of about 1,250,000 acres upstream from station. Lower Yellowstone Project Main Canal diverts from left bank in NW1/4 sec.36, T.18 N., R.56 E., at Lower Yellowstone diversion dam at Intake about 36.6 mi upstream for irrigation of about 52,000 acres of which about one-third lies upstream from station (see table below). Water-quality records for the current year are also available. These records, which have been published in U.S. Geological Survey Report MT-86-1, can also be accessed through the U.S. Geological Survey's WATSTORE data system.

AVERAGE DISCHARGE.--74 years, 13,010 ft<sup>3</sup>/s, 9,426,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge observed, 159,000 ft<sup>3</sup>/s, June 2, 1921, gage height, 12.6 ft, site and datum then in use; maximum gage height observed, 21.85 ft, Mar. 22, 1947, site and datum then in use, backwater from ice; minimum discharge, 470 ft<sup>3</sup>/s, May 17, 1961, gage height, 2.73 ft, site and datum then in use.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 59,900 ft<sup>3</sup>/s, June 10, gage height, 14.87 ft; maximum gage height observed, 19.60 ft, Feb. 27, result of ice jam; minimum daily discharge, 1,800 ft<sup>3</sup>/s, Nov. 26, 27.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7560	6940	3500	5000	5000	45000	8280	13600	32100	28200	13000	6690
2	7580	6900	4000	6000	5000	35000	8010	12900	34700	26800	12700	8920
3	7610	6880	4000	7000	5000	30700	8550	12400	36500	25800	12400	14900
4	7680	6880	4000	7000	4500	24000	8960	12100	39300	24200	11800	11300
5	7520	6810	3500	7500	4500	20100	9320	11700	43200	23000	10900	9970
6	7490	6770	4000	8000	4000	20700	9330	11900	46000	22400	10100	9470
7	7790	6780	5000	7500	4000	17700	9020	13300	47800	23000	9430	8940
8	7930	6750	6000	7000	4000	15900	8810	16200	51400	23600	8630	8710
9	7960	6730	7000	6500	4000	13700	8570	19700	55900	22300	8100	8610
10	7870	6700	8000	6000	4000	12700	8420	26900	58800	20500	7610	8590
11	7970	6820	7000	5500	4000	12500	8320	27300	54100	19300	7500	8600
12	8120	6260	6000	6000	4000	12200	8590	24800	52700	18800	7400	8640
13	8020	6040	5000	7000	4500	12400	9370	23100	53700	18700	7510	8780
14	7880	5700	6000	6500	4500	11300	10200	20900	49300	19000	7380	9010
15	7760	5700	7000	6000	4500	10900	10300	18800	47800	19600	7260	9140
16	7750	5350	6500	6000	4500	10100	10700	17400	48300	19000	7430	9330
17	7700	4500	6000	7500	5000	9740	11200	15700	47000	27100	7430	9840
18	7610	3500	5500	7000	5000	9360	11000	14600	47300	19200	7120	10100
19	7380	2500	6500	6500	5500	9230	10900	14100	49000	17400	6980	11700
20	7060	2000	7000	5500	6000	9110	11300	13300	46400	17800	6840	12400
21	6410	2500	6500	6000	6000	9200	11400	12700	44500	17700	6540	12700
22	6940	3000	6500	6500	6000	9300	10800	12000	41600	17100	6340	12200
23	7230	2500	6000	7000	6500	9490	10400	11600	38400	16300	6370	11800
24	7230	2200	5500	7500	7000	9630	10100	12000	35300	15400	6380	11900
25	7170	1900	6000	7500	7500	9410	10200	15700	32200	14600	6290	15100
26	7070	1800	6000	7000	10000	9130	10200	19500	29400	14200	6280	23700
27	7070	1800	6500	7000	25000	9050	11400	18300	28100	14000	6890	37800
28	7120	2000	6000	6500	35000	8950	13300	16400	26600	14400	6830	32400
29	7070	2500	5500	6000	---	8560	13900	16500	31000	13800	6640	21000
30	7050	3000	5500	5500	---	8570	13900	21000	32100	13700	6500	15600
31	7000	---	5500	5500	---	8410	---	27300	---	13600	6510	---
TOTAL	231520	139710	177000	203000	194500	442040	304750	523700	1280500	600500	249090	387840
MEAN	7468	4657	5710	6548	6946	14260	10160	16390	42680	19370	8035	12930
MAX	8120	6940	8000	8000	35000	45000	13900	27300	58800	28200	13000	37800
MIN	6410	1800	3500	5000	4000	8410	8010	11600	26600	13600	6280	6690
AC-FT	459200	277100	351100	402700	385800	876800	604500	1039000	2540000	1191000	494100	769300
(†)	0	0	0	0	0	0	0	67200	72800	75300	81200	51600
CAL YR 1985	TOTAL	2865070		MEAN	7850	MAX	28700	MIN	1800	AC-FT	5683000	
WTR YR 1986	TOTAL	4734150		MEAN	12970	MAX	58800	MIN	1800	AC-FT	9390000	

†Diversions, in acre-feet, by Lower Yellowstone Canal, furnished by the Bureau of Reclamation.

## YELLOWSTONE RIVER BASIN

06329590 YELLOWSTONE RIVER STAGE GAGE NO. 1 NEAR FAIRVIEW, MT

LOCATION.--Lat 47°48'34", long 104°02'36", sec. 18, T.150 N., R.104 W., McKenzie County, Hydrologic Unit 10100004, on left bank 3 mi south of Fairview, and at mile 15.2.

DRAINAGE AREA.--70,000 mi<sup>2</sup>, approximately.

## GAGE-HEIGHT RECORDS

PERIOD OF RECORD.--March 1959 to current year (seasonal).

GAGE.--Water-stage recorder. Datum of gage is 1,860.00 ft above National Geodetic Vertical Datum of 1929. Prior to Feb. 19, 1962, at datum 60.00 ft lower.

REVISED RECORDS.--WDR ND-82: 1980-81.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily gage height recorded, 23.78 ft, Mar. 21, 1960, present datum; minimum daily recorded, 9.10 ft, May 16, 17, Aug. 12, 13, 1961, present datum.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1985 to SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	11.16	10.87					---	13.18	16.90	15.97	12.89	10.76
2	11.14	10.85					---	12.92	17.31	15.62	12.82	10.96
3	11.12	10.85					---	12.72	17.54	15.37	12.75	13.37
4	11.19	10.87					---	12.62	17.93	---	12.59	12.64
5	11.15	10.79					---	12.46	18.37	---	12.33	12.01
6	11.10	10.83					---	12.51	18.66	---	12.07	11.81
7	11.24	10.83					---	12.82	18.87	---	11.92	11.63
8	11.31	10.85					---	13.67	19.18	---	11.64	11.54
9	11.32	10.84					---	14.55	19.55	---	11.44	11.50
10	11.27	10.95					---	16.11	19.88	---	11.31	11.49
11	11.28	11.14					---	16.23	19.33	---	11.22	11.51
12	11.36	11.01					---	15.71	19.20	---	11.19	11.54
13	11.32	---					---	15.58	19.40	---	11.26	11.61
14	11.24	---					---	15.13	18.90	---	11.23	11.71
15	11.23	---					---	14.72	18.79	---	10.99	11.79
16	11.23	---					---	14.32	18.91	---	11.12	11.85
17	11.18	---					---	13.99	18.81	---	11.27	11.99
18	11.16	---					---	13.59	18.85	---	11.05	12.12
19	11.08	---					---	13.45	19.10	13.95	10.90	12.45
20	11.00	---					---	13.27	18.74	14.00	10.80	13.16
21	10.76	---					---	13.08	18.53	14.00	10.76	13.10
22	10.86	---					---	12.85	18.22	13.94	10.66	12.88
23	10.98	---					---	12.70	17.78	13.71	10.67	12.68
24	10.98	---					---	12.71	17.38	13.46	10.67	12.83
25	10.96	---					12.14	13.46	16.93	13.27	10.62	13.48
26	10.93	---					12.08	14.64	16.44	13.13	10.59	14.90
27	10.94	---					12.19	14.58	16.16	13.05	10.75	17.10
28	10.94	---					12.87	14.02	15.89	13.14	10.86	16.60
29	10.94	---					13.14	13.80	16.32	13.05	10.76	15.21
30	10.91	---					13.15	14.68	16.78	12.98	10.71	14.09
31	10.88	---					---	15.97	---	13.01	10.68	---
MEAN	11.10	---					---	13.94	18.15	---	11.31	12.68
MAX	11.36	---					---	16.23	19.88	---	12.89	17.10
MIN	10.76	---					---	12.46	15.89	---	10.59	10.76

06329610 YELLOWSTONE RIVER STAGE GAGE NO. 2 NEAR CARTWRIGHT, ND

LOCATION.--Lat 47°51'50", long 103°58'06", on south line sec.26, T.151 N., R.104 W., McKenzie County, Hydrologic Unit 10100004, on bridge on State Highway 23, 2 mi west of Cartwright, and at mile 8.6.

DRAINAGE AREA.--70,000 mi<sup>2</sup>, approximately.

## GAGE-HEIGHT RECORDS

PERIOD OF RECORD.--April 1959 to current year (seasonal).

GAGE.--Water-stage recorder. Datum of gage is 1,800.00 ft above National Geodetic Vertical Datum of 1929.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily gage height recorded, 87.08 ft, Mar. 23, 1978; minimum daily recorded, 58.58 ft, July 26, 1974.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	65.51							---	71.30	70.75	67.22	65.17
2	65.55							---	71.81	70.41	67.11	65.27
3	65.53							---	72.06	70.24	67.06	67.69
4	65.56							---	72.40	69.91	66.93	67.20
5	65.51							---	72.92	69.62	66.65	66.47
6	65.47							---	73.30	69.45	66.35	66.20
7	65.53							---	73.57	69.49	66.17	66.31
8	65.54							---	73.91	69.69	65.87	66.12
9	65.55							---	74.41	69.48	65.65	66.07
10	65.54							---	74.72	69.10	65.47	66.14
11	65.56							---	74.33	68.75	65.42	66.26
12	65.65							---	74.02	68.61	65.41	66.16
13	65.64							---	74.19	68.58	65.41	66.19
14	65.60							---	73.74	68.69	65.41	66.04
15	65.56							---	73.51	68.77	65.35	66.03
16	65.59							---	73.60	68.78	65.29	66.13
17	65.57							---	73.48	69.94	65.37	66.28
18	65.56							---	73.48	69.46	65.35	66.40
19	65.50							---	73.78	68.39	65.26	66.67
20	65.45							---	73.47	68.42	65.15	67.18
21	65.29							---	73.20	68.42	65.08	67.22
22	65.31							---	72.90	68.35	65.00	67.15
23	65.43							---	72.42	68.14	65.04	66.94
24	65.42							---	71.99	67.90	65.16	67.03
25	65.40							---	71.50	67.69	65.06	67.67
26	65.35							---	70.97	67.52	64.95	69.11
27	65.37							---	70.66	67.43	65.08	71.52
28	65.40							---	70.43	67.52	65.23	71.23
29	65.34							---	70.72	67.47	65.16	69.71
30	---							69.36	71.69	67.33	65.15	68.40
31	---							70.39	---	67.36	65.12	---
MEAN	---							---	72.82	68.76	65.61	67.07
MAX	---							---	74.72	70.75	67.22	71.52
MIN	---							---	70.43	67.33	64.95	65.17

## YELLOWSTONE RIVER BASIN

06329620 YELLOWSTONE RIVER STAGE GAGE NO. 3 NEAR BUFORD, ND

LOCATION.--Lat 47°56'16", long 103°57'52", in SW¼ sec.35, T.152 N., R.104 W., McKenzie County, Hydrologic Unit 10100004, on left bank 4 mi south of Buford, and at mile 3.3.

DRAINAGE AREA.--70,000 mi<sup>2</sup>, approximately.

## GAGE-HEIGHT RECORDS

PERIOD OF RECORD.--April 1959 to current year (seasonal).

GAGE.--Water-stage recorder. Datum of gage is 1,850.00 ft above National Geodetic Vertical Datum of 1929. Prior to Apr. 19, 1962, at datum 50.00 ft lower.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily gage height recorded, 29.55 ft, Mar. 15, 1972; minimum daily recorded, 6.18 ft, Aug. 24, 1961, present datum.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10.43	10.15					---	10.85	16.53	---	11.95	---
2	10.41	10.16					---	10.62	17.12	---	---	---
3	10.40	10.17					---	10.40	17.41	---	---	11.72
4	10.43	10.18					---	10.29	17.80	---	---	11.62
5	10.40	10.17					---	10.18	18.30	---	---	10.69
6	10.33	10.17					---	10.14	18.70	---	---	10.38
7	10.44	10.18					---	10.39	18.99	---	---	10.10
8	10.59	---					---	11.10	19.31	---	---	9.93
9	10.50	10.22					---	12.16	19.80	---	---	9.88
10	10.56	---					---	13.82	20.18	---	---	9.88
11	10.52	---					---	---	19.79	---	---	9.89
12	10.65	---					---	---	19.30	---	---	9.90
13	10.63	---					---	---	19.40	---	---	9.90
14	10.50	---					---	---	19.00	---	---	10.02
15	10.45	---					---	---	18.68	---	---	10.13
16	10.46	---					---	---	18.76	---	---	10.22
17	10.43	---					---	---	18.65	---	---	10.39
18	10.39	---					---	---	18.51	---	---	10.61
19	10.30	---					---	---	18.85	---	---	10.92
20	10.23	---					---	---	18.70	---	---	11.65
21	10.09	---					---	---	18.41	---	---	11.67
22	10.05	---					---	---	18.09	---	---	11.70
23	10.19	---					---	---	17.55	12.89	---	11.40
24	10.20	---					9.59	---	---	12.65	---	11.46
25	10.21	---					9.61	---	---	12.42	---	11.91
26	10.47	---					9.62	---	---	12.27	---	13.61
27	10.50	---					9.73	---	---	12.17	---	---
28	10.29	---					10.45	13.46	---	12.21	---	---
29	10.20	---					10.77	13.10	---	12.20	---	---
30	10.17	---					10.84	13.88	---	12.06	---	---
31	10.16	---					---	15.36	---	12.09	---	---
MEAN	10.37	---					---	---	---	---	---	---
MAX	10.65	---					---	---	---	---	---	---
MIN	10.05	---					---	---	---	---	---	---



## MISSOURI RIVER MAIN STEM

209

06329640 MISSOURI RIVER STAGE GAGE NO. 5A AT BUFORD, ND

LOCATION.--Lat 47°59'06", long 103°59'05", in SE¼ sec.15, T.152 N., R.104 W., Williams County, Hydrologic Unit 10110101, on left bank 1.5 mi southwest of Buford, and at mile 1,580.7.

DRAINAGE AREA.--164,000 mi<sup>2</sup>, approximately.

## GAGE-HEIGHT RECORDS

PERIOD OF RECORD.--April 1960 to current year (seasonal).

GAGE.--Water-stage recorder. Datum of gage is 1,850.00 ft above National Geodetic Vertical Datum of 1929. Prior to Mar. 8, 1962, at datum 50.00 ft lower.

REMARKS.--Stage regulated by upstream reservoirs.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily gage height recorded, 19.37 ft, Mar. 23, 1978; minimum daily recorded, 2.63 ft, Aug. 15, 16, 1966.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.47	7.16					---	9.48	13.58	12.92	---	6.92
2	7.32	7.11					---	9.32	14.21	12.64	---	6.95
3	7.26	7.07					---	9.09	14.55	12.63	---	8.71
4	7.27	7.06					---	8.97	14.86	12.20	---	8.84
5	7.27	7.02					---	8.87	15.35	11.86	---	8.05
6	7.23	6.97					---	8.95	15.72	11.63	---	7.83
7	7.38	6.95					---	9.16	---	11.62	---	7.69
8	7.54	6.90					---	9.85	---	11.86	---	7.57
9	7.53	6.92					---	10.79	---	11.73	---	7.50
10	7.55	6.95					---	12.40	---	11.38	---	7.46
11	7.56	6.90					---	13.00	---	---	---	7.49
12	7.61	8.55					---	12.68	---	---	---	7.53
13	7.57	10.29					---	12.55	---	---	---	7.46
14	7.50	10.18					---	12.15	---	---	---	7.58
15	7.48	10.73					---	11.86	---	---	---	7.73
16	7.47	---					---	11.62	---	---	---	7.77
17	7.47	---					---	11.50	---	---	---	7.84
18	7.43	---					---	11.16	---	---	---	8.02
19	7.36	---					---	11.01	15.85	---	---	8.30
20	7.31	---					---	10.84	15.75	---	---	8.82
21	7.09	---					---	10.73	15.50	---	7.18	8.90
22	6.99	---					---	10.58	15.23	---	7.10	9.00
23	7.22	---					8.71	10.44	14.72	---	7.12	8.78
24	7.24	---					8.63	10.36	14.28	---	7.16	8.74
25	7.65	---					8.60	10.67	13.75	---	6.86	9.07
26	8.67	---					8.58	11.61	13.21	---	6.74	10.44
27	8.61	---					8.57	11.81	12.83	---	6.79	12.98
28	7.84	---					9.03	11.26	12.51	---	7.01	13.35
29	7.44	---					9.35	10.88	12.56	---	6.96	12.26
30	7.29	---					9.45	11.25	13.64	---	6.92	11.07
31	7.24	---					---	12.44	---	---	6.88	---
MEAN	7.48	---					---	10.88	---	---	---	8.69
MAX	8.67	---					---	13.00	---	---	---	13.35
MIN	6.99	---					---	8.87	---	---	---	6.92

## MISSOURI RIVER MAIN STEM

06329650 MISSOURI RIVER STAGE GAGE NO. 6 NEAR BUFORD, ND

LOCATION.--Lat 47°57'18", long 103°54'36", in SE¼ sec.30, T.152 N., R.103 W., Williams County, Hydrologic Unit 10110101, on right bank 5 mi southeast of Buford, and at mile 1,576.0.

DRAINAGE AREA.--164,000 mi<sup>2</sup>, approximately.

## GAGE-HEIGHT RECORDS

PERIOD OF RECORD.--December 1959 to current year (seasonal).

GAGE.--Water-stage recorder. Datum of gage is 1,840.00 ft above National Geodetic Vertical Datum of 1929. Prior to Apr. 17, 1962, at datum 40.00 ft lower.

REMARKS.--Stage regulated by upstream reservoirs.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily gage height recorded, 24.18 ft, June 10, 1986; minimum daily recorded, 8.23 ft, Aug. 15 and 22, 1963.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	14.61	14.40					---	16.87	20.97	20.61	16.86	14.49
2	14.48	14.36					---	16.74	21.61	20.28	16.78	14.50
3	14.44	14.32					---	16.54	21.98	20.29	16.70	16.09
4	14.44	14.31					---	16.43	22.28	19.90	16.63	16.43
5	14.44	14.30					---	16.38	22.70	19.54	16.33	15.62
6	14.42	14.24					---	16.42	23.11	19.29	15.91	15.37
7	14.60	14.24					---	16.61	23.35	19.24	15.68	15.22
8	14.73	14.20					---	17.25	23.59	19.48	15.40	15.10
9	14.71	14.21					---	18.24	23.98	19.39	15.21	15.04
10	14.72	14.19					---	19.73	24.18	19.08	15.18	15.00
11	14.74	14.35					---	20.55	23.96	18.75	15.14	15.02
12	14.78	15.42					---	20.19	23.45	18.59	15.10	15.07
13	14.72	15.84					---	19.96	23.41	18.50	15.08	15.00
14	14.68	---					---	19.57	23.21	18.50	15.17	15.12
15	14.68	---					---	19.25	23.01	18.54	15.13	15.25
16	14.67	---					---	19.05	23.08	18.65	15.09	15.30
17	14.67	---					---	18.97	23.13	19.18	15.16	15.36
18	14.65	---					---	18.67	23.03	19.94	15.12	15.53
19	14.59	---					---	18.41	23.20	18.45	15.03	15.78
20	14.55	---					---	18.39	23.23	18.41	14.94	16.26
21	14.36	---					---	18.27	23.02	18.24	14.81	16.37
22	14.24	---					---	18.20	22.76	18.10	14.75	16.46
23	14.46	---					16.07	18.05	22.31	17.86	14.73	16.26
24	14.48	---					16.00	18.05	21.87	17.59	14.79	16.22
25	14.83	---					15.96	18.28	21.40	17.32	14.51	16.47
26	15.84	---					15.95	19.05	20.88	17.17	14.37	17.84
27	15.82	---					15.93	19.35	20.47	17.10	14.40	20.59
28	15.08	---					16.35	18.88	20.19	17.09	14.61	21.01
29	14.64	---					16.70	18.51	20.14	17.14	14.57	19.95
30	14.50	---					16.85	18.79	21.30	16.98	14.52	18.61
31	14.46	---					---	19.88	---	16.96	14.49	---
MEAN	14.68	---					---	18.37	22.49	18.59	15.23	16.21
MAX	15.84	---					---	20.55	24.18	20.61	16.86	21.01
MIN	14.24	---					---	16.38	20.14	16.96	14.37	14.49

## MISSOURI RIVER MAIN STEM

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06329660 MISSOURI RIVER STAGE GAGE NO. 7 NEAR TRENTON, ND

LOCATION.--Lat 47°59'21", long 103°47'57", in NE¼ sec.13, T.152 N., R.103 W., McKenzie County, Hydrologic Unit 10110101, on right bank 5 mi south of Trenton, and at mile 1,566.7.

DRAINAGE AREA.--164,000 mi<sup>2</sup>, approximately.

## GAGE-HEIGHT RECORDS

PERIOD OF RECORD.--March 1959 to current year (seasonal).

GAGE.--Water-stage recorder. Datum of gage is 1,840.00 ft above National Geodetic Vertical Datum of 1929. Prior to Aug. 7, 1962, at site 0.8 mi upstream. Prior to May 29, 1963, at datum 40.00 ft lower.

REMARKS.--Stage regulated by upstream reservoirs.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily gage height recorded, 21.56 ft, July 10, 1975; minimum daily recorded, 4.34 ft, Aug. 19, 22, 1963.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10.44	10.15					---	12.73	16.53	16.83	13.42	11.24
2	10.34	10.13					---	12.62	17.25	16.41	13.34	11.24
3	10.28	10.08					---	12.42	17.63	16.40	13.28	12.44
4	10.26	10.09					---	12.30	17.93	16.06	13.22	12.97
5	10.24	10.07					---	12.25	18.27	15.76	12.98	12.26
6	10.24	10.03					---	12.29	18.70	15.46	12.59	11.97
7	10.51	10.02					---	12.41	18.94	15.38	12.37	11.81
8	10.55	10.00					---	12.97	19.14	15.59	12.15	11.70
9	10.51	10.05					---	13.87	19.48	15.57	11.97	11.66
10	10.54	---					---	15.27	19.67	15.32	11.94	11.63
11	10.56	---					---	16.28	19.53	14.98	11.94	11.62
12	10.58	---					---	16.12	19.09	14.80	11.91	11.64
13	10.51	---					---	15.91	19.02	14.72	11.87	11.60
14	10.48	---					---	15.54	18.94	14.71	11.92	11.72
15	10.45	---					---	15.23	18.86	14.76	11.90	11.86
16	10.45	---					---	15.00	18.91	14.88	11.86	11.89
17	10.42	---					---	14.86	19.04	15.37	11.92	11.91
18	10.39	---					---	14.58	18.98	16.25	11.91	12.07
19	10.30	---					---	14.39	19.11	14.91	11.80	12.31
20	10.27	---					---	14.23	19.16	14.76	11.69	12.69
21	10.03	---					---	14.04	19.01	14.61	11.62	12.81
22	10.02	---					---	13.97	18.79	14.47	11.54	12.89
23	10.19	---					12.05	13.87	18.39	14.30	11.45	12.72
24	10.23	---					11.93	13.76	17.99	14.05	11.51	12.65
25	10.79	---					11.88	13.92	17.55	13.81	11.26	12.94
26	11.62	---					11.89	14.70	17.03	13.69	11.12	13.96
27	11.45	---					11.86	15.13	16.58	13.63	11.15	16.53
28	10.76	---					12.21	14.76	16.28	13.60	11.33	17.32
29	10.38	---					12.58	14.34	16.14	13.66	11.30	16.62
30	10.26	---					12.75	14.48	17.19	13.51	11.24	15.29
31	10.21	---					---	15.45	---	13.47	11.20	---
MEAN	10.46	---					---	14.18	18.30	14.89	11.96	12.73
MAX	11.62	---					---	16.28	19.67	16.83	13.42	17.32
MIN	10.02	---					---	12.25	16.14	13.47	11.12	11.24

## MISSOURI RIVER MAIN STEM

06330000 MISSOURI RIVER NEAR WILLISTON, ND

LOCATION.--Lat 48°06'45", long 103°43'04", in SE¼ sec.31, T.154 N., R.101 W., Williams County, Hydrologic Unit 10110101, at city waterplant on left bank, 5 mi southwest of Williston, 29.3 mi downstream from Yellowstone River, and at mile 1,552.7.

DRAINAGE AREA.--164,500 mi<sup>2</sup>, approximately.

## GAGE-HEIGHT RECORDS

PERIOD OF RECORD.--April 1966 to current year. Operated as a stage-discharge station October 1897 to July 1965.

GAGE.--Water-stage recorder. Datum of gage is 1,830.20 ft above National Geodetic Vertical Datum of 1929. See WSP 1917 for history of changes prior to April 1966.

REMARKS.--Stage regulated by upstream reservoirs and backwater from Lake Sakakawea.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily gage height recorded, 26.46 ft, Mar. 26, 1978; minimum daily recorded, 7.80 ft, Nov. 2, 1966.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	14.15	13.85	15.32	18.00	18.24	21.93	15.11	15.81	---	19.76	18.94	17.02
2	14.02	13.79	15.69	18.03	18.25	25.30	15.06	15.82	---	19.51	18.96	16.87
3	13.94	13.79	15.90	18.04	18.26	25.16	14.95	15.65	---	19.37	18.91	17.00
4	13.86	13.79	16.04	18.01	18.31	24.78	15.00	15.45	19.35	19.31	18.94	17.31
5	13.93	13.70	16.19	18.03	18.36	23.85	15.04	15.34	19.54	19.09	18.84	17.17
6	13.91	13.68	16.20	18.03	18.44	22.95	15.05	15.40	19.63	18.92	18.60	16.90
7	14.09	13.69	16.24	17.96	18.50	22.87	15.04	15.50	19.68	19.05	18.45	16.86
8	14.20	13.72	16.43	17.85	18.54	22.61	14.98	15.85	19.80	19.11	18.47	16.98
9	14.17	13.79	16.60	17.73	18.45	22.34	14.94	16.57	20.05	19.31	18.14	17.10
10	14.17	13.89	16.71	17.81	18.05	21.90	14.85	17.38	20.16	19.26	18.30	16.97
11	14.18	14.57	16.87	18.06	17.62	20.42	14.75	18.29	20.20	19.10	18.30	16.79
12	14.16	15.54	17.03	18.17	17.19	19.90	14.75	18.11	20.03	18.95	18.34	16.60
13	14.15	15.10	17.26	18.21	16.85	---	14.85	17.99	20.00	19.03	18.14	16.89
14	14.08	15.06	17.40	18.21	16.67	---	14.91	17.77	20.07	19.04	18.03	17.00
15	14.11	15.09	17.39	18.20	16.76	---	15.09	17.59	20.01	19.22	18.01	17.11
16	14.12	15.35	17.30	18.16	17.02	---	15.20	17.44	20.08	19.34	17.94	17.01
17	14.09	15.56	17.22	18.17	17.21	17.70	15.24	17.45	20.31	19.41	18.06	16.80
18	14.05	15.72	17.31	18.15	17.40	17.31	15.28	17.36	20.30	19.85	18.00	16.96
19	14.06	15.40	17.45	18.14	17.60	17.05	15.27	17.25	20.37	19.40	17.74	17.22
20	14.00	15.03	17.55	18.12	17.76	16.82	15.33	17.12	20.55	19.36	17.55	17.26
21	13.93	14.93	17.63	18.12	17.74	16.56	15.45	17.08	20.55	19.41	17.94	17.14
22	13.73	14.57	17.75	18.19	17.69	16.26	15.43	16.95	20.45	19.46	17.48	17.08
23	13.80	14.26	17.87	18.26	17.68	16.16	15.28	16.85	20.38	19.35	17.55	17.08
24	13.86	14.10	17.97	18.26	17.65	15.99	15.24	16.25	20.30	19.20	17.49	17.20
25	14.03	14.06	18.06	18.19	17.80	15.64	15.20	16.25	20.04	19.31	17.31	17.64
26	14.65	14.29	18.09	18.14	18.08	15.64	15.14	17.13	19.75	19.15	17.20	17.54
27	15.01	14.68	18.10	18.14	19.04	15.50	15.08	---	19.52	19.15	17.17	19.07
28	14.62	15.07	18.11	18.10	20.41	15.38	15.21	---	19.34	19.09	17.20	19.85
29	14.19	15.14	18.14	18.06	---	15.24	15.56	---	19.38	19.15	17.12	19.72
30	14.04	15.05	18.15	18.13	---	15.22	15.71	---	19.70	18.85	17.00	19.04
31	13.90	---	18.08	18.20	---	15.06	---	---	---	18.87	16.90	---
MEAN	14.10	14.54	17.16	18.09	17.91	---	15.13	---	---	19.24	17.97	17.37
MAX	15.01	15.72	18.15	18.26	20.41	---	15.71	---	---	19.85	18.96	19.85
MIN	13.73	13.68	15.32	17.73	16.67	---	14.75	---	---	18.85	16.90	16.60
CAL YR 1985	MEAN	16.16	MAX	19.86	MIN	13.60						



## 06330110 MISSOURI RIVER STAGE GAGE NO. 9 AT WILLISTON, ND

LOCATION.--Lat 48°08'13", long 103°36'16", in NE1/4NE1/4 sec.25, T.154 N., R.101 W., Williams County, Hydrologic Unit 10110101, on left bank levee at southeast edge of Williston 0.5 mi upstream from Little Muddy Creek, and at mile 1,546.2.

DRAINAGE AREA.--164,500 mi<sup>2</sup>, approximately.

## GAGE-HEIGHT RECORDS

PERIOD OF RECORD.--April 1959 to current year (seasonal).

GAGE.--Water-stage recorder. Datum of gage is 1,820.00 ft above National Geodetic Vertical Datum of 1929. Prior to May 13, 1969, at site 900 ft downstream. At datum 20.00 ft lower prior to Apr. 7, 1962.

REMARKS.--Stage regulated by upstream reservoirs and backwater from Lake Sakakawea.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily gage height recorded, 34.22 ft, July 25, 28, 1975; minimum daily recorded, 5.44 ft, Aug. 20, 1961, present datum.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	21.85	21.90	22.75	25.17	25.35	27.51	22.60	22.89	24.67	27.25	28.25	26.45
2	21.77	21.75	23.01	25.16	25.37	29.91	22.73	23.13	25.22	27.37	28.31	26.22
3	21.73	21.74	23.23	25.17	25.40	30.72	22.46	23.11	25.32	27.40	28.31	25.97
4	21.65	21.93	23.44	25.16	25.44	30.52	22.55	22.77	25.49	27.40	28.30	25.93
5	21.76	21.67	23.47	25.17	25.47	30.20	22.49	22.53	25.83	27.10	28.25	26.11
6	21.76	21.72	23.55	25.17	25.53	29.92	22.46	22.49	25.78	27.11	28.03	25.97
7	21.81	21.85	23.53	25.17	25.59	29.98	22.52	22.68	25.84	27.46	27.98	26.00
8	21.95	21.70	23.64	25.10	25.61	30.03	22.55	22.84	26.06	27.52	28.04	26.21
9	21.87	21.73	23.82	25.00	25.57	29.44	22.56	23.37	26.34	27.81	27.71	26.37
10	21.98	21.72	23.88	24.99	25.29	29.52	22.52	23.91	26.39	27.80	27.89	26.15
11	21.94	22.08	23.91	25.18	24.96	28.18	22.30	24.48	26.58	27.72	27.95	25.86
12	21.86	23.14	24.11	25.29	24.57	27.19	22.20	24.26	26.34	27.55	27.92	25.64
13	21.86	23.06	24.26	25.34	24.28	26.59	22.34	24.14	26.39	27.77	27.69	26.12
14	21.83	23.05	24.43	25.35	24.06	25.71	22.77	24.03	26.56	27.82	27.60	26.19
15	21.92	23.01	24.48	25.34	24.05	24.99	22.54	23.95	26.53	28.06	27.57	26.43
16	21.99	23.12	24.46	25.32	24.22	24.50	22.82	23.74	26.68	28.20	27.47	26.16
17	21.89	23.27	24.45	25.32	24.40	24.32	22.75	23.83	27.00	28.26	27.65	25.77
18	21.92	23.41	24.53	25.33	24.53	24.05	22.66	23.88	27.00	28.44	27.55	26.00
19	21.86	23.28	24.65	25.31	24.69	23.88	22.54	23.93	26.97	28.18	27.27	26.30
20	21.83	23.01	24.70	25.30	24.81	23.70	22.57	24.01	27.11	28.37	27.05	26.15
21	21.83	22.86	24.78	25.29	24.84	23.55	22.80	24.52	27.20	28.39	27.60	25.78
22	21.75	22.61	24.86	25.32	24.83	23.19	22.78	24.27	27.15	28.65	26.98	25.67
23	21.71	22.37	24.95	25.39	24.84	23.17	22.54	23.72	27.20	28.48	27.24	25.79
24	21.75	22.24	25.02	25.40	24.82	23.17	22.59	23.61	27.31	28.37	26.93	26.17
25	21.81	22.16	25.12	25.36	24.91	22.81	22.58	23.60	27.19	28.64	26.86	26.59
26	21.99	22.16	25.20	25.31	25.12	22.85	22.44	23.85	27.04	28.43	26.71	26.12
27	22.31	22.29	25.19	25.29	25.77	22.83	22.37	24.21	27.03	28.49	26.69	26.47
28	22.13	22.55	25.21	25.27	26.65	22.76	22.45	24.26	27.00	28.44	26.72	26.99
29	21.99	22.69	25.22	25.23	---	22.46	22.70	24.05	27.38	28.46	26.55	26.97
30	21.97	22.67	25.25	25.25	---	22.55	22.77	23.90	27.41	28.18	26.47	26.76
31	21.79	---	25.23	25.33	---	22.50	---	24.09	---	28.22	26.30	---
MEAN	21.87	22.42	24.33	25.25	25.03	25.89	22.56	23.68	26.53	27.98	27.48	26.18
MAX	22.31	23.41	25.25	25.40	26.65	30.72	22.82	24.52	27.41	28.65	28.31	26.99
MIN	21.65	21.67	22.75	24.99	24.05	22.46	22.20	22.49	24.67	27.10	26.30	25.64
WTR YR 1986	MEAN	24.94		MAX	30.72		MIN	21.65				

## LITTLE MUDDY RIVER BASIN

06331000 LITTLE MUDDY RIVER BELOW COW CREEK NEAR WILLISTON, ND

LOCATION.--Lat 48°17'04", long 103°34'21", in NE¼NW¼ sec.5, T.155 N., R.100 W., Williams County, Hydrologic Unit 10110102, on left bank 37 ft downstream from centerline of highway, 1 mi downstream from Cow Creek, 4 mi upstream from Camp Creek, 10 mi northeast of Williston, and 13 mi upstream from mouth.

DRAINAGE AREA.--875 mi<sup>2</sup>, approximately, of which about 100 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--May 1954 to current year (seasonal records only since 1984).

GAGE.--Water-stage recorder. Datum of gage is 1,863.18 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Feb. 1-26. Records good except those for period of estimated daily discharges, which are poor. Some small diversions for irrigation. Some regulation by Lake Zahl, Fish and Wildlife Service reservoir 22 mi upstream and Blacktail Dam about 15 mi upstream.

AVERAGE DISCHARGE.--29 years (water years 1955-1983), 38.8 ft<sup>3</sup>/s, 28,110 acre-ft/yr; median of yearly mean discharges, 31 ft<sup>3</sup>/s, 22,500 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9,180 ft<sup>3</sup>/s, Apr. 18, 1979, gage height, 12.77 ft; maximum gage height, 13.57 ft, Mar. 27, 1960; minimum discharge, 0.20 ft<sup>3</sup>/s, Nov. 27, 1960, Feb. 5, 1963, and June 4, 1968.

EXTREMES FOR CURRENT YEAR.--Maximum recorded discharge, 1,500 ft<sup>3</sup>/s, Feb. 27, gage height, 9.32 ft, minimum daily discharge, 5.0 ft<sup>3</sup>/s, Sept. 1, but may have been less during period of nonoperation.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1					5.8	460	34	23	9.1	8.8	11	5.0
2					5.8	877	35	22	8.9	8.1	11	5.3
3					6.0	595	34	19	11	8.0	11	6.3
4					6.0	374	33	17	11	7.8	10	5.6
5					6.2	297	34	18	11	13	9.7	5.4
6					6.2	239	34	24	11	12	9.2	5.6
7					6.2	297	33	34	11	12	8.5	6.3
8					6.0	114	32	34	11	11	8.1	6.4
9					6.0	84	32	36	12	11	8.0	5.8
10					6.0	66	30	60	12	11	7.7	5.7
11					6.0	58	31	58	12	13	7.3	5.6
12					6.0	49	32	36	11	13	7.3	5.4
13					6.0	46	37	27	10	13	7.6	5.4
14					5.8	42	35	23	10	11	7.7	5.6
15					5.8	41	30	19	8.3	10	7.3	6.4
16					5.8	35	32	16	8.4	10	7.1	6.4
17					5.8	31	73	14	7.7	427	6.9	6.4
18					5.8	29	81	13	7.7	272	6.9	7.5
19					5.6	26	76	12	7.7	78	6.5	14
20					5.6	25	58	10	9.2	44	6.1	12
21					5.6	27	48	9.3	11	31	5.8	13
22					5.5	28	40	12	14	24	5.5	13
23					5.5	27	34	19	11	19	5.4	11
24					5.5	27	30	18	12	16	5.3	9.8
25					6.0	30	30	19	11	16	5.2	17
26					90	32	30	19	10	15	5.2	16
27					1110	33	30	17	9.3	15	5.2	15
28					586	36	30	14	8.5	15	5.2	15
29					---	40	27	13	8.9	13	5.3	14
30					---	36	26	11	9.7	12	5.3	12
31					---	37	---	11	---	12	5.1	---
TOTAL					1932.5	4138	1141	677.3	305.4	1181.7	223.4	267.9
MEAN					69.0	133	38.0	21.8	10.2	38.1	7.21	8.93
MAX					1110	877	81	60	14	427	11	17
MIN					5.5	25	26	9.3	7.7	7.8	5.1	5.0
AC-FT					3830	8210	2260	1340	606	2340	443	531

06331000 LITTLE MUDDY RIVER BELOW COW CREEK NEAR WILLISTON, ND--CONTINUED

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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)
MAR											
*05...	1105	230	380	7.75	3.5	0.5	100	--	21	12	43
05...	1106	230	380	7.75	3.5	0.5	98	98	21	11	43
19...	1025	26	1220	--	-4.5	1.0	--	--	--	--	--
MAY											
07...	1405	38	2290	--	7.0	10.0	--	--	--	--	--
JUN											
20...	0815	8.8	2200	--	17.0	19.5	--	--	--	--	--
JUL											
22...	0835	24	720	--	22.5	21.5	--	--	--	--	--
AUG											
22...	0810	5.4	2100	8.08	12.5	16.5	390	--	53	63	370
DATE	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR											
*05...	45	2	9.7	110	87	0.9	0.1	10	250	250	0.34
05...	46	2	9.8	107	86	3.0	<0.1	10	260	250	0.35
AUG											
22...	66	8	11	620	560	7.6	0.3	10	1400	1500	1.9
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)	
MAR											
*05...	2	80	100	1	11	80	0.1	1	<1	140	
05...	2	60	180	1	13	51	--	<1	<1	160	
AUG											
22...	6	410	20	<1	79	10	<0.1	3	<1	690	

\*Split sample - analysis by North Dakota State Water Commission Laboratory.

## BEAR DEN CREEK BASIN

06332515 BEAR DEN CREEK NEAR MANDAREE, ND  
(Hydrologic bench-mark station)

(National stream quality accounting network station and radiochemical program station)

LOCATION.--Lat 47°47'14", long 102°46'05", in NW¼ sec.30, T.150 N., R.94 W., McKenzie County, Hydrologic Unit 10110101, on right bank 0.5 mi upstream from county highway culvert, and 5.5 mi northwest of Mandaree.

DRAINAGE AREA.--74 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

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

GAGE.--Water-stage recorder. Datum of gage is 1,947.58 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Oct. 1 to Mar. 17, June 5-17 and July 26 to Sept. 10. Records poor.

AVERAGE DISCHARGE.--20 years, 8.28 ft<sup>3</sup>/s, 6,000 acre-ft/yr; median of yearly mean discharges, 8.3 ft<sup>3</sup>/s, 6,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,840 ft<sup>3</sup>/s, Mar. 13, 1972, gage height, 9.02 ft; maximum gage height, 10.03 ft Apr. 6, 1969; no flow at times most years.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 100 ft<sup>3</sup>/s and maximum (\*):

Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)	Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)
Feb. 26	----	150	*87.61	May 23	0415	321	4.38
May 6	0045	104	3.65	July 17	1500	*389	4.60
May 10	0015	102	3.63				

No flow Dec. 28 to Feb. 4.

a - Backwater from ice

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.05	.32	.16	.00	.00	70	.26	2.8	.80	.19	.24	.12
2	.08	.34	.16	.00	.00	85	.19	.89	.75	.24	.22	.20
3	.12	.40	.15	.00	.00	90	.32	.46	.65	.30	.20	.25
4	.15	.38	.15	.00	.00	75	.35	.65	.45	.23	.18	.20
5	.10	.36	.15	.00	.00	60	.45	12	.35	.21	.15	.40
6	.12	.34	.17	.00	.00	50	.43	65	.50	.19	.18	.30
7	1.0	.30	.19	.00	.00	45	.32	27	.40	.14	.16	.20
8	2.0	.28	.20	.00	.00	40	.41	8.5	.35	.16	.14	.16
9	2.5	.25	.20	.00	.00	50	.37	47	.70	.15	.12	.14
10	3.5	.22	.18	.00	.00	40	.27	32	.50	.19	.11	.14
11	3.2	.22	.15	.00	.00	35	.22	8.1	.40	.42	.10	.13
12	3.0	.20	.10	.00	.00	30	.22	4.3	.30	.36	.12	.12
13	2.8	.20	.08	.00	.00	20	.22	2.3	.25	.36	1.0	.14
14	2.5	.22	.07	.00	.00	15	.25	1.7	.60	.31	1.5	.15
15	2.4	.25	.06	.00	.00	12	.33	1.6	.40	.35	.90	.16
16	2.2	.25	.06	.00	.00	10	.66	1.7	.30	.25	.60	.14
17	1.8	.24	.05	.00	.00	7.5	2.6	1.2	.25	175	.40	.14
18	1.5	.24	.04	.00	.00	4.6	3.7	.94	.24	54	.30	.14
19	1.2	.22	.03	.00	.00	2.9	2.8	.94	.27	7.6	.20	.39
20	1.0	.22	.03	.00	.00	2.3	1.2	1.0	.16	3.1	.16	1.1
21	.82	.22	.03	.00	.00	1.9	.65	.81	.18	1.5	.14	2.0
22	.75	.22	.03	.00	.00	3.7	.42	5.0	.18	.90	.20	2.8
23	.70	.20	.02	.00	.00	3.1	.32	250	.15	.57	.30	2.4
24	.60	.20	.02	.00	.00	2.0	.27	57	.16	.32	.25	3.8
25	.55	.20	.01	.00	25	1.8	.37	20	.15	.30	.22	18
26	.50	.20	.01	.00	100	1.4	.42	8.2	.13	.50	.18	11
27	.45	.18	.01	.00	75	.76	.63	4.6	.16	.80	.16	6.3
28	.40	.18	.00	.00	60	.43	.62	3.2	.16	.60	.14	6.6
29	.35	.18	.00	.00	---	.32	.46	2.5	.43	.40	.13	22
30	.32	.16	.00	.00	---	.26	3.6	1.5	.29	.30	.12	10
31	.30	---	.00	.00	---	.30	---	1.0	---	.26	.11	---
TOTAL	36.96	7.39	2.51	.00	260.00	760.27	23.33	573.89	10.61	274.95	8.93	89.62
MEAN	1.19	.25	.08	.00	9.29	24.5	.78	18.5	.35	8.87	.29	2.99
MAX	3.5	.40	.20	.00	100	90	3.7	250	.80	175	1.5	22
MIN	.05	.16	.00	.00	.00	.26	.19	.46	.13	.14	.10	.12
AC-FT	73	15	5.0	.00	516	1510	46	1140	21	545	18	178
CAL YR 1985	TOTAL	494.14		MEAN	1.35	MAX	36	MIN	.00	AC-FT	980	
WTR YR 1986	TOTAL	2048.46		MEAN	5.61	MAX	250	MIN	.00	AC-FT	4060	



06332515 BEAR DEN CREEK NEAR MANDAREE, ND--CONTINUED  
(Hydrologic bench-mark station)

## WATER-QUALITY RECORDS

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

## WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	TUR- BID- ITY (NTU) (00076)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	HARD- NESS (MG/L AS CACO3) (00900)	
OCT													
21...	1050	0.8	1880	8.30	8.5	5.5	160	<11.4	98	--	--	150	
DEC													
09...	1430	0.2	3220	8.18	-6.5	0.0	16	13.7	101	--	--	230	
MAR													
17...	1235	7.3	835	7.88	2.5	2.5	--	12.4	98	--	--	--	
MAY													
15...	0955	2.0	1580	8.45	12.5	11.0	--	10.4	103	--	--	--	
JUN													
18...	0920	0.22	2580	8.78	23.5	23.0	35	8.1	104	--	--	170	
AUG													
04...	0940	0.2	2180	8.69	26.0	21.5	--	8.3	102	90	120	--	
		HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	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)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	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)
OCT													
21...	0	31	17	340	83	13	6.0	378	3.6	500	4.3	0.3	
DEC													
09...	0	44	29	700	87	21	5.1	878	12	760	3.8	0.3	
MAR													
17...	--	--	--	--	--	--	--	--	4.8	--	--	--	
MAY													
15...	--	--	--	--	--	--	--	--	2.6	--	--	--	
JUN													
18...	0	25	25	570	88	20	6.8	694	1.7	700	5.1	0.4	
AUG													
04...	--	--	--	--	--	--	--	--	2.0	--	--	--	
		SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS NH4) (71846)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS- PHORUS, TOTAL (MG/L AS P) (00665)
OCT													
21...	8.4	1160	1100	1.6	2.5	<0.01	0.17	0.37	0.05	0.06	1.1	0.14	
DEC													
09...	16	1980	2100	2.7	1.1	<0.01	0.36	0.34	0.35	0.45	0.9	0.03	
MAR													
17...	--	--	--	--	--	0.02	0.67	0.19	0.13	0.17	1.8	0.25	
MAY													
15...	--	--	--	--	--	<0.01	<0.10	0.13	0.03	0.04	1.2	0.14	
JUN													
18...	5.6	1800	1700	2.4	1.1	<0.01	<0.10	0.04	<0.01	--	0.8	0.06	

## BEAR DEN CREEK BASIN

06332515 BEAR DEN CREEK NEAR MANDAREE, ND--CONTINUED  
(Hydrologic bench-mark station)

## WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	PHOS- PHORUS TOTAL (MG/L AS PO4) (71886)	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)	BERYL- LIUM, DIS- SOLVED (UG/L AS BE) (01010)	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)
OCT 21...	0.43	<0.01	<0.01	90	1	39	<0.5	<1	<1	<3	3	100
DEC 09...	--	0.01	--	--	--	--	--	--	--	--	--	--
MAR 17...	--	0.10	--	--	--	--	--	--	--	--	--	--
MAY 15...	--	0.02	<0.01	--	--	--	--	--	--	--	--	--
JUN 18...	--	0.03	<0.01	--	--	--	--	--	--	--	--	--

DATE	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)	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)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)
OCT 21...	<1	35	30	<0.1	<10	7	<1	<1	300	<6	9
DATE	GROSS ALPHA, DIS- SOLVED (UG/L AS U-NAT) (80030)	GROSS ALPHA, SUSP. TOTAL (UG/L AS U-NAT) (80040)	GROSS BETA, DIS- SOLVED (PCI/L AS CS-137) (03515)	GROSS BETA, SUSP. TOTAL (PCI/L AS CS-137) (03516)	GROSS BETA, DIS- SOLVED (PCI/L AS SR/ YT-90) (80050)	GROSS BETA, SUSP. TOTAL (PCI/L AS SR/ YT-90) (80060)	RADIUM 226, DIS- SOLVED, RADON METHOD (PCI/L) (09511)	URANIUM DIS- SOLVED, EXTRAC- TION (UG/L) (80020)	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 21...	--	--	--	--	--	--	--	--	354	0.76	100
DEC 09...	--	--	--	--	--	--	--	--	149	0.08	96
MAR 17...	<5.0	20	14	4.5	10	3.9	0.04	1.2	130	2.6	98
MAY 15...	--	--	--	--	--	--	--	--	176	0.94	99
JUN 18...	--	--	--	--	--	--	--	--	71	0.04	96
AUG 04...	--	--	--	--	--	--	--	--	54	0.03	92

DATE	TIME	SAMPLE LOC- ATION, CROSS SECTION (FT FM L BANK) (00009)	DEPTH TO TOP OF SAMPLE INTER- VAL (FT) (72015)	TEMPER- ATURE (DEG C) (00010)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	OXYGEN, DIS- SOLVED (MG/L) (00300)
OCT 21...	1100	0.4	0.28	5.5	1880	8.29	11.3
21...	1103	0.8	0.3	5.5	1880	8.30	11.4
21...	1105	1.20	0.48	5.5	1880	8.30	11.4
21...	1107	1.60	0.46	5.5	1880	8.30	11.4
MAR 17...	1245	2.00	0.36	2.5	830	7.89	12.5
17...	1249	4.00	0.7	2.5	835	7.88	12.4
17...	1251	6.00	0.76	2.5	835	7.90	12.4
17...	1253	8.00	0.55	2.5	835	7.90	12.4
17...	1255	10.0	0.38	2.5	830	7.88	12.4
MAY 15...	1002	0.5	0.42	11.0	1560	8.42	10.4
15...	1004	1.00	0.4	11.0	1580	8.43	10.4
15...	1006	1.50	0.5	11.0	1580	8.45	10.5
15...	1008	2.00	0.48	11.0	1580	8.45	10.5
15...	1010	2.50	0.52	11.0	1580	8.50	10.4
15...	1012	3.00	0.5	11.0	1580	8.45	10.4
15...	1014	3.50	0.6	11.0	1580	8.45	10.4
15...	1016	4.00	0.58	11.0	1580	8.45	10.4
15...	1018	4.50	0.46	11.0	1580	8.44	10.3

## 06335500 LITTLE MISSOURI RIVER AT MARMARTH, ND

LOCATION.--Lat 46°17'44", long 103°55'06", in SW¼ sec.30, T.133 N., R.105 W., Slope County, Hydrologic Unit 10110203, on left bank 90 ft downstream from bridge on U.S. Highway 12 in Marmarth, and 1.5 mi downstream from Little Beaver Creek.

DRAINAGE AREA.--4,640 mi<sup>2</sup>, approximately.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--March 1938 to current year.

REVISED RECORDS (WATER YEARS).--WSP 896: 1938-39. WSP 1086: 1943-44. WSP 1279: 1943(M), 1945-46, 1948. WSP 1439: 1950 (calendar year figures).

GAGE.--Water-stage recorder. Datum of gage is 2,686.32 ft above National Geodetic Vertical Datum of 1929. Prior to June 23, 1950, various nonrecording gages on former highway bridge at present site and datum. June 23, 1950, to Sept. 2, 1957, nonrecording gage at site 90 ft upstream at present datum.

REMARKS.--Estimated daily discharges: Nov. 6 to Mar. 6. Records good except those for period of estimated daily discharges, which are poor. Small diversions for irrigation upstream from station.

AVERAGE DISCHARGE.--48 years, 333 ft<sup>3</sup>/s, 241,300 acre-ft/yr; median of yearly mean discharges, 276 ft<sup>3</sup>/s, 200,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 45,000 ft<sup>3</sup>/s, Mar. 23, 1947, gage height, 21.7 ft; maximum gage height, 23.4 ft, Mar. 31, 1952, backwater from ice; no flow for part of most years.

EXTREMES OUTSIDE PERIOD OF RECORD.--According to local residents, the greatest known flood prior to 1953 occurred in June 1907 (stage unknown). Other major floods occurred in March 1913, May 1929, and March 1920 and reached stages of about 21.5 ft, 20.2 ft, and 19.7 ft, respectively. These stages are not comparable to stages during period of record, owing to construction of levees.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 3,000 ft<sup>3</sup>/s and maximum (\*):

Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)	Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)
Feb. 27	0745	ice jam	a*10.67	May 12	0130	*8920	10.24
Mar. 5	0200	7870	9.67	Sept. 28	0100	3620	6.65

Minimum daily discharge, 1.1 ft<sup>3</sup>/s, Dec. 4.

a - From floodmark

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	20	21	1.3	1.9	5.0	3950	439	1220	159	115	50	23
2	15	22	1.2	2.2	5.5	4290	419	1170	138	88	41	48
3	13	22	1.2	3.5	5.5	3690	489	970	121	78	36	120
4	28	22	1.1	3.9	5.0	3760	469	753	125	71	32	80
5	25	21	1.2	3.0	4.0	5520	437	561	135	61	29	55
6	27	19	1.2	2.5	4.0	4760	646	400	128	57	27	47
7	23	17	1.4	2.1	4.5	4420	584	384	132	53	27	43
8	22	14	1.8	1.9	4.0	4190	1080	946	115	51	26	35
9	39	12	2.3	1.7	4.0	3960	1140	5470	261	51	25	30
10	37	9.0	2.0	1.5	3.5	3550	848	5850	230	90	24	38
11	43	9.5	1.5	1.3	3.5	3460	611	7890	156	52	23	96
12	39	10	1.6	1.2	3.3	3470	457	8520	123	56	24	114
13	35	11	1.7	1.3	3.0	3260	368	7050	203	48	22	74
14	32	12	1.6	1.2	3.0	3410	203	5050	556	45	55	59
15	31	13	1.6	1.3	3.2	3440	200	3650	785	41	57	58
16	28	14	1.7	1.5	3.2	3050	385	2610	655	39	39	53
17	26	10	1.6	2.0	3.3	2450	929	1960	524	38	28	109
18	25	8.0	1.5	2.5	3.4	1790	567	1480	377	37	27	145
19	24	6.5	1.5	3.0	3.7	1420	385	1080	281	34	23	264
20	23	4.9	1.5	3.3	3.5	1170	296	851	238	33	19	286
21	22	4.2	1.5	4.0	4.0	965	269	687	401	31	19	305
22	22	4.8	2.0	5.0	4.5	917	325	558	531	29	19	213
23	21	4.3	2.8	4.5	5.0	839	303	470	257	27	17	130
24	20	4.9	3.5	4.0	4.5	946	282	437	186	27	20	108
25	20	3.8	3.0	4.7	5.0	1260	247	413	141	29	31	1070
26	20	3.0	2.3	5.1	150	1140	219	329	117	56	23	1120
27	21	2.4	2.1	4.7	4000	864	211	274	104	544	22	1850
28	21	2.3	2.0	5.2	3800	727	228	239	98	250	19	2940
29	20	2.2	1.9	6.0	---	677	209	212	95	115	17	2500
30	21	1.5	1.9	5.0	---	590	920	192	127	66	16	1990
31	22	---	1.9	4.5	---	502	---	174	---	57	16	---
TOTAL	785	311.3	55.4	95.5	8051.1	78437	14165	61850	7499	2369	853	14003
MEAN	25.3	10.4	1.79	3.08	288	2530	472	1995	250	76.4	27.5	467
MAX	43	22	3.5	6.0	4000	5520	1140	8520	785	544	57	2940
MIN	13	1.5	1.1	1.2	3.0	502	200	174	95	27	16	23
AC-FT	1560	617	110	189	15970	155600	28100	122700	14870	4700	1690	27770
CAL YR 1985	TOTAL	57694.76		MEAN	158	MAX	6200	MIN	.05	AC-FT	114400	
WTR YR 1986	TOTAL	188474.3		MEAN	516	MAX	8520	MIN	1.1	AC-FT	373800	

## LITTLE MISSOURI RIVER BASIN

06335500 LITTLE MISSOURI RIVER AT MARMARTH, ND--CONTINUED

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1950-51, 1970 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	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)	PERCENT SODIUM (00932)
OCT 09...	1230	42	1530	--	1.0	3.5	--	--	--	--	--
NOV 20...	1445	5.1	--	--	-10.0	0.0	--	--	--	--	--
JAN 15...	1220	1.3	2350	--	-5.0	0.0	--	--	--	--	--
MAR 01...	1100	3720	280	--	9.5	1.0	--	--	--	--	--
06...	1245	4500	470	8.20	-5.0	0.0	88	21	8.5	58	58
27...	1130	888	759	--	22.0	7.5	--	--	--	--	--
MAY 07...	1240	357	1060	--	2.0	6.0	--	--	--	--	--
29...	1400	212	1340	--	31.0	25.0	--	--	--	--	--
JUL 09...	1030	49	1610	--	26.0	20.0	--	--	--	--	--
AUG 27...	1100	22	1760	8.80	22.0	17.5	190	36	24	320	77
DATE		SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR 06...		3	4.1	94	140	6.8	0.2	4.4	293	300	0.4
AUG 27...		10	12	290	600	12	0.4	4.2	1190	1200	1.6
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)
MAR 06...		1	70	30	<1	26	20	0.2	2	<1	190
AUG 27...		1	250	30	<1	85	20	0.1	10	1	470



## LITTLE MISSOURI RIVER BASIN

221

06336600 BEAVER CREEK NEAR TROTTERS, ND

LOCATION.--Lat 47°09'47", long 103°59'32", in SW1/4SW1/4NE1/4 sec.33, T.143 N., R.105 W., Golden Valley County, Hydrologic Unit 10110204, on left bank 100 ft upstream from bridge on county road, 2.4 mi east of Montana-North Dakota State line, 13 mi southwest of Trotters, 17 mi north of Beach, 20 mi upstream from Elk Creek, and 27 mi above mouth.

DRAINAGE AREA.--616 mi<sup>2</sup>, revised.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1977 to current year (seasonal records only since 1984).

REVISED RECORDS.--1977: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 2,370 ft, from topographic map.

REMARKS.--Estimated daily discharges: Feb. 1 to Mar. 7, June 21-28, and July 17-28. Records fair.

AVERAGE DISCHARGE.--6 years (water years 1978-83), 33.3 ft<sup>3</sup>/s, 24,130 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,720 ft<sup>3</sup>/s, Mar. 29, 1978, gage height, 18.61 ft; maximum gage height, 19.27 ft, Mar. 22, 1978, ice jam; no flow at times.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,250 ft<sup>3</sup>/s, Mar. 2, gage height, 17.22 ft, backwater from ice; no flow for many days.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1					.00	1450	30	17	9.0	27	2.2	.19
2					.00	2050	28	16	8.2	18	2.3	.22
3					.00	1830	27	15	7.5	15	2.0	.38
4					.00	1700	26	16	7.4	12	2.0	.23
5					.00	1450	25	15	6.6	11	1.7	.29
6					.00	1200	24	15	6.7	8.9	1.5	.42
7					.00	900	22	15	6.4	7.6	1.5	.43
8					.00	473	20	16	6.4	7.4	2.0	.38
9					.00	310	19	20	7.4	6.5	1.6	.40
10					.00	242	18	28	7.3	6.2	1.2	.42
11					.00	200	18	32	6.6	5.7	.98	.49
12					.00	172	17	78	6.2	5.2	.97	.26
13					.00	152	17	117	5.7	4.5	.95	.26
14					.00	135	17	72	5.2	3.9	.89	.50
15					.00	125	17	48	4.9	3.6	.86	.92
16					.00	112	20	36	4.6	4.5	.64	.98
17					.00	94	19	30	4.3	18	.67	.89
18					.00	83	20	26	4.4	14	.63	1.1
19					.00	77	20	23	4.0	11	.34	2.7
20					.00	70	19	20	4.9	8.5	.32	2.4
21					.00	63	19	18	4.2	7.4	.21	2.0
22					.00	57	19	16	3.8	6.0	.27	1.2
23					.00	51	18	16	3.1	5.0	.36	1.1
24					20	46	17	16	3.1	4.0	.25	1.5
25					100	42	19	15	2.9	3.5	.12	11
26					900	38	19	16	2.9	3.2	.19	26
27					1500	38	18	14	3.1	3.0	.19	33
28					1400	39	17	12	5.6	2.8	.21	20
29					---	36	16	11	804	2.6	.18	18
30					---	35	18	11	200	2.6	.19	14
31					---	33	---	9.9	---	2.3	.18	---
TOTAL					3920.00	13303	603	809.9	1156.4	240.9	27.60	141.66
MEAN					140	429	20.1	26.1	38.5	7.77	.89	4.72
MAX					1500	2050	30	117	804	27	2.3	33
MIN					.00	33	16	9.9	2.9	2.3	.12	.19
AC-FT					7780	26390	1200	1610	2290	478	55	281

## LITTLE MISSOURI RIVER BASIN

06336600 BEAVER CREEK NEAR TROTTERS, ND--CONTINUED

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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)
FEB 27...	1330	1650	232	7.78	2.0	0.5	69	--	16	7.0	18
MAR 10...	1320	238	660	--	4.5	2.5	--	--	--	--	--
20...	1105	68	1320	--	5.0	3.0	--	--	--	--	--
APR 07...	1100	23	1800	--	13.5	9.0	--	--	--	--	--
22...	1155	19	2240	--	24.0	13.0	--	--	--	--	--
MAY 27...	1050	15	2120	--	22.0	19.0	--	--	--	--	--
JUL 15...	1050	3.7	2000	--	27.0	23.0	--	--	--	--	--
AUG 18...	1030	0.75	2570	7.99	28.0	19.5	600	180	89	92	390
DATE	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
FEB 27...	34	1	6.6	110	49	0.4	0.1	5.8	147	170	0.2
AUG 18...	58	7	12	420	1000	8.7	0.2	3.2	1850	1800	2.5
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)	
FEB 27...	1	60	70	1	4	40	0.1	1	<1	110	
AUG 18...	<1	750	20	<1	62	30	0.1	4	1	1300	

## LITTLE MISSOURI RIVER BASIN

223

06337000 LITTLE MISSOURI RIVER NEAR WATFORD CITY, ND  
(National stream-quality accounting network station)

LOCATION.--Lat 47°35'25", long 103°15'05", in NW¼SE¼SE¼ sec.35, T.148 N., R.99 W., McKenzie County, Hydrologic Unit 10110205, at bridge on U.S. Highway 85, 17 mi upstream from Cherry Creek, and 17.5 mi south of Watford City.

DRAINAGE AREA.--8,310 mi<sup>2</sup> approximately.

## WATER-DISCHARGE RECORDS

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

REVISED RECORDS (WATER YEARS).--WSP 926: 1935. WSP 1270: 1943.

GAGE.--Water-stage recorder and supplemental nonrecording gage. Datum of gage is 1,929.03 ft above National Geodetic Vertical Datum of 1929. Oct. 2, 1959, to June 17, 1963, water-stage recorder at present site and datum. June 18, 1963, to Nov. 28, 1964, at site 700 ft upstream at present datum. See WSP 1729 or 1917 for history of changes prior to Oct. 2, 1959.

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

AVERAGE DISCHARGE.--52 years, 587 ft<sup>3</sup>/s, 425,300 acre-ft/yr; median of yearly mean discharges, 470 ft<sup>3</sup>/s, 340,500 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 110,000 ft<sup>3</sup>/s, Mar. 25, 1947, gage height, 24.0 ft from flood-mark, site then in use; no flow at times in most years.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 8,000 ft<sup>3</sup>/s and maximum (\*):

Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)	Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)
Feb. 28	----	*14500	ab*7.90	July 17	1630	9850	6.60

No flow Feb. 11-24.

a - Observed

b - Backwater from ice

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	39	28	3.5	1.4	.80	12000	865	402	439	2660	155	39
2	35	28	3.5	1.4	.80	11500	778	404	391	1510	301	44
3	38	27	3.5	1.3	.75	9850	748	344	356	857	242	42
4	35	28	3.0	1.3	.70	8000	688	310	333	599	191	41
5	36	26	3.0	1.2	.65	7130	667	1040	317	475	163	63
6	55	26	3.0	1.2	.60	5980	632	1910	296	399	137	82
7	122	25	2.5	1.2	.50	6140	592	1640	274	370	120	60
8	139	18	2.5	1.1	.40	5800	667	1000	256	323	110	55
9	151	17	2.5	1.2	.30	4970	579	1650	266	332	99	55
10	209	16	2.3	1.4	.10	4530	547	2250	258	310	92	91
11	293	15	2.2	1.6	.00	4200	634	3510	387	305	86	109
12	427	14	2.1	2.0	.00	4070	679	5110	317	529	86	91
13	431	14	2.0	2.5	.00	3600	1160	5640	279	374	85	79
14	331	14	2.0	2.2	.00	3830	965	7530	271	337	200	79
15	277	14	1.9	2.0	.00	3810	739	7530	299	280	144	123
16	251	14	1.8	1.8	.00	3670	708	6210	258	470	102	100
17	180	13	1.7	2.0	.00	3830	911	4800	219	5710	80	87
18	134	11	1.6	2.2	.00	3830	811	3640	182	2280	73	145
19	90	9.0	1.5	2.5	.00	3580	703	2800	299	945	68	548
20	74	8.0	1.5	2.2	.00	2940	664	2220	605	777	66	941
21	67	7.5	1.6	2.0	.00	2300	1050	1880	542	514	64	747
22	55	7.0	1.8	1.8	.00	1870	989	1630	455	378	58	571
23	50	6.0	1.8	1.7	.00	1610	669	1560	362	287	64	669
24	45	5.5	1.7	1.6	.00	1440	544	1210	294	242	64	509
25	44	5.0	1.7	1.5	25	1190	470	1090	251	211	58	2990
26	41	4.0	1.6	1.3	1500	1100	406	911	246	223	55	3230
27	39	4.0	1.6	1.1	11000	1050	415	764	406	201	50	1750
28	35	4.0	1.5	1.1	13500	1000	404	674	328	184	47	1270
29	32	4.0	1.5	1.0	---	1320	388	621	492	151	44	2320
30	31	4.0	1.4	.90	---	1330	447	575	3160	148	40	2030
31	30	---	1.4	.80	---	1060	---	496	---	151	39	---
TOTAL	3816	416.0	65.2	48.50	26030.60	128530	20519	71351	12838	22532	3183	18960
MEAN	123	13.9	2.10	1.56	930	4146	684	2302	428	727	103	632
MAX	431	28	3.5	2.5	13500	12000	1160	7530	3160	5710	301	3230
MIN	30	4.0	1.4	.80	.00	1000	388	310	182	148	39	39
AC-FT	7570	825	129	96	51630	254900	40700	141500	25460	44690	6310	37610
CAL YR 1985	TOTAL	73992.90		MEAN	203	MAX	4290	MIN	.00	AC-FT	146800	
WTR YR 1986	TOTAL	308289.30		MEAN	845	MAX	13500	MIN	.00	AC-FT	611500	

## LITTLE MISSOURI RIVER BASIN

06337000 LITTLE MISSOURI RIVER NEAR WATFORD CITY, ND--CONTINUED  
(National stream-quality accounting network station)

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	TUR- BID- ITY (NTU) (00076)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	
OCT 22...	0955	50	1730	8.60	15.0	9.0	8000	10.2	97	170	0	38	
MAR 14...	1330	3860	540	7.55	5.5	3.0	980	12.2	98	120	27	27	
MAY 20...	1150	2260	850	8.10	22.0	18.0	550	9.0	103	200	110	47	
JUN 16...	1205	265	1570	8.43	20.5	20.0	--	8.7	103	--	--	--	
DATE	TIME	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	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)
OCT 22	17	320	80	11	7.1	305	--	1.5	500	12	0.4	9.2	1180
MAR 14...	12	65	54	3	4.8	--	--	4.9	170	3.3	0.3	6.0	296
MAY 20...	21	94	49	3	6.5	97	--	1.5	320	3.6	0.2	9.2	535
DATE	TIME	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L AS P) (70301)	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, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS NH4) (71846)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS- PHORUS, TOTAL (MG/L AS P) (00665)	PHOS- PHORUS TOTAL (MG/L AS PO4) (71886)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P) (00666)
OCT 22...	1100	1.6	159	0.02	1.80	0.91	0.07	0.09	2.4	0.92	2.8	<0.01	
MAR 14...	340	0.4	3080	0.01	0.63	0.11	0.10	0.13	3.1	0.97	--	0.02	
MAY 20...	560	0.73	3260	<0.01	0.12	0.10	0.03	0.04	1.5	0.59	--	0.02	
DATE	TIME	PHOS- PHORUS, ORTHO, DIS- SOLVED (MG/L AS P) (00671)	ALUM- INIUM, DIS- SOLVED (UG/L AS AL) (01106)	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)	CADMIUM, DIS- SOLVED (UG/L AS CD) (01025)	CHROMIUM, DIS- SOLVED (UG/L AS CR) (01030)	COBALT, DIS- SOLVED (UG/L AS CO) (01035)	COPPER, DIS- SOLVED (UG/L AS CU) (01040)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	LEAD, DIS- SOLVED (UG/L AS PB) (01049)	LITHIUM, DIS- SOLVED (UG/L AS LI) (01130)
OCT 22...	--	270	2	47	<0.5	<1	<1	<3	10	210	<1	44	
MAR 14...	--	30	<1	24	<0.5	<1	1	<3	5	63	<1	21	
MAY 20...	<0.01	360	1	44	<0.5	<1	<1	<3	4	240	6	52	
DATE	TIME	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)	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)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	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 22...	4	0.2	<10	7	4	<1	390	<6	24	4480	605	100	
MAR 14...	3	<0.1	<10	5	1	<1	240	<6	8	2600	27100	91	
MAY 20...	10	<0.1	<10	3	1	<1	440	<6	10	1230	7520	97	



## LITTLE MISSOURI RIVER BASIN

225

06337000 LITTLE MISSOURI RIVER NEAR WATFORD CITY, ND--CONTINUED  
(National stream-quality accounting network station)

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP- TOCOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)
AUG 05...	1055	167	1240	8.22	26.5	26.0	7.5	101	100	75	2.2	0.01
DATE		NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS NH4) (71846)	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, DIS- SUS- PENDE (MG/L) (80154)	SEDI- MENT, DIS- SUS- PENDE (MG/L (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
AUG 05...	1.10	<0.01	0.01	0.01	0.01	8.0	2.20	0.06	0.03	6570	2960	99
DATE	TIME			SAMPLE LOC- ATION, CROSS SECTION (FT FM L BANK) (00009)	DEPTH TO TOP OF SAMPLE INTER- VAL (FT) (72015)	TEMPER- ATURE (DEG C) (00010)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	OXYGEN, DIS- SOLVED (MG/L) (00300)			
OCT												
	22...		1015	5.00	0.85	9.0	1720	8.55	10.4			
	22...		1018	10.0	1.2	9.0	1730	8.56	10.3			
	22...		1021	15.0	1.3	9.0	1730	8.55	10.2			
	22...		1024	20.0	1.4	9.0	1730	8.57	10.2			
	22...		1027	25.0	1.3	9.0	1730	8.56	10.2			
	22...		1029	30.0	1.0	9.0	1730	8.56	10.2			
	22...		1031	35.0	0.75	9.0	1730	8.56	10.2			
	22...		1033	40.0	0.58	9.0	1730	8.56	10.3			
	22...		1035	45.0	0.5	9.0	1720	8.54	10.3			
MAR												
	14...		1331	38.0	2.6	3.0	530	7.58	12.2			
	14...		1335	68.0	2.6	3.0	530	7.58	12.2			
	14...		1340	98.0	3.0	3.0	540	7.56	12.2			
	14...		1345	128	3.5	3.0	540	7.56	12.2			
	14...		1350	158	3.5	3.0	540	7.55	12.2			
	14...		1355	188	4.2	3.0	540	7.55	12.2			
	14...		1400	218	4.5	3.0	540	7.55	12.2			
	14...		1405	248	2.6	3.0	540	7.55	12.2			
	14...		1410	278	4.5	3.0	540	7.56	12.2			
	14...		1415	308	4.2	3.0	540	7.56	12.2			
	14...		1420	338	3.8	3.0	540	7.55	12.2			
	14...		1425	368	3.8	3.0	540	7.55	12.2			
MAY												
	20...		1150	20.0	4.8	18.0	850	8.10	9.0			
	20...		1153	50.0	4.4	18.0	850	8.12	9.0			
	20...		1156	80.0	3.7	18.0	850	8.10	9.0			
	20...		1200	110	3.5	18.0	850	8.10	9.0			
	20...		1205	140	3.0	18.0	850	8.10	9.0			
	20...		1210	170	2.2	18.0	850	8.10	9.0			
	20...		1215	200	2.1	18.0	850	8.10	9.0			
	20...		1220	230	2.8	18.0	850	8.10	9.0			
	20...		1225	260	2.2	18.0	860	8.12	8.9			
	20...		1230	290	1.9	18.0	860	8.12	8.9			
	20...		1245	350	2.3	18.0	870	8.10	9.0			
	20...		1247	370	3.5	18.0	860	8.10	9.0			
	20...		1250	390	3.3	18.0	850	8.10	9.0			
AUG												
	05...		1057	6.00	0.35	26.0	1250	8.21	7.5			
	05...		1059	12.0	0.32	26.0	1250	8.21	7.5			
	05...		1101	18.0	0.48	26.0	1250	8.21	7.5			
	05...		1103	24.0	0.64	26.0	1240	8.21	7.5			
	05...		1105	30.0	1.0	26.0	1240	8.22	7.5			
	05...		1107	36.0	1.2	26.0	1240	8.22	7.5			
	05...		1109	42.0	1.4	26.0	1240	8.22	7.5			
	05...		1111	48.0	1.6	26.0	1240	8.22	7.5			
	05...		1113	54.0	1.5	26.0	1240	8.22	7.5			
	05...		1115	60.0	1.5	26.0	1240	8.22	7.5			
	05...		1117	66.0	1.5	26.0	1240	8.22	7.5			
	05...		1119	72.0	1.5	26.0	1240	8.22	7.5			
	05...		1121	78.0	1.3	26.0	1240	8.22	7.5			
	05...		1123	84.0	0.78	26.0	1240	8.22	7.5			
	05...		1125	90.0	0.76	26.0	1240	8.22	7.5			
	05...		1127	96.0	0.7	26.0	1240	8.23	7.5			

## MISSOURI RIVER MAIN STEM

06338000 LAKE SAKAKAWEA NEAR RIVERDALE, ND

LOCATION.--Lat 47°30'10", long 101°25'50", in S½ sec.31, T.147 N., R.84 W., Mercer County, Hydrologic Unit 10110101, in control structure of Garrison Dam, 2.5 mi west of Riverdale, 14 mi upstream from Knife River, and at mile 1,389.9.

DRAINAGE AREA.--181,400 mi<sup>2</sup>, approximately.

## MONTHEND-ELEVATION AND CONTENTS RECORDS

PERIOD OF RECORD.--October 1953 to current year. Prior to October 1966, published as Garrison Reservoir near Riverdale.

REVISED RECORDS.--WSP 1559: 1957(M).

GAGE.--Water-stage recorder. Datum of gage is at National Geodetic Vertical Datum of 1929.

REMARKS.--Reservoir is formed by earth-fill dam; storage began in November 1953. Maximum capacity, 24,200,000 acre-ft below elevation 1,854.0 ft, top of 29-ft gates. Normal maximum, 22,700,000 acre-ft below elevation 1,850.0 ft, of which about 4,300,000 acre-ft is designated for flood control. Elevation of crest of spillway, 1,825.0 ft, surmounted by radial gates. Inactive storage, 5,000,000 acre-ft below elevation 1,775.0 ft. Dead storage, zero at elevation 1,672.0 ft. Snake Creek arm of the reservoir has connecting gate to main reservoir, with sill at elevation, 1,810 ft. Figures herein represent total contents.

COOPERATION.--Elevations and contents are furnished by the U.S. Army Corps of Engineers. Elevations are observed elevations at midnight on the last day of each month. Contents are computed based on reservoir inflow, reservoir outflow, evaporation, and rainfall; and are adjusted for wind effect.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 24,368,000 acre-ft, July 25, 1975, elevation, 1,854.6 ft; minimum since first reaching normal maximum level in July of 1969, 14,742,000 acre-ft Mar. 13, 1978, elevation, 1,825.2 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 21,387,000 acre-ft, July 6, elevation, 1,847.1 ft; minimum, 16,811,000 acre-ft, Feb. 25, elevation, 1,832.8 ft.

## MONTHEND ELEVATION AND CONTENTS, AT 2400, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30-----	1838.4	18,487,000	--
Oct. 31-----	1838.6	18,549,000	+62,000
Nov. 30-----	1837.1	18,086,000	-463,000
Dec. 31-----	1835.7	17,664,000	-422,000
CAL YR 1985-----	--	--	-1,847,000
Jan. 31-----	1834.3	17,248,000	-416,000
Feb. 28-----	1833.0	16,868,000	-380,000
Mar. 31-----	1836.6	17,935,000	+1,067,000
Apr. 30-----	1836.6	17,935,000	0
May 31-----	1840.5	19,152,000	+1,217,000
June 30-----	1846.5	21,176,000	+2,024,000
July 31-----	1848.4	21,851,000	+675,000
Aug. 31-----	1846.3	21,106,000	-745,000
Sept. 30-----	1846.3	21,106,000	0
WTR YR 1986-----	--	--	+2,619,000

## MISSOURI RIVER MAIN STEM

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06338490 MISSOURI RIVER AT GARRISON DAM, ND  
(National stream-quality accounting network station)

LOCATION.--Lat 47°30'08", long 101°25'50", in S sec.31, T.147 N., R.84 W., Mercer County, Hydrologic Unit 10130101, downstream from dam at National Fish Hatchery's supply line from penstocks 4 and 5, in control structure of Garrison Dam, 2.5 mi west of Riverdale, 14 mi upstream from Knife River, and at mile 1,389.9.

DRAINAGE AREA.--181,400 mi<sup>2</sup>, approximately.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1969 to current year.

GAGE.--Flow meter and gate readings.

REMARKS.--Records good. Many diversions above station. Flow regulated by Lake Sakakawea (station 06338000). Prior to October 1969 records were obtained at a site 9.1 mi downstream. Discharges at the downstream site were generally about 7 percent greater than those furnished by the U.S. Army Corps of Engineers for the present site.

COOPERATION.--Records furnished by the U.S. Army Corps of Engineers.

AVERAGE DISCHARGE.--16 years, 24,800 ft<sup>3</sup>/s, 17,970,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 65,200 ft<sup>3</sup>/s, July 25, 1975; minimum daily, 6,000 ft<sup>3</sup>/s, Sept. 29, 1974.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 28,700 ft<sup>3</sup>/s, Apr. 3; minimum daily, 9,700 ft<sup>3</sup>/s, May 11.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	13500	14000	19300	25000	25600	19200	28100	11700	10300	17800	21100	21700
2	13700	13200	18900	24700	26000	14500	28100	12100	10100	18000	22200	19900
3	13800	13500	19100	25900	26000	13500	28700	11300	10000	18700	22200	20100
4	13600	13500	18500	25900	26000	14100	27400	12300	9800	17900	24300	20300
5	13700	13800	19400	25700	26000	16500	24900	12400	9900	18000	23800	20100
6	13600	14300	19500	25800	26200	18500	22200	12100	12400	18000	23900	19200
7	13800	14400	18900	26100	27100	23900	21900	12300	14900	17300	23900	18900
8	13600	14100	19000	25900	27300	25900	22000	11600	15200	17900	24000	19300
9	13400	14200	20400	26000	27600	25900	22600	10200	15600	18100	24100	17700
10	13400	14300	20100	24900	25400	25800	21800	10300	14900	18000	23900	18600
11	13600	14100	19800	25100	26200	27200	22200	9700	14800	18100	24200	18000
12	13400	14000	22000	25800	26700	27800	20100	9800	15000	17700	24000	18000
13	13300	14200	21000	26300	27400	28000	16800	10200	15300	17600	23700	17800
14	13200	14200	20800	26200	27000	27900	16700	10400	15200	18100	23900	17600
15	13500	14000	20700	26100	27100	27200	16800	10300	15500	18100	24500	18000
16	13600	14200	20700	26100	27000	28300	17000	9800	15500	18400	23700	18200
17	13300	14200	21500	26400	27100	28100	17200	9800	15600	18300	24000	19700
18	13600	14100	22200	26100	27300	27800	17000	9900	15400	17900	24300	20000
19	13500	14800	23000	26100	27700	27900	17000	9900	15000	17800	23800	20000
20	13500	14500	23400	26200	27100	28100	16700	9900	15500	17700	24700	20000
21	13600	16000	23100	26100	27800	27300	17200	9900	14900	19000	24300	19900
22	13600	18400	22900	27400	27400	27800	16800	10500	15100	20000	24300	19200
23	13700	18600	24100	26300	27400	27700	15300	9900	18100	21000	23800	17700
24	13400	18600	24200	26200	26800	27100	13700	9800	17700	20900	23800	20000
25	13400	18300	24200	26200	26600	28400	14300	9900	17600	21900	23400	20400
26	12900	18200	24300	26100	26100	27800	14300	10300	18000	21300	23900	19900
27	12600	18500	24400	26000	17400	27300	14800	9800	17600	20900	24000	20300
28	13300	18600	24200	26300	19800	27500	14600	11300	17800	21300	24800	20200
29	13700	19100	24300	25800	---	27400	14300	9800	18100	20900	24600	20500
30	13900	19600	25400	25800	---	27400	14200	10100	17700	20900	23900	17800
31	13700	---	25100	25700	---	27300	---	10000	---	20900	23900	---
TOTAL	418400	465500	674400	804200	733100	779100	574700	327300	448500	588400	738900	579000
MEAN	13500	15520	21750	25940	26180	25130	19160	10560	14950	18980	23840	19300
MAX	13900	19600	25400	27400	27800	28400	28700	12400	18100	21900	24800	21700
MIN	12600	13200	18500	24700	17400	13500	13700	9700	9800	17300	21100	17600
AC-FT	829900	923300	1338000	1595000	1454000	1545000	1140000	649200	889600	1167000	1466000	1148000
CAL YR 1985	TOTAL	7154400		MEAN	19600	MAX	31600	MIN	12600	AC-FT14191000		
WTR YR 1986	TOTAL	7131500		MEAN	19540	MAX	28700	MIN	9700	AC-FT14145000		

## MISSOURI RIVER MAIN STEM

06338490 MISSOURI RIVER AT GARRISON DAM, ND--CONTINUED  
(National stream-quality accounting network station)

LOCATION.--Samples collected at National Fish Hatchery's supply line from penstocks 4 and 5, in control structure of Garrison Dam.

## WATER-QUALITY RECORDS

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

PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: October 1971 to current year.

WATER TEMPERATURES: October 1971 to current year.

EXTREMES FOR PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: Maximum daily, 870 microsiemens, May 4, 18, 19, July 4, 1980; minimum daily, 553 microsiemens, Dec. 24, 1975.

WATER TEMPERATURES: Maximum daily, 20.5°C Sept. 26, 27, 1985; minimum daily, 0.0°C on many days during winter months.

EXTREMES FOR CURRENT YEAR.--

SPECIFIC CONDUCTANCE: Maximum daily, 700 microsiemens, Jan. 1; minimum daily, 500 microsiemens, Mar. 20.

WATER TEMPERATURES: Maximum daily, 21.0°C, Aug. 26; minimum observed, 5.5°C Jan. 20, Feb. 9 and 11.

## WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	DIS-CHARGE, IN CUBIC FEET PER SECOND (00060)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH (STAND-ARD UNITS) (00400)	TEMPER-ATURE, AIR (DEG C) (00020)	TEMPER-ATURE (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, (PER-CENT SATUR-ATION) (00301)	COLI-FORM, FECAL, UM-MF (COLS./100 ML) (31625)	STREP-TOCOC- CI, KF AGAR (COLS. PER 100 ML) (31673)	HARD-NESS (MG/L AS CAC03) (00900)	
OCT 23...	0915	13700	660	7.90	15.0	10.5	3.0	9.9	90	<1	K2	220	
DEC 11...	0920	19800	670	8.33	-3.0	3.5	10	11.8	87	<1	<1	230	
JAN 29...	0920	25800	690	8.25	-7.5	2.5	--	12.1	88	<1	K2	--	
APR 16...	1115	17000	645	8.22	8.0	4.0	1.1	11.7	89	--	--	220	
JUN 11...	0915	14800	660	8.25	21.5	8.0	1.5	10.2	86	<1	<1	220	
JUL 23...	0910	21000	640	8.15	29.5	11.5	--	9.0	83	--	--	--	
SEP 03...	0915	20100	650	8.01	20.5	11.5	--	6.9	64	--	--	--	
DATE		HARD-NESS NONCARB WH WAT TOT FLD MG/L AS CAC03 (00902)	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)	PERCENT SODIUM (00932)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY LAB AS CAC03 (90410)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2) (00405)	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)
OCT 23...	54	53	22	60		36	2	4.0	155	0.2	170	11	0.5
DEC 11...	63	55	22	55		34	2	3.9	162	0.2	180	8.2	0.5
JAN 29...	--	--	--	--	--	--	--	--	--	1.7	--	--	--
APR 16...	63	52	21	55		35	2	3.6	163	1.8	170	13	0.6
JUN 11...	54	52	21	53		34	2	3.6	161	1.8	160	6.7	0.5
JUL 23...	--	--	--	--	--	--	--	--	--	2.2	--	--	--
SEP 03...	--	--	--	--	--	--	--	--	--	3.3	--	--	--

K - Results based on colony count outside the acceptable range (non-ideal colony count).



## MISSOURI RIVER MAIN STEM

229

06338490 MISSOURI RIVER AT GARRISON DAM, ND--CONTINUED  
(National stream-quality accounting network station)

## WATER QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS NH4) (71846)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS- PHORUS, TOTAL (MG/L AS P) (00665)
OCT 23...	6.5	425	330	0.58	15700	<0.01	<0.10	0.03	0.05	0.06	0.3	0.02
DEC 11...	6.4	410	340	0.56	21900	<0.01	<0.10	0.05	0.04	0.05	0.4	0.02
JAN 29...	--	--	--	--	--	<0.01	<0.10	0.04	0.04	0.05	0.4	0.01
APR 16...	6.2	405	410	0.55	18600	--	--	--	--	--	--	--
JUN 11...	6.2	405	400	0.55	16200	<0.01	<0.10	0.02	0.03	0.04	0.3	0.02
	PHOS- PHORUS TOTAL (MG/L AS PO4) (71886)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P) (00666)	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)	BERYL- LIUM, DIS- SOLVED (UG/L AS BE) (01010)	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)
OCT 23...	0.06	0.02	0.02	<10	2	52	<0.5	<1	<1	<3	5	<3
DEC 11...	--	0.01	<0.01	--	--	--	--	--	--	--	--	--
JAN 29...	--	<0.01	<0.01	--	--	--	--	--	--	--	--	--
APR 16...	--	--	--	10	2	56	<0.5	<1	<1	<3	1	5
JUN 11...	--	0.02	<0.01	--	--	--	--	--	--	--	--	--
	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)	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)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	
OCT 23...	<1	48	<1	<0.1	<10	4	1	<1	520	<6	19	
APR 16...	<1	47	<1	<0.1	<10	2	1	<1	500	<6	14	

## MISSOURI RIVER MAIN STEM

06338490 MISSOURI RIVER AT GARRISON DAM, ND--CONTINUED  
(National stream-quality accounting network station)

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
ONCE DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	19.5	17.0	10.0	6.0	6.0	8.0	8.0	8.5	10.0	9.5	13.5	12.5
2	19.5	16.0	12.0	6.5	6.0	8.0	8.0	8.5	8.0	10.0	13.5	14.0
3	19.5	16.5	12.5	6.5	6.5	8.0	8.0	---	8.0	10.0	13.0	14.0
4	19.5	15.0	12.5	7.0	6.5	8.0	8.0	8.5	9.0	10.0	13.0	14.0
5	19.5	15.5	10.5	6.5	6.0	8.0	8.0	8.5	9.0	10.0	13.0	13.0
6	19.5	15.0	11.0	7.0	6.0	8.0	8.0	9.0	9.0	10.0	13.5	13.0
7	19.0	15.0	11.5	6.5	6.5	8.0	8.0	9.0	9.0	10.0	13.5	13.0
8	19.0	14.5	11.0	6.5	6.0	8.0	8.0	9.0	8.5	10.0	14.5	11.5
9	18.0	14.0	---	6.5	5.5	7.5	8.0	9.0	9.0	10.5	19.5	12.0
10	18.0	14.0	11.0	6.5	6.0	8.0	8.0	9.0	9.5	10.5	20.0	11.5
11	15.0	13.5	11.5	6.5	5.5	7.5	8.0	9.0	8.5	10.5	12.5	12.0
12	18.0	14.0	11.5	6.5	6.0	7.5	8.0	9.5	9.0	11.0	12.5	12.0
13	19.0	13.5	12.0	6.5	6.5	8.5	8.0	8.0	9.0	10.5	12.5	12.5
14	19.0	14.0	7.0	6.0	6.5	9.0	8.5	8.5	9.0	11.0	12.5	11.5
15	19.5	13.5	8.0	6.5	6.5	8.5	8.0	9.0	9.5	11.0	12.0	13.5
16	19.5	13.5	9.5	6.5	6.0	8.5	7.5	9.0	10.0	10.5	13.0	14.0
17	19.5	14.0	12.5	6.0	6.5	9.0	7.5	9.0	10.0	10.5	13.0	12.0
18	19.5	13.0	11.5	6.0	6.5	9.5	8.0	9.5	9.5	10.5	12.5	15.0
19	20.0	12.5	6.5	6.0	6.5	9.5	8.0	10.0	10.0	11.0	11.5	12.0
20	20.5	13.0	6.5	5.5	6.5	9.0	8.0	---	9.5	12.0	13.0	14.5
21	16.0	13.0	6.0	6.5	6.5	9.0	7.5	---	9.0	11.5	13.0	13.5
22	16.0	13.0	7.0	6.0	6.0	6.0	8.0	8.5	9.5	11.0	13.5	14.5
23	17.0	13.0	7.0	6.5	6.5	6.5	7.5	8.5	10.0	11.0	13.0	12.0
24	16.5	12.5	8.0	6.5	6.5	7.0	7.5	9.0	9.5	13.0	13.5	13.0
25	17.0	13.0	7.5	6.5	6.5	7.5	8.0	9.0	9.5	13.5	14.5	14.5
26	16.5	13.0	7.5	6.0	6.0	7.5	8.0	8.5	9.5	11.5	21.0	15.5
27	17.0	13.0	---	6.5	7.0	7.5	8.0	8.5	9.5	13.0	16.0	16.5
28	16.5	8.0	---	6.5	8.0	7.5	7.5	8.0	9.5	14.0	---	16.5
29	17.5	8.5	---	6.0	---	8.0	8.0	8.0	9.5	13.5	14.5	14.5
30	17.0	8.5	---	6.0	---	8.0	8.0	9.0	9.5	12.5	14.0	15.0
31	16.5	---	---	6.0	---	8.0	---	9.5	---	13.0	14.5	---
MEAN	18.0	13.5	---	6.5	6.5	8.0	8.0	---	9.5	11.0	---	13.5
MAX	20.5	17.0	---	7.0	8.0	9.5	8.5	---	10.0	14.0	---	16.5
MIN	15.0	8.0	---	5.5	5.5	6.0	7.5	---	8.0	9.5	---	11.5

SPECIFIC CONDUCTANCE (MICROSIEMENS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
ONCE DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	610	625	660	700	660	660	620	620	640	600	640	610
2	620	625	650	655	520	690	640	620	660	580	630	650
3	620	625	660	660	640	720	640	---	630	600	620	650
4	610	630	620	660	650	660	640	600	690	600	625	630
5	620	625	660	650	650	520	640	610	670	600	650	610
6	620	630	610	650	650	680	630	610	660	600	650	640
7	620	630	600	660	650	610	620	630	660	600	640	640
8	610	630	640	660	650	570	620	620	650	620	625	620
9	650	630	---	535	650	650	620	600	650	610	640	630
10	640	630	590	610	650	660	660	600	650	600	625	630
11	610	630	520	610	660	650	660	600	650	590	600	630
12	650	650	600	600	660	660	670	620	650	600	600	630
13	640	660	650	600	660	610	660	640	660	600	610	620
14	620	660	530	630	660	610	660	600	650	600	620	600
15	640	660	530	600	660	610	650	610	625	600	645	630
16	640	650	540	615	650	620	660	620	650	600	610	610
17	640	640	630	620	650	610	650	610	660	585	610	630
18	620	640	630	620	690	620	650	610	660	600	625	620
19	620	640	630	560	660	520	650	630	660	560	625	630
20	620	640	625	540	665	500	650	---	630	600	620	620
21	630	640	625	625	670	520	610	---	630	610	620	615
22	640	640	625	620	670	610	620	640	660	630	610	620
23	640	650	625	600	675	600	640	610	640	620	620	615
24	640	640	630	610	660	620	630	670	650	620	610	620
25	590	640	630	610	680	600	610	650	640	620	600	620
26	600	650	630	540	655	605	610	670	640	630	580	620
27	630	650	---	590	650	600	620	670	630	570	625	640
28	620	650	---	680	690	600	620	680	600	590	---	610
29	630	650	---	585	---	600	640	670	600	590	640	560
30	625	650	---	600	---	600	640	660	600	590	620	580
31	625	---	---	660	---	605	---	650	---	600	640	---
MEAN	625	640	---	618	655	613	638	---	645	600	---	621
MAX	650	660	---	700	690	720	670	---	690	630	---	650
MIN	590	625	---	535	520	500	610	---	600	560	---	560

## MISSOURI RIVER BASIN

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06339010 MISSOURI RIVER ABOVE STANTON, ND

LOCATION.--Lat 47°21'45", long 101°21'25", SE1/4NE1/4SE1/4 sec.22, T.145 N., R.84 W., McLean County, Hydrologic Unit 10130101, on left bank 9 mi south of Riverdale, and at mile 1,379.

DRAINAGE AREA.--181,400 mi<sup>2</sup>, approximately.

## GAGE-HEIGHT RECORDS

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

GAGE.--Water-stage recorder. Datum of gage is 1600.00 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Stage regulated completely by releases from Garrison Dam (station 06338490) 13 mi upstream.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily gage height recorded, 72.24 ft, Jan. 29, 1977; minimum daily recorded, 64.30 ft, May 25, 1986.

GAGE HEIGHT, IN FEET, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	65.84	65.72				---	67.78	65.05	64.70	66.08	66.71	66.91
2	65.82	65.76				---	68.09	65.17	64.43	66.44	66.93	66.59
3	65.86	65.84				---	67.78	64.99	64.50	66.37	67.05	65.80
4	65.82	65.86				---	67.23	65.13	64.40	66.14	67.04	65.87
5	65.86	65.90				---	67.38	65.20	64.56	66.40	67.30	66.05
6	65.84	---				---	67.22	65.26	65.06	66.18	67.15	65.79
7	65.88	---				---	67.19	65.22	65.51	66.25	67.22	65.81
8	65.87	---				---	67.27	65.03	65.50	66.29	67.23	65.73
9	65.80	---				---	67.06	64.81	---	66.32	67.35	65.87
10	65.77	---				---	67.27	64.38	---	66.31	67.10	65.88
11	65.71	---				---	67.04	64.69	---	66.43	67.29	65.59
12	65.73	---				---	66.63	64.60	65.69	66.24	67.24	65.80
13	65.94	---				---	66.04	64.52	65.61	66.31	67.18	65.87
14	65.85	---				---	66.26	64.63	65.75	66.25	67.22	65.92
15	65.82	---				---	66.14	64.57	65.49	66.35	67.32	65.86
16	65.81	---				---	66.33	64.52	65.84	66.31	67.33	65.96
17	65.80	---				---	66.21	64.38	65.65	66.26	67.19	65.80
18	65.83	---				---	66.31	64.36	65.72	66.12	67.24	66.12
19	65.76	---				---	66.11	64.51	65.62	66.31	67.18	66.06
20	65.66	---				---	65.96	64.40	65.59	66.20	67.24	66.02
21	65.85	---				---	66.30	64.54	65.73	66.41	67.28	65.98
22	65.86	---				---	66.08	64.52	65.58	66.42	67.36	66.04
23	65.86	---				67.57	65.93	64.66	66.16	66.84	67.19	65.70
24	65.85	---				67.69	65.54	64.39	66.31	66.67	67.17	65.90
25	65.90	---				67.86	65.31	64.30	66.24	66.89	67.13	66.04
26	65.65	---				67.65	65.53	64.55	66.26	66.73	67.22	65.77
27	65.70	---				67.68	65.75	64.60	66.16	66.63	67.19	65.90
28	65.87	---				67.86	65.83	64.79	66.17	66.81	67.11	66.06
29	65.75	---				67.98	65.54	64.54	66.07	66.74	67.37	66.13
30	65.86	---				67.67	65.59	64.57	66.41	66.77	67.34	65.83
31	65.88	---				68.13	---	64.55	---	66.76	67.22	---
MEAN	65.82	---				---	66.49	64.69	---	66.43	67.20	65.95
MAX	65.94	---				---	68.09	65.26	---	66.89	67.37	66.91
MIN	65.65	---				---	65.31	64.30	---	66.08	66.71	65.59

## KNIFE RIVER BASIN

06339100 KNIFE RIVER AT MANNING, ND

LOCATION.--Lat 47°14'10", long 102°46'10", in SE¼NW¼ sec.6, T.143 N., R.95 W., Dunn County, Hydrologic Unit 10130201, on left bank 50 ft downstream from bridge on State Highway 22, and 0.4 mi north of Manning.

DRAINAGE AREA.--205 mi<sup>2</sup>, approximately.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--July 1967 to current year.

GAGE.--Water-stage recorder. Datum of gage is 2,156.55 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Oct. 20 to Feb. 24, Mar. 12, 13. Records good except those for periods of estimated daily discharges, which are poor.

AVERAGE DISCHARGE.--19 years, 22.6 ft<sup>3</sup>/s, 16,370 acre-ft/yr; median of yearly mean discharges, 24 ft<sup>3</sup>/s, 17,400 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,940 ft<sup>3</sup>/s, June 15, 1970, gage height, 16.20 ft; no flow at times.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 300 ft<sup>3</sup>/s and maximum (\*):

Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)	Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)
Feb. 27	2130	*1690	*15.08	Sept. 26	0130	523	9.98
Mar. 2	1845	1070	13.66	Sept. 30	0130	441	9.33
May 10	1515	547	10.16				

Minimum daily discharge, 0.32 ft<sup>3</sup>/s, Sept. 1.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.46	.80	.75	.85	1.2	619	8.7	7.3	5.6	6.1	1.4	.32
2	.39	.85	.80	.85	1.2	985	8.5	7.7	4.6	8.6	1.2	.33
3	.55	.85	.90	.80	1.1	888	9.7	15	4.0	4.4	1.2	.34
4	.65	.90	1.0	.75	1.1	648	10	10	3.8	2.8	.97	.41
5	.88	.90	1.1	.70	1.1	544	9.7	9.3	3.4	3.0	.87	.54
6	1.6	.95	1.1	.65	1.0	304	9.3	44	3.2	2.5	.79	.72
7	3.6	.95	1.1	.60	1.0	122	8.9	86	3.1	2.0	.75	.78
8	4.4	1.0	1.1	.60	1.0	79	8.7	90	2.9	2.2	.70	.81
9	4.4	1.0	1.0	.65	.95	66	8.4	78	3.1	2.1	.67	.77
10	4.3	1.0	1.0	.70	.90	73	7.5	440	2.8	2.8	.66	.86
11	3.0	1.0	.95	.70	.80	61	6.4	167	3.4	26	.69	.87
12	3.1	1.0	.85	.80	.80	50	5.9	58	3.3	45	.67	.79
13	5.6	1.0	.75	.85	.80	45	5.8	36	2.9	31	.82	.73
14	12	1.1	.60	.90	.75	40	5.8	22	2.9	23	.92	1.5
15	14	1.1	.55	.90	.70	36	5.8	15	2.7	11	1.1	1.6
16	8.7	1.2	.55	.95	.70	33	6.2	11	2.5	8.0	1.4	1.3
17	8.3	1.3	.60	1.0	.70	30	14	9.0	2.5	7.5	1.3	1.3
18	7.1	1.3	.65	1.1	.65	27	40	7.9	2.5	11	1.1	1.3
19	6.1	1.2	.65	1.1	.60	23	69	6.9	2.5	59	1.0	2.8
20	4.5	1.0	.70	1.2	.60	17	55	6.0	2.2	30	.76	4.8
21	3.0	1.0	.80	1.2	.65	15	38	5.8	2.0	15	.63	13
22	1.5	.95	.90	1.3	.70	15	23	6.2	1.5	9.0	.74	9.7
23	.75	.90	.90	1.3	.80	16	15	13	1.2	5.8	.68	10
24	1.5	.90	.90	1.3	1.0	17	11	33	1.2	3.9	.55	7.1
25	.80	.80	.85	1.3	13	21	9.9	55	1.1	3.1	.55	173
26	.90	.80	.80	1.3	371	18	9.1	44	1.1	2.3	.47	400
27	1.2	.75	.75	1.3	1090	15	8.5	29	.95	2.4	.43	108
28	.90	.70	.75	1.3	1010	14	8.0	17	.94	2.5	.40	49
29	.80	.70	.75	1.3	---	12	7.8	11	2.1	2.4	.41	148
30	.75	.70	.80	1.3	---	11	7.3	8.7	3.6	2.2	.37	299
31	.75	---	.80	1.2	---	9.4	---	7.1	---	1.7	.33	---
TOTAL	106.48	28.60	25.70	30.75	2504.80	4853.4	440.9	1355.9	79.59	338.3	24.53	1239.67
MEAN	3.43	.95	.83	.99	89.5	157	14.7	43.7	2.65	10.9	.79	41.3
MAX	14	1.3	1.1	1.3	1090	985	69	440	5.6	59	1.4	400
MIN	.39	.70	.55	.60	.60	9.4	5.8	5.8	.94	1.7	.33	.32
AC-FT	211	57	51	61	4970	9630	875	2690	158	671	49	2460
CAL YR 1985	TOTAL	1036.55		MEAN	2.84	MAX	45	MIN	.02	AC-FT	2060	
WTR YR 1986	TOTAL	11028.62		MEAN	30.2	MAX	1090	MIN	.32	AC-FT	21880	



## 06339100 KNIFE RIVER AT MANNING, ND--CONTINUED

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	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)	PERCENT SODIUM (00932)
OCT 24...	1020	2.0	2260	--	7.5	6.0	--	--	--	--	--
JAN 28...	1200	1.3	2070	--	1.5	0.0	--	--	--	--	--
FEB 28...	1410	847	170	7.11	5.0	0.5	32	8.0	3.0	21	52
MAR 11...	1505	50	525	--	9.0	1.5	--	--	--	--	--
APR 29...	1330	8.1	1530	--	14.0	9.5	--	--	--	--	--
JUN 03...	0930	3.7	1500	--	23.5	21.0	--	--	--	--	--
JUL 29...	1045	2.2	935	--	26.5	21.5	--	--	--	--	--
SEP 12...	1020	0.82	1750	8.50	10.5	13.0	230	44	28	330	75

DATE	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
FEB 28...	2	7.2	55	31	1.2	0.1	3.4	116	110	0.16
SEP 12...	10	8.5	500	450	7.2	0.7	4.4	1180	1200	1.6

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)
FEB 28...	1	50	190	1	3	80	0.1	1	<1	57
SEP 12...	1	460	60	<1	36	10	0.2	5	<1	520

## 06339500 KNIFE RIVER NEAR GOLDEN VALLEY, ND

LOCATION.--Lat 47°09'40", long 102°03'39", in SE¼ sec.34, T.143 N., R.90 W., Mercer County, Hydrologic Unit 10130201, on left bank 6 ft downstream from highway bridge, 4.5 mi downstream from Elm Creek, and 9 mi south of Golden Valley.

DRAINAGE AREA.--1,230 mi<sup>2</sup>, approximately.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--May 1903 to November 1906, April 1907 to November 1915, April 1916 to October 1919, and October 1921 to September 1924 (published as "at Broncho" or "near Broncho"), and April 1943 to current year. Monthly discharge only for some periods published in WSP 1309.

REVISED RECORDS (WATER YEARS).--WSP 1006:0 Drainage area. WSP 1279: 1904, 1914-19(M), 1922-24(M), 1944.

GAGE.--Water-stage recorder. Datum of gage is 1,847.13 ft above National Geodetic Vertical Datum of 1929. See WSP 1729 or 1917 for history of changes prior to May 1, 1946.

REMARKS.--Estimated daily discharges: Nov. 20 to Mar. 5; ice backwater. Records fair.

AVERAGE DISCHARGE.--60 years, 97.0 ft<sup>3</sup>/s, 70,300 acre-ft/yr; median of yearly mean discharges, 86 ft<sup>3</sup>/s, 62,300 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 11,200 ft<sup>3</sup>/s, May 9, 1970, gage height, 25.84 ft; maximum gage height, 26.7 ft, Mar. 26, 27, 1943, from floodmark; no flow at times in some years.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Mar. 26, 27, 1943 reached a stage of 26.7 ft, from floodmark, 11,500 ft<sup>3</sup>/s. The 1943 flood was the highest since 1903 according to information from local residents.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,500 ft<sup>3</sup>/s and maximum (\*):

Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)	Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)
Mar. 3	----	*4500	*21.84	No other peak greater than base discharge.			
Minimum daily, 3.1 ft <sup>3</sup> /s, Sept. 1.							
a - Ice jam							

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.0	7.9	7.2	7.0	10	3000	49	50	61	79	14	3.1
2	5.7	8.3	7.5	7.5	10	3300	45	45	46	87	13	3.2
3	6.1	8.6	7.8	7.5	9.5	4000	45	44	38	125	11	3.5
4	8.1	8.7	8.0	7.0	9.5	3600	43	42	32	139	11	3.7
5	7.4	8.3	8.0	6.5	9.0	3000	44	61	28	85	9.6	3.9
6	8.5	10	8.2	6.2	9.0	1830	46	173	26	57	8.7	4.6
7	11	7.7	8.5	6.0	9.0	1040	46	181	24	38	8.5	4.7
8	13	6.9	8.5	6.0	8.5	617	49	174	22	29	8.4	4.5
9	14	7.0	8.5	6.2	8.0	497	48	274	22	23	7.4	4.2
10	15	7.2	8.5	6.5	7.0	392	46	392	21	24	6.7	4.7
11	16	7.4	8.2	7.0	7.0	344	42	368	20	29	6.1	5.8
12	16	7.4	7.8	7.0	7.0	337	38	505	19	70	6.2	6.7
13	17	7.3	7.2	7.5	6.5	336	35	387	18	102	6.1	6.2
14	19	7.7	6.5	8.0	6.5	323	33	214	17	117	7.0	6.8
15	28	7.5	6.0	8.0	6.0	277	35	136	16	81	6.9	8.2
16	28	7.9	6.0	8.0	6.5	230	33	96	14	81	6.0	8.2
17	29	8.1	6.2	8.5	7.0	187	38	76	14	263	5.1	9.2
18	32	7.2	6.5	9.0	7.0	155	92	63	14	243	5.3	8.5
19	32	6.3	6.8	9.5	6.5	133	231	50	13	241	5.3	11
20	28	6.0	7.0	10	6.0	123	272	44	13	195	6.5	13
21	23	6.0	7.5	10	6.0	115	247	39	14	154	5.9	16
22	20	6.0	8.0	10	6.5	100	200	37	13	134	5.3	17
23	18	6.0	8.5	10	7.0	91	148	231	12	113	4.4	24
24	16	6.0	8.0	10	8.0	87	106	510	11	73	4.5	39
25	14	6.0	7.6	9.8	10	87	83	454	11	50	4.1	63
26	12	6.0	7.2	9.5	20	75	67	293	10	38	4.1	71
27	11	6.2	7.0	10	1500	74	58	208	11	31	3.7	371
28	9.3	6.5	6.5	10	3200	70	50	173	16	25	3.6	428
29	8.6	6.8	6.0	9.5	---	68	46	133	33	22	3.7	364
30	7.9	7.0	6.2	9.5	---	60	54	98	35	19	3.4	203
31	7.6	---	6.5	9.5	---	55	---	76	---	17	3.3	---
TOTAL	487.2	215.9	227.9	256.7	4913.0	24603	2369	5627	644	2784	204.8	1719.7
MEAN	15.7	7.20	7.35	8.28	175	794	79.0	182	21.5	89.8	6.61	57.3
MAX	32	10	8.5	10	3200	4000	272	510	61	263	14	428
MIN	5.7	6.0	6.0	6.0	6.0	55	33	37	10	17	3.3	3.1
AC-FT	966	428	452	509	9740	48800	4700	11160	1280	5520	406	3410
CAL YR 1985	TOTAL	8899.35		MEAN	24.4	MAX	468	MIN	.70	AC-FT	17650	
WTR YR 1986	TOTAL	44052.2		MEAN	121	MAX	4000	MIN	3.1	AC-FT	87380	

## KNIFE RIVER BASIN

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06339500 KNIFE RIVER NEAR GOLDEN VALLEY, ND--CONTINUED

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1950, 1964-65, 1972 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	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)	PERCENT SODIUM (00932)
OCT 25...	1035	15	2820	--	18.0	8.0	--	--	--	--	--
DEC 09...	1135	8.4	3150	--	-8.0	0.0	--	--	--	--	--
JAN 29...	1125	9.5	3180	--	-9.0	0.0	--	--	--	--	--
MAR 01...	1240	2870	285	7.30	10.0	0.5	57	13	6.0	34	52
11...	1140	341	540	--	8.5	2.0	--	--	--	--	--
APR 29...	0950	47	2300	--	12.0	8.5	--	--	--	--	--
JUN 12...	0945	19	2070	--	17.5	21.0	--	--	--	--	--
JUL 30...	1135	19	1340	--	21.0	23.0	--	--	--	--	--
SEP 15...	1005	8.1	1870	8.35	7.5	11.0	280	51	36	330	71
DATE		SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR 01...		2	7.7	72	68	1.1	0.1	4.7	173	180	0.24
SEP 15...		9	10	500	490	6.4	0.4	9.1	1290	1200	1.8
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)
MAR 01...		1	50	110	1	5	90	0.1	1	<1	120
SEP 15...		1	340	500	1	43	140	0.1	4	<1	740

## KNIFE RIVER BASIN

06339560 BRUSH CREEK NEAR BEULAH, ND

LOCATION.--Lat 47°10'43", long 101°47'05", in NW1/4SW1/4NW1/4 sec.25, T.143 N., R.88 W., Mercer County, Hydrologic Unit 10130201, on right bank 60 ft upstream from bridge on State Highway 49, and 6 mi south of Beulah.

DRAINAGE AREA.--23.92 mi<sup>2</sup>, approximately.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1974 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 1,948 ft above National Geodetic Vertical Datum of 1929, from State Highway Department levels.

REMARKS.--Estimated daily discharges: Nov. 13 to Mar. 1, Mar. 6-10, Apr. 13-15, and June 7-10. Records fair except those for periods of estimated daily discharges, which are poor.

AVERAGE DISCHARGE.--12 years, 1.86 ft<sup>3</sup>/s, 1,350 acre-ft/yr; median of yearly mean discharges, 1.6 ft<sup>3</sup>/s, 1,130 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 940 ft<sup>3</sup>/s, Mar. 29, 1982, gage height, 8.40 ft, backwater from ice; maximum gage height, 9.26 ft, Mar. 21, 1978; no flow at times.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 373 ft<sup>3</sup>/s, Feb. 26, gage height, 6.89 ft, only peak above base of 50 ft<sup>3</sup>/s; no flow for many days.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.57	.65	.00	.00	.00	90	1.3	2.6	1.0	1.3	.39	.17
2	.60	.69	.00	.00	.00	85	1.3	2.5	.97	.86	.35	.20
3	.64	.69	.00	.00	.00	78	1.9	2.3	.85	.73	.31	.23
4	.76	.71	.00	.00	.00	59	1.8	2.0	.78	.66	.30	.22
5	.71	.69	.00	.00	.00	39	2.1	3.6	.78	.55	.31	.20
6	.67	.66	.00	.00	.00	10	1.9	7.6	.79	.54	.31	.23
7	1.1	.68	.00	.00	.00	2.0	1.7	5.2	1.0	.52	.34	.24
8	1.3	.63	.00	.00	.00	4.0	1.6	5.1	1.0	.52	.34	.22
9	1.2	.59	.00	.00	.00	5.0	1.6	11	1.1	.46	.33	.22
10	1.1	.56	.00	.00	.00	4.5	1.6	7.6	1.1	.95	.29	.26
11	1.2	.53	.00	.00	.00	2.9	1.7	5.0	.93	.66	.28	.30
12	1.5	.52	.00	.00	.00	3.4	1.6	4.3	.80	.69	.29	.36
13	1.5	.50	.00	.00	.00	3.4	1.5	3.4	.71	.67	.33	.33
14	1.3	.50	.00	.00	.00	3.1	1.5	2.6	.70	.62	.44	.35
15	1.4	.45	.00	.00	.00	2.5	2.0	2.2	.71	.59	.36	.46
16	1.2	.45	.00	.00	.00	2.0	3.0	2.0	.60	.62	.32	.40
17	.95	.40	.00	.00	.00	1.8	5.5	1.9	.56	.59	.26	.40
18	.97	.30	.00	.00	.00	1.6	8.2	1.9	.51	.52	.25	.37
19	.86	.25	.00	.00	.00	1.5	7.3	1.8	.49	.52	.25	.44
20	.76	.20	.00	.00	.00	1.4	5.5	1.6	.49	.50	.23	.55
21	.69	.15	.00	.00	.00	1.5	4.2	1.5	.85	.49	.20	.62
22	.76	.10	.00	.00	.00	1.7	3.6	1.5	.64	.49	.25	.52
23	.65	.08	.00	.00	.00	1.4	3.1	6.1	.53	.52	.26	.45
24	.66	.05	.00	.00	.00	1.4	2.6	5.4	.47	.54	.22	.46
25	.64	.04	.00	.00	.00	1.4	3.0	3.2	.43	.49	.20	3.1
26	.64	.03	.00	.00	240	1.3	3.1	2.1	.41	.47	.19	2.1
27	.65	.02	.00	.00	100	1.2	2.7	1.9	.38	.45	.20	1.1
28	.66	.01	.00	.00	30	1.3	2.6	1.7	.66	.48	.20	1.3
29	.64	.00	.00	.00	---	1.3	2.5	1.4	.86	.49	.19	3.6
30	.65	.00	.00	.00	---	1.3	3.3	1.2	1.2	.44	.17	2.7
31	.67	---	.00	.00	---	1.2	---	1.1	---	.41	.17	---
TOTAL	27.60	11.13	.00	.00	370.00	415.1	85.3	103.3	22.30	18.34	8.53	22.10
MEAN	.89	.37	.00	.00	13.2	13.4	2.84	3.33	.74	.59	.28	.74
MAX	1.5	.71	.00	.00	240	90	8.2	11	1.2	1.3	.44	3.6
MIN	.57	.00	.00	.00	.00	1.2	1.3	1.1	.38	.41	.17	.17
AC-FT	55	22	.00	.00	734	823	169	205	44	36	17	44
CAL YR 1985	TOTAL	548.50	MEAN	1.50	MAX	40	MIN	.00	AC-FT	1090		
WTR YR 1986	TOTAL	1083.70	MEAN	2.97	MAX	240	MIN	.00	AC-FT	2150		



06339560 BRUSH CREEK NEAR BEULAH, ND--CONTINUED

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1975 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED SATUR- ATION) (00301)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	
OCT	24...	1315	0.67	2030	7.90	15.0	8.0	11.4	--	--	--	--	
FEB	28...	1314	26	260	7.47	4.5	0.5	11.2	78	77	0	17	8.4
MAR	10...	1328	4.7	830	--	8.0	4.0	--	--	--	--	--	
APR	22...	1237	3.6	1550	8.17	26.0	14.0	9.9	98	430	31	79	56
JUN	10...	1426	1.1	1910	8.01	24.0	21.5	7.8	89	--	--	--	--
JUL	24...	1145	0.55	1880	8.32	24.0	20.0	6.5	72	--	--	--	--
SEP	04...	1126	0.22	2000	7.94	21.0	15.5	6.5	66	500	1	85	69
		SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)
FEB	28...	18	31	0.9	9.5	--	0	58	2.3	<0.1	7.7	174	--
APR	22...	220	52	5	7.7	397	5.2	430	8.1	0.2	10	1080	1000
SEP	04...	280	55	6	8.5	495	11	600	9.6	0.3	13	1540	1400
		SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P) (00665)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P) (00666)	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BERYL- LIUM, TOTAL RECOV- ERABLE (UG/L AS BE) (01012)	BERYL- LIUM, DIS- SOLVED (UG/L AS BE) (01010)	BORON, DIS- SOLVED (UG/L AS B) (01020)
FEB	28...	0.24	12	0.76	0.43	1.8	0.30	0.22	1	1	10	<0.5	40
APR	22...	1.5	10	<0.10	0.07	0.9	0.08	0.04	--	--	--	--	230
SEP	04...	2.1	0.91	0.11	<0.01	1.0	0.08	0.02	1	1	<10	<0.5	380
		CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD) (01027)	CADMIUM DIS- SOLVED (UG/L AS CD) (01025)	CHRO- MIUM, TOTAL RECOV- ERABLE (UG/L AS CR) (01034)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR) (01030)	COPPER, DIS- SOLVED (UG/L AS CU) (01040)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	LEAD, TOTAL RECOV- ERABLE (UG/L AS PB) (01051)	LEAD, DIS- SOLVED (UG/L AS PB) (01049)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MERCURY TOTAL RECOV- ERABLE (UG/L AS HG) (71900)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)	
FEB	28...	1	<1	<10	<10	3	640	2	1	110	--	--	
APR	22...	--	--	--	--	--	60	--	--	40	--	--	
SEP	04...	<1	<1	<10	<10	1	500	<5	<5	150	<0.1	0.2	

## KNIFE RIVER BASIN

06339560 BRUSH CREEK NEAR BEULAH, ND--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	NICKEL, TOTAL RECOV- ERABLE (UG/L AS NI) (01067)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, TOTAL (UG/L AS SE) (01147)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN) (01092)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C) (00681)	CYANIDE TOTAL (MG/L AS CN) (00720)	PHENOLS TOTAL (UG/L) (32730)	SEDI- MENT, SUS- PENDE (MG/L) (80154)	MENT, DIS- CHARGE, SUS- PENDE (T/DAY) (80155)
FEB 28...	5	1	<1	<1	20	12	17	<0.01	2	44	3.1
APR 22...	--	--	--	--	--	--	13	--	--	46	0.44
SEP 04...	7	2	<1	<1	20	9	10	<0.01	4	28	0.02

## KNIFE RIVER BASIN

239

06340000 SPRING CREEK AT ZAP, ND

LOCATION.--Lat 47°17'10", long 101°55'31", in SW1/4 sec.14, T.144 N., R.89 W., Mercer County, Hydrologic Unit 10130201, on right bank 250 ft downstream from Burlington Northern Railway bridge in Zap, and 9 mi upstream from mouth.

DRAINAGE AREA.--549 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--March to September 1924, October 1945 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,819.39 ft above National Geodetic Vertical Datum of 1929. Mar. 4 to Sept. 30, 1924, nonrecording gage at site 250 ft upstream at different datum. Oct. 1, 1945, to Sept. 30, 1947, nonrecording gage 250 ft upstream at datum 1.12 ft higher.

REMARKS.--Estimated daily discharges: Oct. 1 to Mar. 4 and Aug. 13 to Sept 4. Records fair except those for periods of estimated daily discharges, which are poor. Flow slightly regulated by Lake Ilo, 56 mi upstream, capacity 7,130 acre-ft.

AVERAGE DISCHARGE.--41 years, 43.4 ft<sup>3</sup>/s, 31,400 acre-ft/yr; median of yearly mean discharges, 41 ft<sup>3</sup>/s, 29,700 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,130 ft<sup>3</sup>/s, Apr. 7, 1952, gage height, 20.03 ft; maximum gage height, 20.70 ft, Mar. 15, 1972; no flow at times.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage known occurred in about 1902, from ice jam. Floods of February 1913 and March 1943 reached a stage of about 20 ft and 19.5 ft, respectively, from information by local residents.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,310 ft<sup>3</sup>/s, Mar. 2, gage height, 15.12 ft, only peak greater than base discharge of 1,000 ft<sup>3</sup>/s; minimum daily 7.0 ft<sup>3</sup>/s, Feb. 20.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8.5	12	9.0	11	9.5	1320	43	39	43	84	22	11
2	8.0	12	9.5	11	9.5	1900	41	37	36	127	20	11
3	8.0	12	10	10	9.5	2100	36	34	32	117	19	11
4	9.0	12	10	10	9.5	1790	37	37	28	80	18	12
5	12	13	11	10	9.5	1270	39	42	23	55	17	11
6	15	13	12	9.5	9.5	686	39	128	22	39	16	12
7	18	12	12	9.0	9.0	376	39	164	23	32	16	12
8	27	12	12	11	9.0	282	37	136	21	25	15	12
9	26	11	11	12	8.0	219	33	151	20	29	14	12
10	26	10	11	12	7.5	167	32	188	20	41	13	13
11	26	10	11	12	8.0	147	31	169	19	37	13	13
12	26	11	10	12	8.0	132	28	173	19	28	12	13
13	27	12	9.5	12	8.0	137	26	137	19	26	14	12
14	28	12	10	12	8.0	157	24	114	18	24	14	12
15	29	13	11	11	8.0	137	27	87	17	23	13	14
16	31	13	11	12	8.0	122	35	71	17	24	13	14
17	33	13	11	12	8.0	100	41	63	16	307	13	14
18	32	11	11	12	8.0	87	77	50	15	89	13	14
19	28	10	10	12	7.5	75	98	48	14	54	13	15
20	25	9.8	10	12	7.0	67	90	41	14	77	12	16
21	20	9.6	12	12	8.0	61	70	32	16	98	12	17
22	18	9.4	12	11	8.0	61	65	30	15	95	11	18
23	16	9.2	12	11	8.0	60	55	76	12	81	12	18
24	15	9.0	12	11	8.0	57	45	139	11	75	15	16
25	14	9.0	11	11	50	56	41	140	12	57	14	28
26	14	9.0	12	10	200	51	42	119	13	47	14	25
27	12	8.8	11	10	950	45	43	102	12	40	13	25
28	12	8.6	11	10	1400	47	37	86	17	36	13	28
29	12	8.0	11	10	---	48	35	73	31	31	12	35
30	12	8.5	11	9.8	---	42	42	61	74	27	12	31
31	12	---	11	9.5	---	40	---	52	---	24	12	---
TOTAL	599.5	322.9	338.0	339.8	2801.0	11839	1328	2819	649	1929	440	495
MEAN	19.3	10.8	10.9	11.0	100	382	44.3	90.9	21.6	62.2	14.2	16.5
MAX	33	13	12	12	1400	2100	98	188	74	307	22	35
MIN	8.0	8.0	9.0	9.0	7.0	40	24	30	11	23	11	11
AC-FT	1190	640	670	674	5560	23480	2630	5590	1290	3830	873	982
CAL YR 1985	TOTAL	7374.5		MEAN	20.2	MAX	250	MIN	2.0	AC-FT	14630	
WTR YR 1986	TOTAL	23900.2		MEAN	65.5	MAX	2100	MIN	7.0	AC-FT	47410	

## KNIFE RIVER BASIN

06340000 SPRING CREEK AT ZAP, ND--CONTINUED

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1969-70, 1974 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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 25...	0849	14	1900	--	11.0	6.0	--	--	--	--	--
DEC 10...	1341	11	2200	--	-9.5	0.0	--	--	--	--	--
JAN 30...	1045	9.8	1950	--	-1.0	0.0	--	--	--	--	--
FEB 28...	1112	1420	287	7.86	4.0	0.5	71	3	15	8.0	22
MAR 05...	1444	1220	380	--	6.5	1.0	--	--	--	--	--
MAR 11...	1135	152	590	--	8.5	2.0	--	--	--	--	--
APR 23...	0900	56	2070	--	22.0	12.5	--	--	--	--	--
JUN 12...	0841	18	1610	--	17.5	20.0	--	--	--	--	--
JUL 24...	0927	79	1080	--	23.0	23.0	--	--	--	--	--
SEP 04...	0923	12	1690	8.43	17.0	16.0	400	--	74	53	250
		SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
FEB 28...	37	1	9.1	67	63	1.1	<0.1	4.1	163	160	0.22
SEP 04...	57	6	9.2	420	530	9.4	0.4	6.7	1170	1200	1.6
		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)
FEB 28...		1	80	320	<1	9	120	0.1	1	<1	190
SEP 04...		<1	450	30	<1	63	40	0.2	2	<1	1400



## KNIFE RIVER BASIN

241

06340500 KNIFE RIVER AT HAZEN, ND  
(National stream-quality accounting network station)

LOCATION.--Lat 47°17'07", long 101°37'18", in SW¼SE¼SE¼ sec.18, T.144 N., R.86 W., Mercer County, Hydrologic Unit 10130201, on left bank at downstream side of highway bridge, 0.5 mi south of Hazen, and 3 mi upstream from Antelope Creek.

DRAINAGE AREA.--2,240 mi<sup>2</sup>, approximately.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October to November 1928, March 1929 to September 1933, August 1937 to current year. Monthly discharge only for some periods, published in WSP 1309.

REVISED RECORDS.--WSP 1146: 1943. WSP 1279: 1930-31, 1932-33(M). WSP 1917: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,712.35 ft above National Geodetic Vertical Datum of 1929. Prior to Sept. 25, 1947, nonrecording gages at same site and datum.

REMARKS.--Estimated daily discharges: Oct. 21, 22, and Nov. 8 to Mar. 12. Records good except for Nov. 8 to Mar. 12, which are poor. Slight regulation by Lake Ilo 81 mi upstream, capacity 7,130 acre-ft.

AVERAGE DISCHARGE.--53 years (1929-33, 1937-85), 180 ft<sup>3</sup>/s, 130,400 acre-ft/yr; median of yearly mean discharges, 157 ft<sup>3</sup>/s, 113,700 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 35,300 ft<sup>3</sup>/s, June 24, 1966, gage height, 27.01 ft; no flow at times in 1933, 1959, 1962.

EXTREMES OUTSIDE PERIOD OF RECORD.--According to local residents, the floods of 1943 and 1950 were not exceeded during the period 1884 to 1942.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 8,800 ft<sup>3</sup>/s, Mar. 4, gage height, 24.00 ft, only peak discharge greater than base discharge of 1,500 ft<sup>3</sup>/s; minimum daily, 19.0 ft<sup>3</sup>/s, Oct. 1, 2.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	19	31	23	29	30	5350	132	164	168	156	58	33
2	19	30	23	29	29	6260	128	142	143	178	54	33
3	21	28	24	29	29	7390	124	130	123	277	50	33
4	26	28	25	28	28	8520	122	123	109	243	47	34
5	27	28	26	27	28	6810	121	126	97	239	44	34
6	26	28	26	26	28	4430	121	366	92	166	43	34
7	36	28	27	25	27	2460	123	532	114	126	44	35
8	51	27	27	26	26	1520	120	449	215	103	40	35
9	59	26	27	27	25	1150	117	525	146	86	38	35
10	56	25	27	28	23	901	114	837	123	99	37	37
11	56	25	27	30	23	732	112	799	104	100	36	38
12	58	25	26	30	24	666	107	749	92	95	36	38
13	63	25	25	31	24	664	103	863	85	106	36	38
14	65	25	23	31	23	636	105	616	79	145	41	39
15	68	25	24	31	22	582	100	387	74	155	41	43
16	81	25	25	31	23	492	114	268	68	148	39	45
17	86	26	26	31	24	408	128	216	65	174	39	46
18	84	27	26	32	24	342	249	185	65	566	40	46
19	83	26	26	33	24	295	592	163	63	336	41	49
20	80	25	26	34	23	260	561	145	59	304	38	58
21	75	25	27	34	22	239	489	131	58	289	36	67
22	70	25	28	33	23	228	404	117	62	254	36	67
23	56	25	29	33	23	214	323	181	60	219	42	67
24	50	24	27	32	24	206	253	611	51	201	47	68
25	45	23	25	32	26	197	211	951	48	156	41	99
26	42	23	26	32	250	186	190	776	47	121	38	159
27	39	23	27	31	1400	171	173	514	46	99	37	144
28	35	23	26	31	2900	164	158	373	52	88	36	462
29	33	23	25	31	---	159	144	306	69	78	35	601
30	31	23	27	30	---	150	150	247	117	73	34	500
31	31	---	27	30	---	141	---	201	---	64	33	---
TOTAL	1571	770	803	937	5175	51923	5888	12193	2694	5444	1257	3017
MEAN	50.7	25.7	25.9	30.2	185	1675	196	393	89.8	176	40.5	101
MAX	86	31	29	34	2900	8520	592	951	215	566	58	601
MIN	19	23	23	25	22	141	100	117	46	64	33	33
AC-FT	3120	1530	1590	1860	10260	103000	11680	24180	5340	10800	2490	5980
CAL YR 1985	TOTAL	26682.4		MEAN	73.1	MAX	1160	MIN	6.0	AC-FT	52920	
WTR YR 1986	TOTAL	91672		MEAN	251	MAX	8520	MIN	19	AC-FT	181800	

## KNIFE RIVER BASIN

06340500 KNIFE RIVER AT HAZEN--CONTINUED  
(National stream-quality accounting network station)

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1950, 51, 1969 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	TUR- BID- ITY (NTU) (00076)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	COLI- FORM, FECAL, O.7 UM-MF (COLS./ 100 ML) (31625)	STREP- TOCOCCHI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	HARD- NESS (MG/L AS CACO3) (00900)
OCT 22...	0951	71	1910	8.50	16.5	9.0	13	10.6	93	110	85	340
DEC 10...	0946	27	2320	8.03	-9.0	0.0	--	10.2	69	--	--	--
JAN 28...	1025	31	2410	7.85	0.0	0.0	5.1	10.5	73	37	300	440
MAR 01...	1218	5220	290	--	6.0	0.0	--	--	--	--	--	--
05...	1146	6950	350	--	5.0	1.0	--	--	--	--	--	--
11...	0910	702	560	7.97	7.5	2.0	--	12.2	89	--	--	--
APR 22...	0855	425	2000	8.37	20.0	12.0	--	10.2	96	--	--	--
JUN 10...	1128	117	1540	8.30	24.5	21.0	--	7.3	82	--	--	--
JUL 22...	0941	256	1470	8.26	27.5	23.0	150	6.7	78	K630	580	270
AUG 19...	0923	42	1490	--	26.5	22.5	--	--	--	--	--	--
SEP 03...	1355	33	1680	8.39	21.5	20.0	--	9.4	105	--	--	--
DATE	HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	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)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	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 22...	0	58	47	320	67	8	9.7	2.8	530	13	0.5	8.4
JAN 28...	0	87	54	390	65	8	8.7	17	720	11	0.5	14
JUL 22...	0	50	35	220	63	6	9.6	3.1	460	5.4	0.3	9.8
DATE	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L) (70301)	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, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS NH4) (71846)	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 22...	1330	1100	1.8	254	0.04	0.26	0.16	0.17	0.22	1.4	0.49	0.37
JAN 28...	1660	1700	2.3	138	0.01	0.50	0.12	0.13	0.17	0.7	0.07	0.01
JUL 22...	1020	970	1.4	705	0.02	0.20	0.08	0.05	0.06	1.5	0.23	0.04
DATE	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)	BERYL- LIUM, DIS- SOLVED (UG/L AS BE) (01010)	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)
OCT 22...	0.32	--	3	57	<0.5	4	<1	<3	3	54	<1	58
JAN 28...	<0.01	10	5	<100	<10	1	<1	1	2	20	<1	60
JUL 22...	0.02	130	3	84	<0.5	<1	<1	<3	5	200	<5	38

06340500 KNIFE RIVER AT HAZEN--CONTINUED  
(National stream-quality accounting network station)

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	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)	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)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	SEDI- MENT, DIS- CHARGE, SUS- PENDE (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN (70331)	
OCT 22...	21	0.1	<10	6	<1	<1	1100	<6	10	84	16	93
JAN 28...	140	<0.1	2	2	<1	<1	1500	2	40	14	1.2	87
JUL 22...	14	0.1	<10	4	<1	<1	750	<6	5	608	420	12

## KNIFE RIVER BASIN

06340520 ANTELOPE CREEK ABOVE HAZEN, ND

LOCATION.--Lat 47°20'07", long 101°41'41", in SE1/4SE1/4NE1/4 sec.36, T.145 N., R.87 W., Mercer County, Hydrologic Unit 10130201, on left bank about 100 ft upstream from bridge on county road, 4.2 mi northwest of Hazen, and 2.0 mi upstream from Schramm Dam.

DRAINAGE AREA.--47.2 mi<sup>2</sup>, revised.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1977 to December 1985 (discontinued).

GAGE.--Water-stage recorder. Elevation of gage is 1,800 ft, from topographic map.

REMARKS.--Estimated daily discharges: Oct. 7-9, Oct.26 to Nov. 3, Nov. 7-13, and Nov. 17 to Dec. 31. Records good except those for periods of estimated daily discharges, which are poor.

AVERAGE DISCHARGE.--8 years (water years 1978-85), 4.24 ft<sup>3</sup>/s, 3,100 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,420 ft<sup>3</sup>/s, Mar. 29, 1982, from rating curve extended above 350 ft<sup>3</sup>/s, gage height, 8.55 ft; maximum gage height, 8.95 ft, Mar. 21, 1978, ice jam; no flow for many days each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge during period October 1985 to December 1985, 8.1 ft<sup>3</sup>/s, Oct. 15, gage height 2.62, ft. No peaks greater than base discharge of 50 ft<sup>3</sup>/s; no flow Oct. 1, 2.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.32	.14									
2	.00	.33	.14									
3	.01	.35	.14									
4	.09	.37	.14									
5	.35	.41	.14									
6	.21	.32	.14									
7	1.5	.32	.14									
8	2.5	.32	.14									
9	1.3	.30	.14									
10	1.0	.26	.14									
11	2.5	.21	.14									
12	2.8	.19	.14									
13	4.6	.19	.13									
14	6.9	.19	.14									
15	7.3	.20	.14									
16	6.2	.21	.13									
17	4.7	.19	.12									
18	4.0	.18	.12									
19	2.8	.17	.13									
20	2.0	.17	.14									
21	1.4	.17	.15									
22	1.2	.16	.16									
23	.91	.16	.15									
24	.62	.16	.15									
25	.74	.15	.14									
26	.70	.15	.14									
27	.57	.15	.14									
28	.40	.15	.13									
29	.40	.14	.13									
30	.40	.13	.13									
31	.39	---	.13									
TOTAL	58.49	6.72	4.28									
MEAN	1.89	.22	.14									
MAX	7.3	.41	.16									
MIN	.00	.13	.12									
AC-FT	116	13	8.5									
CAL YR 1985	TOTAL	1637.53	MEAN	4.49	MAX	180	MIN	.00	AC-FT	3250		



## KNIFE RIVER BASIN

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06340520 ANTELOPE CREEK ABOVE HAZEN--CONTINUED

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	OXYGEN, DIS- SOLVED (MG/L) (00300)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	
OCT 24...	0847	0.57	1950	7.90	6.5	6.0	11.0	450	14	
DATE		CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	SODIUM AD- SORP- TION RATIO (00931)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, RESIDUE AT 105 DEG. C, SUS- PENDED (MG/L) (00530)
OCT 24...	83	59	290	6	428	0.9	620	1400	16	

## 06340528 WEST BRANCH ANTELOPE CREEK NO. 4 NEAR ZAP, ND

LOCATION.--Lat 47°21'21", long 101°51'16", in the NW¼NW¼NE¼ sec.26, T.145 N., R.88 W., Mercer County, Hydrologic Unit 10130201, on left bank upstream from culvert, and 6.0 mi northeast of Zap.

DRAINAGE AREA.--8.46 mi<sup>2</sup>, revised.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1976 to September 1986 (discontinued). Prior to Oct. 1978, published as Antelope Creek Tributary No. 4 near Zap.

GAGE.--Water-stage recorder.

REMARKS.--Estimated daily discharges: Oct. 7-9 and Nov. 9 to Mar. 10. Records fair. Some regulation by stock dams above station.

AVERAGE DISCHARGE.--10 years, 0.66 ft<sup>3</sup>/s, 478 acre-ft.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 650 ft<sup>3</sup>/s, Apr. 17, 1979, gage height, 9.66 ft; no flow for several months each year.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 10 ft<sup>3</sup>/s and maximum (\*):

Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)	Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)
Mar. 1	2400	*a106	*b7.16	No other peak greater than base discharge			
July 17	1300	83	5.08				

No flow for several months.

a - Backwater from ice

b - From high-water mark

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.01	.00	.00	.00	60	.28	.84	.22	.00	.00	.00
2	.00	.00	.00	.00	.00	45	.30	.79	.19	.00	.00	.00
3	.00	.00	.00	.00	.00	17	.58	.77	.16	.00	.00	.00
4	.00	.00	.00	.00	.00	10	.47	.63	.15	.00	.00	.00
5	.00	.00	.00	.00	.00	5.0	.53	1.2	.08	.00	.00	.00
6	.00	.00	.00	.00	.00	2.0	.51	2.9	.07	.00	.00	.00
7	.00	.00	.00	.00	.00	.60	.40	2.8	.07	.00	.00	.00
8	.00	.00	.00	.00	.00	1.0	.32	2.0	.04	.00	.00	.00
9	.00	.00	.00	.00	.00	1.2	.45	4.1	.05	.00	.00	.00
10	.00	.00	.00	.00	.00	1.3	.51	4.2	.06	.04	.00	.00
11	.00	.00	.00	.00	.00	1.8	.50	1.9	.03	.00	.00	.00
12	.00	.00	.00	.00	.00	2.1	.26	1.5	.00	.00	.00	.00
13	.01	.00	.00	.00	.00	1.9	.23	1.1	.00	.00	.00	.00
14	.01	.00	.00	.00	.00	1.5	.20	.82	.00	.00	.00	.00
15	.03	.00	.00	.00	.00	1.1	.39	.67	.00	.00	.00	.00
16	.03	.00	.00	.00	.00	.88	.79	.57	.00	.00	.00	.00
17	.03	.00	.00	.00	.00	.68	1.9	.52	.00	25	.00	.00
18	.02	.00	.00	.00	.00	.59	4.8	.51	.00	14	.00	.00
19	.01	.00	.00	.00	.00	.50	5.6	.48	.00	5.1	.00	.00
20	.01	.00	.00	.00	.00	.42	3.0	.42	.00	1.8	.00	.00
21	.01	.00	.00	.00	.00	.46	1.7	.36	.00	.75	.00	.00
22	.01	.00	.00	.00	.00	.56	1.3	.36	.00	.20	.00	.00
23	.01	.00	.00	.00	.00	.45	.98	1.9	.00	.03	.00	.00
24	.01	.00	.00	.00	.00	.43	.71	2.7	.00	.00	.00	.00
25	.01	.00	.00	.00	1.0	.42	.80	2.0	.00	.00	.00	.00
26	.01	.00	.00	.00	5.0	.37	.92	1.1	.00	.00	.00	.00
27	.01	.00	.00	.00	4.0	.35	.76	.73	.00	.00	.00	.00
28	.01	.00	.00	.00	2.0	.35	.68	.53	.00	.00	.00	.00
29	.01	.00	.00	.00	---	.37	.70	.41	.04	.00	.00	.00
30	.01	.00	.00	.00	---	.36	1.5	.33	.00	.00	.00	.00
31	.01	---	.00	.00	---	.34	---	.28	---	.00	.00	---
TOTAL	.26	.01	.00	.00	12.00	159.03	32.07	39.42	1.16	46.92	.00	.00
MEAN	.01	.00	.00	.00	.43	5.13	1.07	1.27	.04	1.51	.00	.00
MAX	.03	.01	.00	.00	5.0	60	5.6	4.2	.22	25	.00	.00
MIN	.00	.00	.00	.00	.00	.34	.20	.28	.00	.00	.00	.00
AC-FT	.5	.02	.00	.00	24	315	64	78	2.3	93	.00	.00
CAL YR 1985	TOTAL	165.30	MEAN	.45	MAX	17	MIN	.00	AC-FT	328		
WTR YR 1986	TOTAL	290.87	MEAN	.80	MAX	60	MIN	.00	AC-FT	577		

## KNIFE RIVER BASIN

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06340528 WEST BRANCH ANTELOPE CREEK NO. 4 NEAR ZAP, ND

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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 24...	1137	0.01	1390	--	13.0	5.0	--	--	--	--	--
MAR 01...	1424	52	185	7.20	9.0	1.0	66	15	15	7.0	7.0
10...	1122	1.2	740	--	5.0	1.5	--	--	--	--	--
APR 21...	1241	1.6	1020	--	15.0	9.0	--	--	--	--	--
JUN 10...	1557	0.06	1320	--	21.5	18.0	--	--	--	--	--
JUL 22...	1416	0.15	760	--	28.5	22.0	--	--	--	--	--
		SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR 01...	16	0.4	9.1	52	28	1.1	0.1	7.0	117	110	0.16
		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 01...		<1	60	180	<1	4	50	0.1	<1	<1	90

## MISSOURI RIVER MAIN STEM

06340700 MISSOURI RIVER NEAR STANTON, ND

LOCATION.--Lat 47°17'14", long 101°20'25", in SW¼ sec.16, T.144 N., R.84 W., McLean County, Hydrologic Unit 10130101, on right bank 3 mi southeast of Stanton, 0.1 mi below Ft. Clark irrigation pumping station, 0.4 mi above the United Power Association power plant, and at mile 1,372.

DRAINAGE AREA.--182,000 mi<sup>2</sup>, approximately.

## GAGE-HEIGHT RECORDS

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

GAGE.--Water-stage recorder. Datum of gage is 1,650.00 ft above National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). Prior to Sept. 30, 1964, at datum 50.00 ft lower.

REMARKS.--Stage regulated completely by releases from Garrison Dam (station 06338490) 18 mi upstream.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily gage height recorded, 24.56 ft, Feb. 22, 1965; minimum daily recorded, 10.06 ft, May 26, 1986.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	11.07	10.92	12.75	14.17	13.68	13.96	14.09	10.56	---	11.79	12.59	12.97
2	10.98	10.97	13.09	14.03	13.84	13.25	14.16	10.66	---	12.23	12.85	12.54
3	11.01	10.89	13.69	14.05	13.78	12.60	14.27	10.52	---	12.12	13.06	12.29
4	10.94	10.93	13.56	14.01	13.63	12.94	14.02	10.50	---	11.91	13.17	12.44
5	10.97	10.93	13.26	13.87	13.76	13.32	13.87	10.53	---	12.11	13.38	12.48
6	10.91	11.15	13.04	14.08	13.80	13.10	13.15	10.64	---	11.92	13.12	12.13
7	11.13	10.84	12.77	14.59	13.88	13.71	12.99	10.75	10.98	12.05	13.27	12.16
8	11.03	11.07	12.52	14.59	13.73	13.94	13.08	10.67	10.90	11.98	13.32	12.17
9	10.96	11.08	12.63	14.04	14.28	13.85	12.81	10.40	11.36	12.01	13.45	12.21
10	10.91	11.13	12.64	13.80	13.81	14.07	13.13	---	11.29	11.99	13.12	11.99
11	10.78	11.10	12.62	13.60	13.57	14.02	12.98	10.37	11.00	12.12	13.38	11.95
12	10.73	10.96	13.23	13.71	14.07	14.35	12.56	10.14	11.32	11.81	13.33	11.93
13	11.14	11.16	14.65	13.91	13.97	14.24	11.97	10.09	11.26	11.98	13.27	11.91
14	10.97	11.01	14.91	13.94	13.91	14.27	12.07	10.12	11.42	11.87	13.30	11.83
15	10.95	11.08	14.58	13.89	14.09	14.08	11.75	---	11.04	12.06	13.44	11.91
16	10.90	11.04	14.10	13.78	14.04	14.28	12.04	---	11.54	12.02	13.38	12.10
17	10.93	11.06	13.86	13.83	14.02	14.55	11.77	---	11.27	12.04	13.21	12.14
18	10.96	11.17	14.23	13.82	14.08	14.22	12.01	---	11.42	11.89	13.36	12.61
19	10.87	11.06	14.34	13.79	14.18	14.14	11.76	---	11.29	12.19	13.33	12.50
20	10.82	11.32	14.39	13.79	13.96	14.16	11.77	---	11.15	11.98	13.33	12.47
21	10.96	11.68	14.07	13.73	14.08	13.94	12.12	---	11.37	12.18	13.42	12.32
22	10.96	11.63	13.63	14.03	14.23	14.22	11.80	---	11.14	12.25	13.53	12.52
23	10.91	12.12	13.50	14.01	14.03	14.05	11.67	---	11.87	12.77	13.30	11.78
24	10.84	12.35	13.78	13.69	14.24	14.15	11.23	---	12.11	12.64	13.26	12.26
25	10.99	12.25	13.93	13.85	13.89	13.99	10.97	---	11.97	12.78	13.21	12.65
26	10.68	12.09	13.92	13.75	13.61	14.04	11.09	10.06	11.97	12.69	13.29	12.41
27	10.72	12.03	13.77	13.96	13.21	14.06	11.34	10.12	11.83	12.52	13.31	12.51
28	10.91	12.41	14.27	13.66	12.85	14.01	11.51	---	11.92	12.73	13.22	12.37
29	10.87	12.30	14.96	13.73	---	13.92	11.10	---	11.80	12.65	13.59	12.87
30	10.97	12.60	14.84	13.71	---	13.82	11.10	---	12.25	12.64	13.49	12.17
31	10.96	---	14.55	13.65	---	14.18	---	---	---	12.63	13.29	---
MEAN	10.93	11.41	13.74	13.91	13.86	13.92	12.34	---	---	12.21	13.28	12.29
MAX	11.14	12.60	14.96	14.59	14.28	14.55	14.27	---	---	12.78	13.59	12.97
MIN	10.68	10.84	12.52	13.60	12.85	12.60	10.97	---	---	11.79	12.59	11.78



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LOCATION.--Lat 47°16'45", long 101°11'03", in SW<sup>1</sup>/<sub>4</sub> sec.22, T.144 N., R.83 W., McLean County, Hydrologic Unit 10130101, on left bank about 7.5 mi west of Washburn, and at mile 1,362.

### GAGE-HEIGHT RECORDS

GAGE.--Water-stage recorder. Datum of gage is 1,640.00 ft above National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). Prior to Sept. 30, 1964, at datum 40 ft lower.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily gage height recorded, 27.77 ft, Mar. 20, 1965; minimum daily recorded, 13.65 ft, June 04, 1986.

[illegible]

## COAL LAKE COULEE BASIN

06340905 COAL LAKE COULEE NEAR HENSLER, ND

LOCATION.--Lat 47°18'09", long 101°07'52", in SW1/4SE1/4SE1/4 sec.12, T.144 N., R.83 W., McLean County, Hydrologic Unit 10130101, on right bank 100 ft upstream from bridge, on county road 4.5 mi west of Washburn, 3.6 mi northwest of Hensler, and 0.3 mi upstream from mouth.

DRAINAGE AREA.--70.5 mi<sup>2</sup>, of which 53.3 mi<sup>2</sup> is probably noncontributing, revised.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1977 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 1,690 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Feb. 26 to Mar. 11, Mar. 18-21, Mar. 31 to Apr. 1, Apr. 13-15, June 22 to July 25, and Aug. 8-26. Records fair.

AVERAGE DISCHARGE.--9 years, 2.52 ft<sup>3</sup>/s, 1,830 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 926 ft<sup>3</sup>/s, Aug. 20, 1980, gage height, 8.61 ft, from rating extended above 600 ft<sup>3</sup>/s on basis of a culvert computation of peak flow; no flow for many months each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, about 100 ft<sup>3</sup>/s, Feb. 26, gage height, 3.27 ft, only peak greater than base discharge of 40 ft<sup>3</sup>/s; no flow for several months.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.00	19	5.0	8.2	2.4	1.0	.00	.00
2	.00	.00	.00	.00	.00	21	6.5	8.5	2.7	.90	.00	.00
3	.00	.00	.00	.00	.00	16	7.8	8.0	2.7	.80	.00	.00
4	.00	.00	.00	.00	.00	10	7.1	6.8	2.9	.70	.00	.00
5	.00	.00	.00	.00	.00	4.0	7.0	7.4	2.9	.70	.00	.00
6	.00	.00	.00	.00	.00	1.0	6.4	6.6	3.3	.60	.00	.00
7	.00	.00	.00	.00	.00	.10	5.7	8.3	3.6	.50	.00	.00
8	.00	.00	.00	.00	.00	.20	5.2	13	3.0	.40	.00	.00
9	.00	.00	.00	.00	.00	.50	5.2	21	3.3	.30	.00	.00
10	.00	.00	.00	.00	.00	1.0	5.2	15	3.5	.50	.00	.00
11	.00	.00	.00	.00	.00	2.0	4.8	13	3.0	.45	.00	.00
12	.00	.00	.00	.00	.00	6.6	4.2	10	2.4	.35	.00	.00
13	.00	.00	.00	.00	.00	7.9	3.0	9.3	2.0	.30	.00	.00
14	.00	.00	.00	.00	.00	6.8	1.0	8.5	2.1	.25	.00	.00
15	.00	.00	.00	.00	.00	6.7	.20	6.9	2.2	.25	.00	.00
16	.00	.00	.00	.00	.00	6.9	7.2	6.6	1.8	1.2	.00	.00
17	.00	.00	.00	.00	.00	6.9	12	5.7	1.5	.80	.00	.00
18	.00	.00	.00	.00	.00	6.0	20	5.5	1.8	.50	.00	.00
19	.00	.00	.00	.00	.00	5.0	17	5.1	1.5	.20	.00	.00
20	.00	.00	.00	.00	.00	4.0	15	4.6	1.1	.10	.00	.00
21	.00	.00	.00	.00	.00	5.0	16	4.1	.85	.05	.00	.00
22	.00	.00	.00	.00	.00	7.6	15	3.9	.80	.03	.00	.00
23	.00	.00	.00	.00	.00	6.7	14	4.9	.70	.02	.00	.00
24	.00	.00	.00	.00	.00	7.6	11	4.2	.60	.01	.00	.00
25	.00	.00	.00	.00	.00	7.5	13	3.0	.50	.00	.00	.00
26	.00	.00	.00	.00	30	5.7	13	2.4	.40	.00	.00	.00
27	.00	.00	.00	.00	15	7.7	12	2.1	.35	.00	.00	.00
28	.00	.00	.00	.00	8.0	7.4	10	1.8	.30	.00	.00	.00
29	.00	.00	.00	.00	---	7.2	9.1	1.5	.25	.00	.00	.00
30	.00	.00	.00	.00	---	6.1	10	1.5	.80	.00	.00	.00
31	.00	---	.00	.00	---	6.0	---	1.9	---	.00	.00	---
TOTAL	.00	.00	.00	.00	53.00	206.10	268.60	209.3	55.25	10.91	.00	.00
MEAN	.00	.00	.00	.00	1.89	6.65	8.95	6.75	1.84	.35	.00	.00
MAX	.00	.00	.00	.00	30	21	20	21	3.6	1.2	.00	.00
MIN	.00	.00	.00	.00	.00	.10	.20	1.5	.25	.00	.00	.00
AC-FT	.00	.00	.00	.00	105	409	533	415	110	22	.00	.00
CAL YR 1985	TOTAL	457.04	MEAN	1.25	MAX	16	MIN	.00	AC-FT	907		
WTR YR 1986	TOTAL	803.16	MEAN	2.20	MAX	30	MIN	.00	AC-FT	1590		

## KNIFE RIVER BASIN

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06340905 COAL LAKE COULEE NEAR HENSLER, ND--CONTINUED

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED SATUR- ATION (00301)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)
FEB										
26...	1104	17	170	--	5.5	1.0	--	--	--	--
27...	1257	7.7	180	--	-1.0	0.5	--	--	--	--
MAR										
12...	1329	2.7	770	8.01	5.5	2.5	12.6	92	85	0
APR										
24...	1050	11	1710	8.35	16.5	11.0	9.9	90	530	39
JUN										
11...	1433	2.9	2200	8.48	24.5	23.0	7.2	84	770	350
JUL										
15...	1022	0.23	--	--	23.5	20.0	--	--	--	--
DATE		CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	SODIUM AD- SORP- TION RATIO (00931)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, RESIDUE AT 105 DEG. C, SUS- PENDEED (MG/L) (00530)
MAR										
12...	30		2.5	93	5	--	5.6	200	551	166
APR										
24...	66		89	210	4	340	4.2	560	1240	68
JUN										
11...	110		120	260	4	422	2.3	750	1630	110

## MISSOURI RIVER MAIN STEM

06341000 MISSOURI RIVER AT WASHBURN, ND

LOCATION.--Lat 47°17'20", long 101°02'15", in SE¼SW¼ sec.14, T.144 N., R.82 W., McLean County, Hydrologic Unit 10130101, on left bank near municipal water plant in Washburn, and at mile 1,355.

DRAINAGE AREA.--184,000 mi<sup>2</sup>, approximately.

## GAGE-HEIGHT RECORDS

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

GAGE.--Water-stage recorder. Datum of gage is 1,640.00 ft above National Geodetic Vertical Datum of 1929. Prior to Sept. 30, 1964, at datum 40 ft lower.

REMARKS.--Stage regulated by releases from Garrison Dam (station 06338490) 35 mi upstream.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily gage height recorded, 22.76 ft, Jan. 11, 1964; minimum daily recorded, 9.73 ft, May 7, 1978.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	11.24	11.03	15.82	17.42	---	13.80	13.72	10.81	---	11.83	12.39	13.06
2	11.17	11.17	15.18	16.96	13.69	13.53	13.81	10.66	---	12.02	12.50	12.55
3	11.16	11.03	15.42	16.70	13.65	12.64	13.87	10.60	---	11.92	12.78	12.19
4	11.11	11.09	15.75	16.54	13.66	12.80	13.94	10.50	---	11.87	12.80	12.40
5	11.14	11.03	15.66	16.40	13.62	13.08	13.56	10.60	---	11.95	13.21	12.36
6	11.08	11.24	15.83	---	13.63	12.91	13.11	10.71	10.27	11.87	12.86	12.24
7	11.17	11.13	15.73	---	13.64	13.21	12.82	10.69	10.83	12.01	13.00	12.20
8	11.17	11.16	15.19	---	13.58	13.58	12.84	10.73	11.01	11.92	13.06	12.06
9	11.11	11.17	14.46	17.22	13.96	13.63	12.66	10.70	11.31	11.76	13.23	12.24
10	11.05	11.22	14.21	15.98	13.86	13.72	12.89	---	11.39	11.94	12.91	12.03
11	11.06	11.20	14.87	15.18	13.53	13.62	12.73	10.51	11.07	11.89	13.08	11.98
12	10.98	---	15.44	14.77	14.16	13.92	12.47	10.23	11.26	11.79	13.00	11.95
13	11.30	11.22	15.53	14.69	14.04	13.84	12.14	10.21	11.28	11.87	13.11	11.93
14	11.12	11.16	---	14.50	14.37	13.89	12.04	10.19	11.37	11.64	13.03	11.96
15	---	11.18	---	---	---	13.92	11.61	10.14	11.07	11.85	13.10	11.86
16	---	11.17	---	---	---	13.84	11.89	10.12	11.39	11.84	13.26	12.03
17	---	11.14	16.06	13.83	---	14.21	11.60	---	11.26	11.89	13.08	12.00
18	---	11.19	16.21	13.75	---	13.97	12.00	---	11.31	11.86	12.91	12.40
19	---	11.12	16.32	13.67	---	13.80	11.71	---	11.41	11.99	13.16	12.40
20	---	11.39	16.24	13.70	---	13.84	11.66	---	11.13	11.88	13.02	12.40
21	---	---	---	13.60	---	13.66	11.97	---	11.35	11.85	13.13	12.32
22	---	---	---	13.69	---	13.94	11.72	---	11.16	12.05	13.28	12.53
23	---	---	---	13.85	---	13.73	11.80	10.21	11.37	12.37	13.12	11.96
24	10.99	12.25	---	13.58	---	13.87	11.28	---	12.10	12.51	13.05	11.92
25	11.08	12.20	---	13.64	---	13.63	11.05	---	11.87	12.50	13.06	12.53
26	10.96	12.15	---	13.61	13.58	13.85	11.05	10.07	11.86	12.58	12.96	12.39
27	11.02	12.49	16.48	---	13.70	13.73	11.24	10.21	11.68	12.39	13.05	12.36
28	10.90	13.37	16.45	---	12.38	13.70	11.50	10.09	11.85	12.52	12.97	12.35
29	11.00	15.05	16.56	---	---	13.71	11.08	10.31	11.71	12.53	13.31	12.64
30	11.10	15.65	17.35	---	---	13.56	11.11	---	12.04	12.51	13.35	12.44
31	11.12	---	---	---	---	13.74	---	---	---	12.38	13.09	---
MEAN	---	---	---	---	---	13.64	12.23	---	---	12.06	13.03	12.26
MAX	---	---	---	---	---	14.21	13.94	---	---	12.58	13.35	13.06
MIN	---	---	---	---	---	12.64	11.05	---	---	11.64	12.39	11.86



## PAINTED WOODS CREEK BASIN

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06341800 PAINTED WOODS CREEK NEAR WILTON, ND

LOCATION.--Lat 47°16'30", long 100°47'30", in SW1/4SW1/4 sec.23, T.144 N., R.80 W., McLean County, Hydrologic Unit 10130101, on right bank 600 ft upstream from county highway bridge, 7 mi upstream from Yanktonal Creek, and 8 mi north of Wilton.

DRAINAGE AREA.--427 mi<sup>2</sup>, approximately, of which about 310 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1957 to September 1981, August 1982 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 1,760 ft, from topographic map.

REMARKS.--Estimated daily discharges: Nov. 21 to Mar. 23 and Apr. 13-15. Records good except those for winter period, which are poor. Since the fall of 1982 Missouri River basin water has been diverted into the stream at a point several miles upstream.

AVERAGE DISCHARGE.--24 years (water years 1958-81), 8.07 ft<sup>3</sup>/s, 5,850 acre-ft/yr; median of yearly mean discharges, 6.7 ft<sup>3</sup>/s, 4,850 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,050 ft<sup>3</sup>/s, Apr. 19, 1979, gage height, 9.64 ft; no flow for many days most years.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 520 ft<sup>3</sup>/s, Mar. 1, gage height, 7.03; minimum daily discharge 1.6 ft<sup>3</sup>/s, June 26-28.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	36	35	18	25	20	380	29	74	5.0	40	42	45
2	35	35	19	23	20	400	28	67	4.6	43	46	44
3	37	35	19	21	19	340	41	63	3.9	41	48	42
4	39	35	20	20	19	300	48	59	3.6	42	47	39
5	37	34	21	20	19	230	49	57	3.3	41	45	38
6	35	36	23	20	19	130	49	59	3.2	41	42	39
7	38	34	27	20	19	80	46	61	3.2	41	38	39
8	42	25	28	21	19	90	44	65	2.9	43	35	39
9	35	32	27	22	19	88	42	83	3.0	42	36	40
10	23	30	27	23	18	84	41	72	2.7	47	41	42
11	25	31	27	25	17	80	40	74	2.7	47	42	43
12	33	34	27	24	16	65	40	69	2.4	46	39	42
13	37	34	27	24	15	40	35	64	2.3	48	42	42
14	38	35	28	23	15	32	25	57	2.3	45	50	42
15	39	36	27	23	15	32	10	55	2.8	45	45	45
16	38	35	25	24	15	26	50	52	2.6	48	42	47
17	14	36	24	24	15	23	45	52	3.0	46	43	47
18	5.8	27	23	24	15	20	78	51	2.8	45	41	45
19	4.0	28	23	26	15	23	150	50	2.4	44	38	44
20	3.0	26	23	25	15	13	134	50	2.2	43	39	45
21	2.4	20	24	24	15	15	83	48	2.2	41	40	45
22	2.2	20	25	23	15	20	54	46	2.1	41	40	45
23	2.0	19	25	22	15	19	48	49	2.0	42	44	43
24	1.9	19	25	22	15	17	39	42	1.9	45	41	43
25	2.0	20	23	21	15	16	59	16	1.8	46	42	50
26	1.9	19	25	20	25	14	78	12	1.6	43	44	46
27	1.8	19	24	20	100	14	81	10	1.6	43	45	46
28	17	18	24	20	200	13	81	9.4	1.6	43	44	42
29	24	17	24	20	---	14	74	8.2	22	41	42	44
30	31	18	25	20	---	29	75	7.0	40	39	43	42
31	37	---	24	20	---	28	---	6.1	---	42	44	---
TOTAL	717.0	842	751	699	744	2675	1696	1487.7	137.7	1344	1310	1295
MEAN	23.1	28.1	24.2	22.2	26.6	86.3	56.5	48.0	4.59	43.4	42.3	43.2
MAX	42	36	28	26	200	400	150	83	40	48	50	50
MIN	1.8	17	18	20	15	13	10	6.1	1.6	39	35	38
AC-FT	1420	1670	1490	1370	1480	5310	3360	2950	273	2670	2600	2570
CAL YR 1985	TOTAL	11286.5		MEAN	30.9	MAX	110	MIN	1.8	AC-FT	22390	
WTR YR 1986	TOTAL	13688.4		MEAN	37.5	MAX	400	MIN	1.6	AC-FT	27150	

## PAINTED WOODS CREEK BASIN

06341800 PAINTED WOODS CREEK NEAR WILTON, ND--CONTINUED

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1959-64, 1970 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	TUR- BID- ITY (NTU) (00076)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)
OCT 25...	1301	1.9	2090	8.11	19.0	7.0	3.0	570	190	70
DEC 11...	1423	27	1610	--	-14.0	0.0	--	--	--	--
JAN 29...	1518	20	1530	--	-7.0	0.0	--	--	--	--
FEB 27...	1123	97	420	--	-3.0	0.5	--	--	--	--
MAR 03...	1501	333	280	7.55	9.0	1.0	24	80	0	16
MAR 12...	1156	65	570	--	3.5	1.5	--	--	--	--
APR 24...	1432	37	1730	8.21	14.0	14.0	4.0	470	90	70
JUN 12...	1242	2.1	2150	8.55	20.0	20.0	7.0	550	46	70
JUL 23...	1212	42	1760	8.36	29.5	25.0	3.5	510	240	59
SEP 10...	1109	42	1660	8.55	14.5	15.5	2.8	460	200	56
DATE	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	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)
OCT 25...	97	290	51	5	23	388	5.8	740	27	0.3
MAR 03...	9.8	21	32	1	14	--	0	59	4.4	<0.1
APR 24...	72	240	52	5	13	381	4.5	530	9.9	0.2
JUN 12...	90	320	55	6	17	499	2.7	690	12	0.2
JUL 23...	88	210	46	4	20	269	2.2	710	19	0.3
SEP 10...	78	190	46	4	21	260	1.4	650	24	0.4
DATE	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	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)	
OCT 25...	2.4	1440	1500	2.0	7.5	<0.10	0.02	460	20	
MAR 03...	10	192	--	0.26	173	0.65	0.19	70	300	
APR 24...	18	1240	1200	1.7	123	0.13	0.04	350	66	
JUN 12...	13	1590	1500	2.2	9.1	<0.10	0.09	470	30	
JUL 23...	6.1	1300	1300	1.8	148	<0.10	0.02	410	10	
SEP 10...	5.4	1250	1200	1.7	141	<0.10	0.01	380	13	

## MISSOURI RIVER MAIN STEM

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06342020 MISSOURI RIVER AT PRICE, ND

LOCATION.--Lat 47°04'47", long 100°55'55", in NW¼ sec.34, T.142 N., R.81 W., Oliver County, Hydrologic Unit 10130101, on right bank 0.5 mi south of Price, and at mile 1,338.

DRAINAGE AREA.--185,000 mi<sup>2</sup>, approximately.

## GAGE-HEIGHT RECORDS

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

GAGE.--Water-stage recorder. Datum of gage is 1,620.00 ft above National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). Prior to Sept. 30, 1964, at datum 20 ft lower.

REMARKS.--Stage regulated by releases from Garrison Dam (station 06338490) 52 mi upstream.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily gage height recorded, 30.12 ft, Jan. 22, 1967; minimum daily recorded, 17.76 ft, Mar. 31, 1968.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1		---	25.37	25.02	26.58	21.77	21.61		---	19.72	20.28	20.99
2		---	24.79	24.99	25.29	21.89	21.69		---	19.68	20.29	20.59
3		---	24.76	24.92	23.66	21.06	21.74		---	19.74	20.58	20.23
4		---	24.97	24.97	22.92	20.93	21.86		---	19.74	20.63	20.30
5		---	24.98	24.82	22.41	21.11	21.49		---	19.70	21.05	20.28
6		---	25.02	24.58	22.02	21.05	21.16		17.78	19.69	20.85	20.23
7		---	25.16	24.13	21.83	21.21	20.79		18.42	19.70	20.86	20.11
8		---	24.98	24.83	22.23	21.93	20.73		18.83	19.70	20.94	19.98
9		---	24.84	25.28	23.52	21.59	20.65		18.97	19.58	21.04	20.08
10		---	24.80	25.03	25.36	21.59	20.74		19.23	19.75	20.86	19.95
11		---	24.48	24.70	27.07	21.57	20.64		18.96	19.68	20.88	19.91
12		---	24.15	24.59	28.48	21.74	20.49		18.91	19.71	20.88	19.88
13		---	23.87	24.65	27.84	21.78	20.20		19.03	19.63	20.97	19.82
14		---	24.58	24.76	27.11	21.78	19.95		19.07	19.54	20.90	19.85
15		---	24.84	24.69	27.38	21.83	19.56		18.93	19.66	20.93	19.74
16		---	24.83	24.67	27.04	21.68	19.72		18.98	19.69	21.10	19.85
17		---	24.61	24.73	27.27	21.95	19.55		19.10	19.74	20.98	19.88
18		---	24.62	24.70	27.18	21.87	19.85		19.01	19.73	20.77	20.13
19		---	24.77	24.36	27.05	21.66	19.67		19.16	19.72	21.00	20.29
20		---	24.90	23.69	26.69	21.68	19.62		18.92	19.76	20.92	20.29
21		---	24.99	23.08	26.89	21.57	19.72		19.03	19.68	20.98	20.26
22		---	25.22	23.01	27.28	21.71	19.68		18.96	19.87	21.11	20.33
23		19.74	25.08	23.14	27.17	21.61	19.66		18.92	20.11	21.04	20.06
24		20.36	24.69	23.21	27.38	21.69	19.32		19.75	20.37	20.94	19.75
25		20.58	24.35	23.13	27.37	21.49	---		19.71	20.35	20.93	20.29
26		22.24	24.86	23.53	25.30	21.68	---		19.65	20.47	20.86	20.33
27		25.14	24.91	26.74	23.17	21.59	---		19.56	20.31	20.93	20.22
28		25.13	24.22	28.80	21.27	21.56	---		19.58	20.32	20.90	20.31
29		24.97	24.18	27.99	---	21.56	---		19.56	20.41	21.12	20.37
30		25.11	24.68	27.22	---	21.45	---		19.69	20.35	21.25	20.49
31		---	24.96	26.59	---	21.52	---		---	20.25	21.02	---
MEAN		---	24.76	24.86	25.53	21.58	---		---	19.88	20.90	20.16
MAX		---	25.37	28.80	28.48	21.95	---		---	20.47	21.25	20.99
MIN		---	23.87	23.01	21.27	20.93	---		---	19.54	20.28	19.74

## SQUARE BUTTE CREEK BASIN

06342260 SQUARE BUTTE CREEK BELOW CENTER, ND

LOCATION.--Lat 47°03'25", long 101°11'35", in SE¼ sec.4, T.141 N., R.83 W., Oliver County, Hydrologic Unit 10130101, on right bank at southeast corner of farmyard, and 6 mi southeast of Center.

DRAINAGE AREA.--146 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--May 1965 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 1,865 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Oct. 1 to Mar. 4 and July 27 to Sept. 30. Records good except those for periods of estimated daily discharges, which are poor. Flow regulated by Nelson Lake 1.5 miles upstream beginning Aug. 24, 1967, capacity 5,000 acre-ft. The capacity of Nelson Lake was increased to 10,000 acre-ft in Aug. 1975.

AVERAGE DISCHARGE.--21 years, 11.9 ft<sup>3</sup>/s, 8,620 acre-ft/yr; median of yearly mean discharges, 13 ft<sup>3</sup>/s, 9,420 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9,700 ft<sup>3</sup>/s, June 24, 1966, gage height, 14.35 ft; no flow Feb. 14-26, 1966.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 899 ft<sup>3</sup>/s, Mar. 2, gage height, 7.15 ft; minimum daily 0.55 ft<sup>3</sup>/s, Feb. 21.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.0	2.0	2.3	2.0	1.0	215	1.2	.93	7.6	10	1.7	1.0
2	1.0	1.9	2.3	1.9	1.0	600	1.0	.67	7.4	9.8	1.6	1.0
3	1.5	1.8	2.5	1.9	1.0	580	1.7	.67	7.4	9.7	1.6	.98
4	2.0	1.7	2.9	1.9	1.0	410	2.0	.68	7.4	9.7	1.5	.96
5	1.7	1.6	2.9	1.7	1.0	266	1.9	.78	7.4	9.3	1.5	.96
6	1.5	1.6	2.8	1.6	.95	176	1.7	.78	7.7	9.3	1.5	.98
7	1.4	1.5	2.8	1.5	.85	129	1.7	.78	7.5	9.3	1.5	.96
8	1.4	1.5	2.8	1.7	.80	109	1.7	.87	7.3	9.4	1.5	.96
9	1.3	1.5	2.8	1.7	.80	74	1.5	1.4	7.8	9.5	1.4	.96
10	1.4	1.5	2.6	1.8	.80	72	1.4	11	7.7	10	1.4	.96
11	1.4	1.5	2.4	1.9	.80	70	1.4	37	7.6	9.5	1.4	.96
12	1.5	1.5	2.4	1.8	.80	75	1.4	35	7.9	9.5	1.4	.95
13	2.0	1.6	2.5	1.7	.80	130	1.4	35	7.9	4.8	1.5	.92
14	2.5	2.5	2.8	1.6	.80	99	1.2	35	8.1	1.7	1.4	.92
15	2.5	2.5	2.6	1.6	.80	76	27	19	8.0	2.1	1.4	.95
16	2.1	2.5	2.4	1.6	.80	75	35	1.1	8.2	1.9	1.3	.95
17	1.8	2.5	2.2	1.6	.72	68	25	.95	8.3	1.9	1.3	.95
18	1.7	2.5	2.0	1.5	.66	47	5.3	.73	8.5	2.0	1.2	.92
19	1.8	2.5	2.0	1.4	.62	43	6.6	.67	8.3	1.9	1.1	.90
20	1.8	2.5	2.0	1.4	.60	3.8	61	.67	8.8	1.8	1.2	.95
21	1.6	2.4	2.2	1.3	.55	2.7	128	.67	9.3	1.9	1.1	.95
22	1.6	2.4	2.2	1.3	.58	2.5	103	.69	8.8	1.9	1.2	.95
23	1.6	2.3	2.0	1.2	.60	2.0	72	1.4	8.8	2.1	1.2	.90
24	1.5	2.3	2.0	1.1	.60	1.9	43	1.5	8.7	2.0	1.1	.92
25	1.4	2.3	1.8	1.0	1.0	1.9	43	.94	9.1	2.0	1.1	1.0
26	1.4	2.3	2.0	1.0	5.0	1.9	43	.67	8.9	2.0	1.1	.95
27	1.5	2.3	1.9	1.0	17	1.9	26	.67	8.9	1.9	1.0	.95
28	1.6	2.3	1.6	1.0	95	1.8	1.6	2.9	9.7	1.9	1.0	.95
29	1.7	2.3	1.7	1.0	---	1.7	1.0	7.2	11	1.8	1.0	.95
30	1.9	2.3	2.0	1.0	---	1.3	1.0	7.2	10	1.8	1.0	1.0
31	2.0	---	1.9	1.0	---	1.2	---	7.4	---	1.7	1.0	---
TOTAL	51.1	61.9	71.3	45.7	136.93	3338.6	642.7	214.92	250.0	154.1	40.2	28.61
MEAN	1.65	2.06	2.30	1.47	4.89	108	21.4	6.93	8.33	4.97	1.30	.95
MAX	2.5	2.5	2.9	2.0	.95	600	128	.37	11	10	1.7	1.0
MIN	1.0	1.5	1.6	1.0	.55	1.2	1.0	.67	7.3	1.7	1.0	.90
AC-FT	101	123	141	91	272	6620	1270	426	496	306	80	57
CAL YR 1985	TOTAL	3200.85		MEAN	8.77	MAX	253	MIN	.75	AC-FT	6350	
WTR YR 1986	TOTAL	5036.06		MEAN	13.8	MAX	600	MIN	.55	AC-FT	9990	



## SQUARE BUTTE CREEK BASIN

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06342260 SQUARE BUTTE CREEK BELOW CENTER, ND--CONTINUED

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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 21...	1336	1.6	1480	--	21.0	10.0	--	--	--	--	--
DEC 09...	1158	2.8	1440	--	-3.0	1.5	--	--	--	--	--
JAN 22...	1325	1.3	1440	--	-4.0	1.0	--	--	--	--	--
FEB 27...	1413	16	1600	--	0.0	5.5	--	--	--	--	--
MAR 03...	1047	516	1150	8.40	5.5	4.0	250	37	43	35	160
MAR 11...	1441	69	980	--	7.5	11.0	--	--	--	--	--
APR 23...	1144	73	920	--	22.0	16.0	--	--	--	--	--
JUN 05...	0954	7.3	920	--	21.0	17.0	--	--	--	--	--
JUL 21...	1225	2.0	1380	--	30.5	24.0	--	--	--	--	--
SEP 02...	1241	0.98	1380	8.03	17.5	18.0	350	--	77	38	190

DATE	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR 03...	56	4	17	210	380	9.6	0.3	3.4	791	780	1.1
SEP 02...	54	5	6.7	390	370	7.9	0.3	16	928	950	1.3

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)
MAR 03...	<1	1100	80	<1	41	20	0.1	4	1	670
SEP 02...	1	1800	20	<1	42	70	0.2	2	<1	920

## BURNT CREEK BASIN

06342450 BURNT CREEK NEAR BISMARCK, ND

LOCATION.--Lat 46°54'54", long 100°48'48", in SW¼NW¼SW¼ sec.29, T.140 N., R.80 W., Burleigh County, Hydrologic Unit 10130101, on left bank on upstream side of county highway bridge, and 7 mi northwest of Bismarck.

DRAINAGE AREA.--108 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1967 to current year (seasonal records only since 1982).

GAGE.--Water-stage recorder. Altitude of gage is 1,690 ft, from topographic map.

REMARKS.--Estimated daily discharges: Feb. 1 to Mar. 3, Apr. 7-22, and June 6 to Sept. 30. Records poor.

AVERAGE DISCHARGE.--15 years (water years 1968-82), 8.03 ft<sup>3</sup>/s, 5,820 acre-ft/yr; median of yearly mean discharges, 4.7 ft<sup>3</sup>/s, 3,400 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,000 ft<sup>3</sup>/s, Apr. 18, 1979, gage height, 16.93 ft from rating curve extended above 2,200 ft<sup>3</sup>/s on basis of culvert and flow-over-road measurement of peak flow; no flow for many days each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, about 950 ft<sup>3</sup>/s, Mar. 2, gage height, 11.65 ft; no flow for several months.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1					.00	440	4.6	8.5	1.8	.20	.30	.04
2					.00	694	4.8	7.9	1.6	.10	.10	.05
3					.00	590	5.9	6.6	1.4	.05	.08	.04
4					.00	387	11	6.0	1.1	.04	.06	.04
5					.00	101	13	5.4	.84	.04	.05	.04
6					.00	60	12	5.3	.69	.03	.04	.04
7					.00	50	11	5.3	.58	.03	.04	.04
8					.00	40	10	6.1	.44	.04	.04	.04
9					.00	35	9.4	10	.35	.05	.04	.04
10					.00	30	8.8	12	.27	.07	.03	.04
11					.00	25	8.0	8.9	.26	.10	.04	.04
12					.00	20	7.6	6.5	.25	.20	.04	.04
13					.00	18	6.8	5.8	.20	.60	.05	.04
14					.00	15	5.6	5.3	.17	1.3	.05	.04
15					.00	11	5.0	4.8	.15	1.2	.05	.04
16					.00	9.6	6.0	4.3	.12	1.1	.05	.05
17					.00	8.5	10	4.1	.10	1.0	.04	.05
18					.00	9.0	15	3.6	.09	.92	.04	.05
19					.00	10	20	3.5	.08	.92	.04	.05
20					.00	7.8	30	3.2	.06	.80	.04	.05
21					.00	6.3	26	3.2	.05	.89	.05	.05
22					.00	5.6	21	3.0	.04	.86	.05	.05
23					.00	5.3	18	3.3	.04	12	.05	.05
24					.00	5.3	14	3.5	.04	3.6	.05	.05
25					2.0	4.9	12	3.7	.03	2.0	.04	.05
26					300	4.4	13	3.8	.03	1.7	.04	.05
27					450	4.2	13	3.4	.03	1.4	.04	.05
28					350	4.2	12	3.2	.04	1.1	.04	.05
29					---	4.4	9.8	2.7	.09	.90	.04	.05
30					---	3.7	9.3	2.3	.36	.85	.04	.05
31					---	4.6	---	2.2	---	.60	.04	---
TOTAL					1102.00	2613.8	352.6	157.4	11.30	34.69	1.70	1.36
MEAN					39.4	84.3	11.8	5.08	.38	1.12	.05	.04
MAX					450	694	30	12	1.8	12	.30	.05
MIN					.00	3.7	4.6	2.2	.03	.03	.03	.04
AC-FT					2190	5180	699	312	22	69	3.4	2.7

## BURNT CREEK BASIN

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06342450 BURNT CREEK NEAR BISMARCK, ND--CONTINUED

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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)
MAR											
06...	1150	55	--	--	-4.0	0.5	--	--	--	--	--
13...	1250	19	--	--	11.0	2.5	--	--	--	--	--
21...	1135	9.1	642	7.85	--	2.0	240	--	45	30	57
APR											
23...	1000	19	960	--	31.0	16.0	--	--	--	--	--
JUN											
19...	1130	0.08	970	7.50	30.0	24.0	450	4	65	70	190
JUL											
11...	0940	0.1	1160	--	20.0	20.0	--	--	--	--	--
15...	1015	1.3	1120	--	19.0	17.0	--	--	--	--	--
AUG											
04...	1040	0.06	1180	--	25.0	24.0	--	--	--	--	--
		SODIUM AD- SORP- TION RATIO (00932)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR											
21...	33	2	8.3	240	110	1.9	0.1	12	414	410	0.56
JUN											
19...	47	4	9.0	450	380	8.1	0.2	2.5	935	990	1.3
		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											
21...	1	100	130	<1	39	80	0.1	1	<1	340	
JUN											
19...	1	240	20	<1	110	30	<0.1	1	<1	690	

## 06342500 MISSOURI RIVER AT BISMARCK, ND

LOCATION.--Lat 46°48'51", long 100°49'12", in SE1/4NW1/4SE1/4 sec.31, T.139 N., R.80 W., Burleigh County, Hydrologic Unit 10130101, on left bank 40 ft upstream from Bismarck city waterplant, 2,100 ft downstream from Burlington Northern Railway bridge, 1.6 mi northwest of Bismarck Post Office, 3.5 mi upstream from Heart River, and at mile 1,314.5.

DRAINAGE AREA.--186,400 mi<sup>2</sup>, approximately.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October to November 1927, April 1928 to current year. See WSP 1729 or 1917 for history of data prior to April 1928.

GAGE.--Water-stage recorder. Datum of gage is 1,618.28 ft, revised, above National Geodetic Vertical Datum of 1929. See WSP 1729 or 1917 for history of changes prior to Sept. 30, 1937.

REMARKS.--Records good. Many diversions from tributaries. Flow regulated by Lake Sakakawea (station 06338000) 75.4 mi upstream since November 1953. Several observations of water temperature and specific conductance were made during the year and are available in files at the Bismarck District office.

AVERAGE DISCHARGE.--58 years (water years 1929-86), 22,740 ft<sup>3</sup>/s, 16,480,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 500,000 ft<sup>3</sup>/s, Apr. 6, 1952, gage height, 27.90 ft. Since completion of Garrison Dam in 1953, maximum discharge, 68,900 ft<sup>3</sup>/s, July 13, 1975, gage height, 14.24 ft; maximum gage height, 14.58 ft, Dec. 18, 1979, backwater from ice; minimum discharge, about 1,800 ft<sup>3</sup>/s, Jan. 3, 1940; minimum gage height, 1.35 ft, Sept. 4, 1934, present site and datum.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage known, 31.6 ft, Mar. 31, 1881, present site and datum.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 35,200 ft<sup>3</sup>/s, Mar. 9, gage height, 9.74 ft; maximum gage height, 12.96 ft, Feb. 27, backwater from ice; minimum daily, 10,100 ft<sup>3</sup>/s, June 5.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16800	14300	20400	27200	27600	22700	30900	15800	11100	20300	23000	26100
2	15200	14000	21000	26900	27500	27700	30900	14100	11800	19100	23000	26100
3	14800	14300	20700	26800	27400	32500	31700	14000	11000	20300	23900	23700
4	14800	13900	20200	26400	27800	32000	32000	13400	10200	20000	25100	21700
5	14600	14100	20400	27700	27800	31500	31400	13300	10100	19600	25900	21900
6	14600	14100	19800	27700	27800	31000	29300	13900	10800	19900	27500	22100
7	14500	14800	20800	27500	27800	30200	26100	14000	12500	19400	26100	21900
8	15000	14200	20900	27600	28000	32700	24800	14400	14800	19900	26600	20900
9	14900	14400	20200	27900	29000	34700	24800	15200	15500	19500	27000	20600
10	14500	14500	20300	27700	29200	32900	24200	14300	16800	19800	27600	21000
11	14300	14700	21800	27800	29500	32900	25000	12300	16600	19800	26200	19300
12	14100	14600	21500	26600	27200	32700	24300	13700	15500	20000	27000	20300
13	13800	14300	21200	26900	28000	33900	22700	12900	16400	19200	26900	19600
14	14900	14700	23500	27600	28600	33600	20700	12800	16400	19500	27200	19600
15	14500	14400	22500	28100	29300	33600	20200	12800	16800	19000	26900	19400
16	14200	14400	22300	28000	28900	33000	18900	12300	15500	19800	27500	19200
17	14000	14400	22100	27900	29000	33200	19600	12000	17000	19900	27800	19600
18	14300	14300	22100	27900	28900	34400	19600	11500	16300	21600	26800	19800
19	14200	15200	23000	28200	29000	33000	20600	11400	16700	20700	26600	21500
20	14000	15100	23800	27900	29200	32200	19700	11900	16500	21100	27400	21800
21	13800	15800	24600	27900	29600	32000	19500	11500	15800	20500	25900	21800
22	14100	15500	25000	28000	29000	31400	20600	12200	16500	20600	26900	21800
23	14200	17100	24700	27900	29700	32100	19500	12000	15600	21500	26500	21700
24	14200	19700	24500	29300	29300	31300	18600	12300	17600	23200	26500	19800
25	13800	19900	25800	28100	29300	31700	16600	11500	20100	23500	25900	21200
26	14100	19900	25900	28000	28700	31000	15700	11900	19300	23900	25900	23400
27	13400	19600	25900	28000	28800	31400	16000	12400	19100	23700	25500	22700
28	13400	19500	26000	27900	29300	31000	16900	12400	18600	23000	26000	22800
29	13500	19800	26100	27800	---	30900	17400	12300	19200	23700	26200	22800
30	13700	19900	25900	28100	---	30400	16100	12200	19000	23700	27000	24100
31	14200	---	26000	27600	---	29900	---	11400	---	23300	26800	---
TOTAL	444400	475400	708900	858900	801200	983500	674300	398100	469100	649000	815100	648200
MEAN	14340	15850	22870	27710	28610	31730	22480	12840	15640	20940	26290	21610
MAX	16800	19900	26100	29300	29700	34700	32000	15800	20100	23900	27800	26100
MIN	13400	13900	19800	26400	27200	22700	15700	11400	10100	19000	23000	19200
AC-FT	881500	943000	1406000	1704000	1589000	1951000	1337000	789600	930500	1287000	1617000	1286000
CAL YR 1985	TOTAL	7950700	MEAN	21780	MAX	33800	MIN	13400	AC-FT	15770000		
WTR YR 1986	TOTAL	7926100	MEAN	21720	MAX	34700	MIN	10100	AC-FT	15721000		

## MISSOURI RIVER MAIN STEM

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06342500 MISSOURI RIVER AT BISMARCK, ND--CONTINUED

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--July 1969 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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 21...	1225	13500	680	--	18.0	11.5	--	--	--	--	--
JUN 16...	1500	15500	650	--	22.0	17.0	--	--	--	--	--
AUG 05...	1535	25300	675	--	28.5	17.5	--	--	--	--	--
SEP 24...	1145	19100	665	8.44	20.5	14.5	220	62	53	22	57
DATE	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LITY LAB (MG/L AS CACO3) (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 SI02) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
SEP 24...	35	2	4.7	160	170	11	0.6	5.9	446	420	0.61
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)	
SEP 24...	1	70	10	<1	46	10	0.1	3	<1	550	



## HEART RIVER BASIN

06343500 E. A. PATTERSON LAKE NEAR DICKINSON, ND

LOCATION.--Lat 46°52'11", long 102°49'37", in NE1/4NW1/4SW sec.8, T.139 N., R.96 W., Stark County, Hydrologic Unit 10130202, at left edge of spillway, and 2 mi southwest of Dickinson.

DRAINAGE AREA.--400 mi<sup>2</sup>, approximately.

## RESERVOIR-ELEVATION AND CONTENTS RECORDS

PERIOD OF RECORD.--May 1950 to current year. Prior to October 1958, published as Dickinson Reservoir near Dickinson.

GAGE.--Water-stage recorder. Datum of gage is 2,400.00 ft above National Geodetic Vertical Datum of 1929 (levels by Water and Power Resources Service); gage readings have been reduced to elevations NGVD. Prior to Jan. 4, 1961; nonrecording gage at same site and datum.

REMARKS.--Reservoir is formed by earthfill dam; storage began May 23, 1950; dam completed Aug. 9, 1950. Total capacity is 24,600 acre-ft at maximum pool, elevation, 2,428.9 ft. Dead storage is 1,000 acre-ft below lowest point of outlet, elevation, 2,404.0 ft. Conservation storage is 9,100 acre-ft between elevation 2,404.0 ft and 2,420.0 ft, crest of spillway. The crest of the spillway was raised 3.5 ft in 1981 from 2,416.5 ft. Figures given herein represent total contents based on capacity table dated Jan. 1, 1965. The reservoir is for flood control, irrigation and municipal supply.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 11,590 acre-ft, June 9, 1982, elevation, 2,421.13 ft; minimum since initial filling of reservoir, 2,950 acre-ft, Mar. 16, 1962, elevation, 2,410.41 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents recorded, 11,130 acre-ft, July 15, elevation, 2,420.77 ft; minimum, 5,920 acre-ft, Dec. 2, elevation 2,415.53 ft.

## MONTHEND ELEVATION AND CONTENTS AT 2400, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30-----	2,415.61	5,980	--
Oct. 31-----	2,415.75	6,080	+100
Nov. 30-----	2,415.57	5,950	-130
Dec. 31-----	2,415.60	5,980	30
CAL YR 1985-----	--	--	-1,930
Jan. 31-----	2,415.61	5,980	0
Feb. 28-----	2,420.33	10,580	+4,600
Mar. 31-----	2,420.09	10,280	-300
Apr. 30-----	2,420.15	10,360	+80
May 31-----	2,420.08	10,270	-90
June 30-----	2,420.50	10,790	+520
July 31-----	2,420.13	10,330	-460
Aug. 31-----	2,419.41	9,500	-830
Sept. 30-----	2,420.43	9,520	+20
WTR YR 1986 -----	--	--	+3,540

## HEART RIVER BASIN

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06343500 E.A. PATTERSON LAKE NEAR DICKINSON, ND--CONTINUED

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1971, 1975, 1980 to current year:

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	SAM- PLING DEPTH (FEET) (00003)	RESER- VOIR DEPTH (FEET) (72025)	TEMPER- ATURE, AIR (DEG C) (00020)	CLOUD COVER (PER- CENT) (00032)	WIND DIREC- TION (DEG. FROM TRUE NORTH) (00036)	WIND SPEED (MILES PER HOUR) (00035)	BARO- METRIC PRES- SURE (MM OF HG) (00025)	ICE THICK- NESS (FEET) (82130)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE (DEG C) (00010)	
OCT 01...	1040	3.30	21.0	8.0	0	190	3.0	697	--	1600	8.60	7.5	
JAN 08...	1515	3.30	23.0	3.0	100	315	7.0	699	1.40	1930	8.04	2.0	
APR 29...	1020	3.30	29.0	12.0	99	45	3.0	690	0.0	680	8.20	8.0	
JUL 02...	1000	3.30	28.0	26.0	5	180	5.0	701	--	1170	8.50	20.5	
DATE		COLOR (PLAT- INUM- COBALT UNITS) (00080)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	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)	PERCENT SODIUM RATIO (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)
OCT 01...	35	11.2	100	300	4	60	37	260	64	7	9.3	298	
JAN 08...	30	5.0	40	360	0	71	45	310	64	7	10	417	
APR 29...	55	9.7	90	130	9	28	14	88	58	3	6.9	119	
JUL 02...	40	7.7	94	220	34	46	26	170	61	5	8.4	188	
DATE		CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P) (00666)	BORON, DIS- SOLVED (UG/L AS B) (01020)
OCT 01...	1.4	510	11	0.4	0.6	1120	1100	1.5	0.0	<0.10	0.07	330	
JAN 08...	64	660	13	0.5	1.9	1360	1400	1.8	0.0	<0.10	0.06	380	
APR 29...	1.4	200	5.7	0.2	4.6	444	420	0.6	0.0	0.43	0.04	130	
JUL 02...	1.1	410	13	0.2	1.4	799	790	1.1	0.0	<0.10	0.03	220	

## HEART RIVER BASIN

06343500 E.A. PATTERSON LAKE NEAR DICKINSON, ND--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	SAM- PLING DEPTH (FEET) (00003)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE (DEG C) (00010)	OXYGEN, DIS- SOLVED (MG/L) (00300)
OCT						
01...	1035	0.0	1600	8.60	7.5	11.2
01...	1038	1.60	1610	8.70	7.5	11.2
01...	1040	3.30	1600	8.60	7.5	11.2
01...	1042	6.60	1610	8.80	7.0	10.9
01...	1044	13.1	1610	8.80	7.0	10.5
01...	1046	19.7	1610	8.80	6.5	11.3
JAN						
08...	1510	0.0	1920	7.06	1.0	5.4
08...	1512	1.60	1930	7.67	1.0	5.2
08...	1515	3.30	1930	8.04	2.0	5.0
08...	1517	6.60	1920	8.13	2.0	3.6
08...	1519	13.1	1950	8.14	3.0	0.5
08...	1522	19.7	2050	7.98	3.5	0.4
08...	1525	23.0	2060	7.96	3.5	0.4
APR						
29...	1015	0.0	685	7.90	8.5	9.8
29...	1017	1.60	685	8.10	8.5	9.8
29...	1020	3.30	680	8.20	8.0	9.7
29...	1022	6.60	690	8.20	8.0	9.7
29...	1024	13.1	680	8.20	8.0	9.5
29...	1026	19.7	680	8.20	8.0	9.2
29...	1030	26.4	680	8.20	8.0	7.6
JUL						
02...	0956	0.0	1160	8.48	20.5	8.0
02...	0958	1.60	1160	8.53	20.5	7.8
02...	1000	3.30	1170	8.50	20.5	7.7
02...	1002	6.60	1160	8.47	20.0	7.2
02...	1004	13.1	1160	8.42	20.0	6.3
02...	1006	19.7	1170	8.34	20.0	5.1
02...	1008	26.4	1180	8.19	19.5	3.8

## 06344300 HEART RIVER AT DICKINSON, ND

LOCATION.--Lat 46°51'56", long 102°44'10", in SW1/4NW1/4SE1/4 sec.12, T.139 N., R.96 W., Stark County, Hydrologic Unit 101302202, on left bank near the southeast corner of Dickinson sewage lagoon cell No. 3, 1.9 mi southeast of Dickinson and 9.5 mi downstream from Edward Arthur Patterson Lake.

DRAINAGE AREA.--440 mi<sup>2</sup>, approximately.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--November 1983 to current year.

GAGE.--Water-stage recorder and concrete control. Elevation of gage is 2,360 ft from topographic map.

REMARKS.--Estimated daily discharges: Nov. 19 to Jan. 7 and Feb. 3 to Mar. 5. Records good except those for period of estimated discharges, which are poor. Flow regulated by Edward Arthur Patterson Lake (station 06343500) 10 mi upstream.

EXTREME FOR PERIOD OF RECORD.--Maximum discharge, about 3,500 ft<sup>3</sup>/s, Mar. 3, 1986, gage height 10.56, backwater from ice; maximum gage height, 10.93 ft, Mar. 1, 1986, backwater from ice; minimum daily discharge, .10 ft<sup>3</sup>/s, Mar. 27, 1985.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, about 3,500 ft<sup>3</sup>/s, Mar. 3, gage height, 10.56 ft, backwater from ice; maximum gage height, 10.93 ft, Mar. 1, backwater from ice; minimum daily discharge, .98 ft<sup>3</sup>/s, Aug. 30.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.0	2.4	2.3	2.5	1.9	1800	7.4	22	5.4	628	7.6	1.4
2	2.1	2.5	2.3	2.4	2.2	2800	6.2	12	3.9	285	5.1	1.5
3	12	2.5	2.3	2.4	2.4	3000	11	10	4.5	153	5.1	1.8
4	16	2.4	2.4	2.3	2.0	1850	7.3	12	3.4	123	5.7	1.6
5	3.8	2.5	2.4	2.3	1.9	1100	16	23	2.7	96	4.8	1.4
6	2.5	2.8	2.4	2.2	1.8	582	15	40	2.3	58	4.5	1.6
7	3.8	2.4	2.4	2.2	1.7	279	14	7.3	2.2	34	4.4	1.5
8	11	2.2	2.4	2.2	1.6	148	12	4.1	1.9	24	3.5	1.9
9	7.0	2.1	2.4	2.3	1.5	179	10	32	16	22	3.4	25
10	4.2	2.1	2.3	2.3	1.4	141	9.3	36	3.9	80	4.0	4.5
11	5.3	2.2	2.4	2.6	1.5	121	7.8	58	1.8	376	5.9	3.6
12	4.7	2.2	2.2	2.8	1.6	110	7.6	118	1.4	551	3.6	3.9
13	3.4	2.3	2.3	2.3	1.7	100	4.2	92	1.2	279	5.8	3.4
14	2.7	2.4	2.3	2.3	1.6	89	8.0	75	2.5	130	7.6	3.6
15	3.9	2.5	2.3	2.2	1.7	75	10	52	5.0	1400	4.2	4.7
16	3.4	2.4	2.2	2.2	1.8	64	6.8	38	4.7	1910	1.6	3.2
17	2.7	2.4	2.2	2.3	1.9	54	10	23	3.8	794	1.6	3.0
18	2.5	2.3	2.2	2.4	1.9	49	24	16	6.3	211	2.6	2.9
19	2.4	2.4	2.3	2.3	1.9	42	43	14	7.0	154	2.7	19
20	2.5	2.4	2.4	2.6	1.7	35	64	11	6.5	173	2.1	6.8
21	2.4	2.4	2.7	2.4	1.7	29	72	6.8	8.8	123	9.4	6.1
22	2.5	2.4	2.7	2.1	1.7	27	71	21	6.3	89	13	3.4
23	2.7	2.4	2.7	2.0	1.7	22	59	34	6.3	63	3.1	3.0
24	3.3	2.4	2.7	2.0	2.0	20	41	23	3.6	46	2.8	3.5
25	2.9	2.4	2.5	2.1	10	23	34	24	3.4	32	2.4	69
26	2.5	2.4	2.4	1.9	130	19	29	19	10	24	2.0	6.5
27	2.4	2.4	2.7	1.8	120	15	26	16	3.7	18	2.0	271
28	2.5	2.3	2.6	2.1	40	14	22	13	1.7	17	1.8	174
29	2.5	2.3	2.2	2.4	---	18	20	11	91	14	1.3	125
30	2.3	2.3	2.4	2.1	---	17	39	9.3	250	19	.98	112
31	2.4	---	2.5	2.0	---	9.9	---	7.5	---	11	1.3	---
TOTAL	126.3	71.1	74.5	70.0	342.8	12831.9	706.6	880.0	471.2	7937	125.88	869.8
MEAN	4.07	2.37	2.40	2.26	12.2	414	23.6	28.4	15.7	256	4.06	29.0
MAX	16	2.8	2.7	2.8	130	3000	72	118	250	1910	13	271
MIN	2.0	2.1	2.2	1.8	1.4	9.9	4.2	4.1	1.2	11	.98	1.4
CAL YR 1985	TOTAL	1599.80		MEAN	4.38	MAX	84	MIN	.37			
WTR YR 1986	TOTAL	24507.08		MEAN	67.1	MAX	3000	MIN	.98			

## HEART RIVER BASIN

06344300 HEART RIVER AT DICKINSON, ND--CONTINUED

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1984 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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 01...	1540	2.0	2060	--	15.0	7.0	--	--	--	--	--
NOV 27...	1405	2.4	2410	--	-22.0	0.5	--	--	--	--	--
JAN 10...	1325	2.4	2300	--	4.5	0.0	--	--	--	--	--
MAR 08...	1125	174	800	7.80	10.0	2.0	140	25	29	16	100
MAR 21...	1225	29	585	--	19.0	5.0	--	--	--	--	--
MAY 01...	1430	17	810	--	13.0	11.0	--	--	--	--	--
JUN 11...	1815	1.7	1390	--	30.0	26.0	--	--	--	--	--
JUL 01...	1620	598	1140	--	19.0	22.0	--	--	--	--	--
JUL 16...	1200	1810	1010	--	26.0	21.0	--	--	--	--	--
JUL 21...	1200	123	--	--	27.5	22.5	--	--	--	--	--
AUG 29...	1215	1.4	1890	8.20	29.0	19.5	380	--	81	43	280
		SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR 08...	59	4	10	110	220	24	0.3	7.8	500	480	0.68
AUG 29...	61	6	9.7	380	560	47	0.4	4.2	1280	1300	1.7
		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 08...		1	160	60	<1	13	200	<1	2	<1	260
AUG 29...		2	320	20	<1	44	20	<1	5	<1	790



## HEART RIVER BASIN

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06344600 GREEN RIVER NEAR NEW HRADEC, ND

LOCATION.--Lat 47°01'40", long 103°03'10", on line between secs.13 and 14, T.141 N., R.98 W., Billings County, Hydrologic Unit 10130202, on left bank above county highway bridge, and 8 mi west of New Hradec.

DRAINAGE AREA.--152 mi<sup>2</sup>, approximately.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--February 1964 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 2,510 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Dec. 24 to Mar. 5 and July 26 to Sept. 24. Records fair except those for estimated daily discharges, which are poor.

AVERAGE DISCHARGE.--22 years, 17.6 ft<sup>3</sup>/s, 12,750 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,120 ft<sup>3</sup>/s May 9, 1970, gage height, 16.88 ft; maximum gage height, 17.60 ft, Mar. 22, 1978, backwater from ice; no flow for several days in some years.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 100 ft<sup>3</sup>/s and maximum (\*):

Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)	Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)
Mar. 2	0630	*1300	a*16.18	July 10	0200	591	10.10
May 10	1245	211	7.26	July 18	1915	151	6.53
June 30	0200	550	9.85	Sept. 25	2330	425	9.24

Minimum daily discharge, 0.25 ft<sup>3</sup>/s on June 26-27.

a - Backwater from ice

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.93	.90	.81	.80	2.5	600	4.9	4.2	2.2	114	1.6	.60
2	.90	.95	.87	.80	2.7	1150	4.6	4.1	2.0	36	1.6	.70
3	1.1	.90	.90	.80	3.0	1000	5.7	3.0	1.2	20	1.4	.70
4	1.4	.90	.90	.75	3.0	550	5.9	3.0	1.1	13	1.3	.80
5	1.1	.98	.90	.70	2.5	400	6.2	3.4	1.1	8.7	1.2	1.0
6	1.1	.90	.88	.70	2.0	217	6.6	4.8	.96	5.5	1.1	1.0
7	1.4	.90	.83	.65	1.5	106	7.6	7.4	.89	3.8	1.0	.90
8	1.7	.90	.83	.60	1.2	71	6.3	8.9	.77	3.0	1.0	.80
9	1.6	.87	.91	.60	1.0	54	5.5	69	.95	58	1.0	.85
10	2.0	.81	.86	.65	1.0	59	4.9	142	1.1	369	.95	.90
11	2.2	.79	.89	.70	.95	43	4.2	47	1.0	160	.90	1.0
12	2.5	.83	.91	.75	.95	34	3.5	24	.78	135	.90	1.0
13	2.8	.77	.90	.75	.90	28	3.6	15	.62	42	.90	1.1
14	3.3	.88	1.1	.75	.90	26	3.4	11	.57	23	.85	1.5
15	3.4	.92	.89	.80	.85	22	3.9	8.6	.50	19	.85	1.4
16	3.9	.88	.85	.80	.85	19	4.1	6.7	.40	15	.82	1.2
17	3.7	.97	.88	.85	.80	16	12	5.1	.40	11	.80	1.4
18	3.0	.87	.90	.85	.80	14	23	4.0	.40	94	.80	1.5
19	2.4	.85	.90	.90	.75	11	28	3.3	.37	97	.80	2.0
20	2.0	.76	.90	.90	.75	9.6	20	3.2	.39	36	.80	4.0
21	1.6	.76	.98	.90	.70	8.8	14	2.7	.53	20	.85	3.0
22	1.5	.88	.98	.95	.70	8.7	11	2.7	.43	13	.90	2.5
23	1.5	.87	.98	1.0	.70	8.1	8.4	5.5	.33	9.1	1.0	3.0
24	1.2	.83	.90	1.0	.80	7.6	6.1	12	.28	6.1	.95	5.0
25	1.1	.83	.90	1.0	1.0	7.5	5.5	9.3	.27	4.5	.90	269
26	.99	.83	.90	1.0	5.0	6.7	5.3	9.6	.27	4.0	.85	193
27	.98	.81	.90	1.1	30	6.1	5.1	7.8	.25	3.5	.80	39
28	1.0	.78	.90	1.5	300	5.7	4.5	6.1	.25	3.0	.75	22
29	.99	.80	.85	1.6	---	5.1	4.0	4.7	.46	2.5	.70	25
30	.91	.76	.85	1.8	---	5.2	4.4	3.5	477	2.0	.65	46
31	.90	---	.85	2.2	---	5.4	---	2.7	---	1.8	.60	---
TOTAL	55.10	25.68	27.80	29.15	367.80	4504.5	232.2	444.3	543.31	1332.5	29.52	631.85
MEAN	1.78	.86	.90	.94	13.1	145	7.74	14.3	18.1	43.0	.95	21.1
MAX	3.9	.98	1.1	2.2	300	1150	28	142	.477	369	1.6	269
MIN	.90	.76	.81	.60	.70	5.1	3.4	2.7	.25	1.8	.60	.60
AC-FT	109	51	55	58	730	8930	461	881	1080	2640	59	1250
CAL YR 1985	TOTAL	609.73		MEAN	1.67	MAX	19	MIN	.00	AC-FT	1210	
WTR YR 1986	TOTAL	8223.71		MEAN	22.5	MAX	1150	MIN	.25	AC-FT	16310	

## HEART RIVER BASIN

06344600 GREEN RIVER NEAR NEW HRADEC, ND--CONTINUED

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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 23...	1425	1.6	1850	--	7.5	8.0	--	--	--	--	--
DEC 06...	1150	0.9	1430	--	0.0	0.0	--	--	--	--	--
JAN 28...	1020	1.5	1380	--	2.0	0.0	--	--	--	--	--
FEB 25...	1000	0.9	1330	7.42	6.5	0.0	--	--	--	--	--
28...	1155	251	240	7.42	3.0	0.0	44	--	10	4.5	30
MAR 10...	1540	58	445	--	3.5	1.5	--	--	--	--	--
20...	1350	9.4	750	--	5.0	4.0	--	--	--	--	--
APR 28...	1435	4.5	1160	--	19.5	11.0	--	--	--	--	--
JUN 03...	1105	0.86	1320	--	25.0	21.5	--	--	--	--	--
JUL 21...	1130	21	710	--	25.5	21.5	--	--	--	--	--
SEP *03...	0910	0.7	1400	8.50	16.5	16.0	300	--	58	37	210
03...	0911	0.7	1400	8.50	16.5	16.0	280	280	56	35	210
DATE	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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 SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
FEB 28...	55	2	7.6	54	49	1.4	0.1	4.0	158	140	0.21
SEP *03...	60	5	8.1	360	380	6.8	0.4	5.6	962	920	1.3
03...	61	6	7.2	359	360	6.9	0.4	5.5	1070	900	1.5
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)	
FEB 28...	1	100	120	1	4	110	0.1	2	<1	68	
SEP *03...	1	490	20	<1	33	20	<1	7	1	490	
03...	2	470	15	<5	39	22	--	5	<1	510	

\*Split sample - analysis by North Dakota State Water Commission Laboratory.

## HEART RIVER BASIN

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06345500 HEART RIVER NEAR RICHARDTON, ND

LOCATION.--Lat 46°44'46", long 102°18'27", in NE¼ sec.29, T.138 N., R.92 W., Stark County, Hydrologic Unit 10130202, on right bank 5 ft upstream from bridge on State Highway 8, 0.5 mi downstream from Plum Creek, and 9.5 mi south of Richardton.

DRAINAGE AREA.--1,240 mi<sup>2</sup>, approximately.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--May 1903 to September 1922, April 1943 to current year. Monthly discharge only for some periods, published in WSP 1309.

REVISED RECORDS (WATER YEARS).--WSP 1209: Drainage area. WSP 1239: 1906, 1918(M), 1947(M).

GAGE.--Water-stage recorder. Datum of gage is 2,153.67 ft above National Geodetic Vertical Datum of 1929. May 18, 1903, to Sept. 30, 1922, nonrecording gage at 3 sites in 1 mi reach below present site at different datums. Apr. 14, 1943, to July 7, 1947, nonrecording gage at present site and datum.

REMARKS.--Estimated daily discharges: Nov. 8 to Mar. 1. Records good except those for period of estimated daily discharges, which are fair. Flow is regulated by Patterson Lake Reservoir (station 06343500) 85 river miles upstream from station and some diversions for irrigation and water supply at low flow.

AVERAGE DISCHARGE.--62 years (water years 1904-22, 1944-85), 108 ft<sup>3</sup>/s, 78,250 acre-ft/yr; median of yearly mean discharges, 100 ft<sup>3</sup>/s, 72,400 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 23,400 ft<sup>3</sup>/s, Apr. 16, 1950, gage height, 28.05 ft, from high-water mark in gage well; no flow at times in some years.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of July 5, 1938, reached a stage of about 26 ft, from information by local residents, discharge, 16,000 ft<sup>3</sup>/s; flood of Mar. 25, 1943, reached a stage of 24.2 ft from floodmarks, discharge, 11,700 ft<sup>3</sup>/s.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 6,730 ft<sup>3</sup>/s, Mar. 3, gage height, 18.58 ft; minimum daily 5.5 ft<sup>3</sup>/s, Dec. 2.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	11	15	6.0	14	22	2100	68	68	44	260	39	9.8
2	11	15	5.5	14	23	6200	59	77	37	1250	33	11
3	12	16	6.0	14	24	6560	61	63	32	933	28	13
4	15	17	9.0	14	22	6240	62	50	28	448	25	12
5	17	17	9.0	13	22	5070	69	47	24	290	23	13
6	33	17	10	13	22	3620	69	49	22	196	21	13
7	29	18	9.5	14	21	1880	71	57	21	148	20	13
8	25	15	9.5	15	20	968	66	72	20	101	19	13
9	24	11	9.0	16	20	724	62	67	21	70	18	13
10	28	14	9.5	16	19	608	58	86	21	60	18	15
11	32	14	9.0	16	18	478	54	123	22	67	16	21
12	29	14	9.0	16	19	412	52	351	26	691	16	26
13	28	14	8.0	17	20	386	52	313	20	1100	16	20
14	28	15	9.0	18	21	344	47	234	18	635	15	19
15	25	16	10	19	22	305	47	178	16	582	17	19
16	22	15	10	20	22	271	58	140	15	2630	17	20
17	20	15	9.0	20	22	239	83	106	14	2480	19	20
18	19	12	10	20	21	213	155	85	15	1110	17	20
19	19	11	11	20	20	190	172	68	16	520	15	21
20	17	9.8	11	20	19	168	159	58	15	366	14	24
21	16	9.3	12	21	18	148	201	51	21	546	13	31
22	15	8.8	13	21	19	135	207	54	19	363	12	34
23	15	8.3	12	20	19	125	182	173	17	246	12	30
24	15	7.8	12	20	21	114	150	155	17	171	15	30
25	15	7.5	13	21	70	104	127	121	16	122	19	59
26	15	7.0	14	20	1700	97	104	91	15	91	15	166
27	14	6.5	12	21	4200	93	94	87	14	71	14	472
28	14	6.5	12	22	2000	84	84	81	12	60	13	726
29	14	6.5	13	23	---	77	75	68	19	51	13	421
30	14	6.0	13	22	---	72	69	58	42	45	12	286
31	14	---	14	22	---	72	---	51	---	40	11	---
TOTAL	605	365.0	319.0	562	8466	38097	2817	3282	639	15743	555	2590.8
MEAN	19.5	12.2	10.3	18.1	302	1229	93.9	106	21.3	508	17.9	86.4
MAX	33	18	14	23	4200	6560	207	351	44	2630	39	726
MIN	11	6.0	5.5	13	18	72	47	47	12	40	11	9.8
AC-FT	1200	724	633	1110	16790	75570	5590	6510	1270	31230	1100	5140
CAL YR 1985	TOTAL	7962.9	MEAN	21.8	MAX	146	MIN	5.5	AC-FT	15790		
WTR YR 1986	TOTAL	74040.8	MEAN	203	MAX	6560	MIN	5.5	AC-FT	146900		

## HEART RIVER BASIN

06345500 HEART RIVER NEAR RICHARDTON, ND--CONTINUED

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1950, 1972 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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 07...	1725	28	1910	--	0.0	4.0	--	--	--	--	--
NOV 25...	1510	7.2	2910	--	-15.0	0.0	--	--	--	--	--
JAN 13...	1405	16	2240	--	4.5	0.0	--	--	--	--	--
MAR 03...	1240	6540	441	8.10	9.5	0.5	95	--	20	11	47
MAY 05...	1405	46	1520	--	8.0	15.0	--	--	--	--	--
27...	1535	85	1920	--	25.0	22.0	--	--	--	--	--
JUL 07...	1330	146	1100	--	22.0	20.0	--	--	--	--	--
AUG 25...	1405	19	1500	8.60	17.0	18.0	390	85	77	47	210
		SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR 03...	49	2	8.6	130	110	6.9	0.1	6.1	261	290	0.35
AUG 25...	53	5	12	300	520	17	0.3	7.1	997	1100	1.4
		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 03...	1	80	70	<1	6	120	0.1	2	<1	220	
AUG 25...	1	250	30	<1	38	20	0.1	4	<1	980	

06346000 LAKE TSCHIDA NEAR GLEN ULLIN, ND

LOCATION.--Lat 46°35'43", long 101°48'34", in SW1/4NE1/4 sec.13, T.136 N., R.89 W., Grant County, Hydrologic Unit 10130202, 10 mi upstream from Heart Butte Creek, and 14 mi north of Elgin.

DRAINAGE AREA.--1,710 mi<sup>2</sup>, approximately.

## RESERVOIR-ELEVATION AND CONTENTS RECORDS

PERIOD OF RECORD.--August 1949 to current year. Prior to October 1957, published as Heart Butte Reservoir near Glen Ullin.

GAGE.--Nonrecording gage. Datum of gage is at National Geodetic Vertical Datum of 1929, levels by Water and Power Resources Service.

REMARKS.--Reservoir is formed by earthfill dam; storage began Sept. 29, 1949; dam completed Dec. 9, 1949. Total capacity is 430,000 acre-ft at maximum pool, elevation 2,118.2 ft. Dead storage is 6,750 acre-ft below lowest point of outlet, elevation 2,030.0 ft. Active conservation storage is 69,030 acre-ft between elevation 2,030.0 ft and 2,064.5 ft, crest of spillway. Figures given herein represent total contents. Controlled releases are through 4 by 5 ft slide gate. The spillway is uncontrolled "glory hole" type and discharges through a conduit 14 ft in diameter. The reservoir is for flood control, irrigation, and incidental water supply.

COOPERATION.--Record of elevations and contents furnished by U.S. Bureau of Reclamation. Monthend elevations interpolated from once-daily readings. Extremes are those observed.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 174,000 acre-ft, Apr. 9, 1952, elevation, 2,086.23 ft; minimum since first reaching spillway level, 40,840 acre-ft, Mar. 6, 1962, elevation, 2,052.5 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 108,540 acre-ft, Mar. 6, elevation, 2,073.19 ft; minimum, 57,900 acre-ft, Oct. 1, 2, and 7, elevation, 2,058.90 ft.

## MONTHEND ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30-----	2,058.91	57,930	--
Oct. 31-----	2,059.19	58,770	+840
Nov. 30-----	2,059.30	59,100	+330
Dec. 31-----	2,059.49	59,680	+580
CAL YR 1985-----	--	--	-330
Jan. 31-----	2,059.76	60,500	+820
Feb. 28-----	2,062.85	70,270	+9,770
Mar. 31-----	2,065.30	78,520	+8,250
Apr. 30-----	2,065.36	78,730	+210
May 31-----	2,065.49	79,180	+450
June 30-----	2,064.27	75,000	-4,180
July 31-----	2,065.32	78,590	+3,590
Aug. 31-----	2,063.99	74,050	-4,540
Sept. 30-----	2,064.62	76,190	+2,140
WTR YR 1986-----	--	--	+18,260



## HEART RIVER BASIN

06346000 LAKE TSCHIDA NEAR GLEN ULLIN, ND--CONTINUED

## WATER-QUALITY DATA

PERIOD OF RECORD.--Water years 1971, 1980 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	SAM- PLING DEPTH (FEET) (00003)	RESER- VOIR DEPTH (FEET) (72025)	TEMPER- ATURE, AIR (DEG C) (00020)	CLOUD COVER (PER- CENT) (00032)	WIND DIREC- TION (DEG. FROM TRUE NORTH) (00036)	WIND SPEED (MILES PER HOUR) (00035)	BARO- METRIC PRES- SURE (MM OF HG) (00025)	ICE THICK- NESS (FEET) (82130)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE (DEG C) (00010)
OCT 22...	1124	3.30	43.0	14.0	20	170	18	740	--	1480	8.68	8.0
JAN 08...	1254	3.30	45.5	2.0	100	245	5.0	756	1.70	1720	8.70	0.5
MAY 13...	1104	3.30	51.5	15.0	0	215	7.0	747	--	1020	8.34	10.5
JUL 31...	1130	3.30	47.0	20.5	0	270	8.0	759	--	1150	8.49	22.5
DATE	COLOR (PLAT- INUM- COBALT UNITS) (00080)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	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)	PERCENT SODIUM RATIO (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)
OCT 22...	10	10.2	--	370	110	66	49	200	53	5	11	252
JAN 08...	20	13.0	--	410	120	72	55	220	53	5	11	283
MAY 13...	30	11.5	105	250	68	47	31	120	50	3	8.8	177
JUL 31...	20	7.4	86	290	78	56	36	140	50	4	8.9	210
DATE	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P) (00666)	BORON, DIS- SOLVED (UG/L AS B) (01020)
OCT 22...	1	560	12	0.3	2.1	1080	1100	1.5	0.0	<0.10	0.01	310
JAN 08...	1.1	620	10	0.4	2.8	1180	1200	1.6	0.0	0.11	0.02	310
MAY 13...	1.6	330	8.0	0.2	5.2	667	660	0.91	0.0	0.65	0.02	180
JUL 31...	1.3	410	8.4	0.3	4.8	817	790	1.1	0.0	<0.10	0.02	230

06346000 LAKE TSCHIDA NEAR GLEN ULLIN, ND--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	SAM- PLING DEPTH (FEET) (00003)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE (DEG C) (00010)	OXYGEN, DIS- SOLVED (MG/L) (00300)
OCT						
22...	1120	0.0	1480	8.68	8.0	10.2
22...	1122	1.60	1480	8.68	8.0	10.1
22...	1124	3.30	1480	8.68	8.0	10.2
22...	1126	6.60	1480	8.67	8.0	10.2
22...	1128	13.2	1480	8.66	8.0	10.2
22...	1130	19.8	1420	8.66	8.0	10.3
22...	1132	26.4	1460	8.66	7.5	10.2
22...	1134	33.0	1470	8.67	7.5	10.2
22...	1136	40.0	1470	8.66	7.5	10.0
22...	1138	42.6	1470	8.67	7.5	10.0
JAN						
08...	1250	0.0	1680	8.64	0.5	12.9
08...	1252	1.60	--	--	0.5	13.0
08...	1254	3.30	1720	8.70	0.5	13.0
08...	1256	6.60	1750	8.69	1.5	12.9
08...	1258	13.2	1750	8.69	1.5	12.6
08...	1300	19.8	1740	8.63	2.0	11.1
08...	1302	26.4	1720	8.65	2.5	11.0
08...	1304	33.0	1800	8.39	3.0	7.0
08...	1306	40.0	1830	8.31	3.0	6.9
MAY						
13...	1100	0.0	1000	8.45	10.5	11.5
13...	1102	1.60	--	--	10.5	11.5
13...	1104	3.30	1020	8.34	10.5	11.5
13...	1106	6.60	1000	8.43	10.5	11.4
13...	1108	13.2	1000	8.47	10.0	11.2
13...	1110	19.8	1000	8.48	10.0	11.0
13...	1112	26.4	1000	8.48	10.0	10.9
13...	1114	33.0	1000	8.48	9.5	10.9
13...	1116	40.0	1000	8.48	9.5	10.9
13...	1118	46.0	--	--	9.5	10.8
13...	1120	49.0	--	--	9.0	10.7
JUL						
31...	1126	0.0	1150	8.49	22.5	7.4
31...	1128	1.60	1150	8.49	22.5	7.4
31...	1130	3.30	1150	8.49	22.5	7.4
31...	1132	6.60	1150	8.49	22.5	7.3
31...	1134	13.2	1150	8.48	22.5	7.3
31...	1136	19.8	1150	8.48	22.5	7.3
31...	1138	26.4	1170	8.37	22.5	7.3
31...	1140	33.0	1170	8.37	22.0	7.2
31...	1142	40.0	1150	8.37	20.0	2.2

## HEART RIVER BASIN

06348000 HEART RIVER NEAR LARK, ND

LOCATION.--Lat 46°36'37", long 101°22'54", in NW¼NW¼SW¼ sec.9, T.136 N., R.85 W., Grant County, Hydrologic Unit 10130203, on right bank 20 ft downstream from county highway bridge, 0.6 mi downstream from Big Muddy Creek, and 10 mi north of Lark.

DRAINAGE AREA.--2,750 mi<sup>2</sup>, approximately.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--June 1946 to current year (seasonal records only since Oct. 1982).

GAGE.--Water-stage recorder. Datum of gage is 1,802.83 ft above National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). Prior to Nov. 16, 1948, nonrecording gage at same site and datum.

REMARKS.--Estimated daily discharges: Jan 30 to Mar. 2 and July 24-30. Records good except those for periods of estimated daily discharges, which are fair. Flow regulated by Lake Tschida (06346000) 45 mi upstream since 1949.

AVERAGE DISCHARGE.--35 years, (1947-82) 225 ft<sup>3</sup>/s, 163,000 acre-ft/yr; median of yearly mean discharges, 172 ft<sup>3</sup>/s, 124,600 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 29,200 ft<sup>3</sup>/s, Apr. 17, 1950, gage height, 20.70 ft, from rating curve extended above 11,000 ft<sup>3</sup>/s on basis of contracted-opening measurement of peak flow; no flow Jan. 16 to Mar. 4, 1950, Jan. 17-26, 1962.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 7,850 ft<sup>3</sup>/s, Mar. 3, gage height, 14.36 ft, backwater from ice; minimum daily recorded, 21 ft<sup>3</sup>/s, Oct. 27, 29-31.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	27				91	1040	293	276	267	203	168	82
2	27				95	3600	266	238	232	316	145	88
3	28				104	6700	258	213	181	342	129	93
4	27				108	7000	266	197	162	265	112	93
5	24				108	6160	268	186	147	241	96	90
6	24				108	4700	270	208	145	218	86	90
7	24				107	3960	258	238	154	204	84	91
8	24				92	3680	234	222	186	196	82	90
9	25				76	3550	233	490	206	188	69	88
10	27				66	3380	222	707	246	211	58	87
11	27				58	2910	211	606	212	198	55	79
12	27				58	2360	206	504	208	177	50	74
13	27				58	1940	194	403	192	172	93	68
14	26				58	1580	152	348	187	174	102	68
15	27				58	1310	188	350	175	244	90	68
16	27				58	1120	205	317	158	713	80	75
17	27				62	963	204	314	148	4130	83	78
18	27				68	840	326	385	145	2070	75	79
19	27				71	743	769	263	145	1770	80	107
20	26				73	658	970	246	141	1070	121	102
21	25				76	595	724	236	137	889	160	110
22	25				78	555	523	210	128	815	199	121
23	23				79	528	435	269	120	733	142	125
24	23				83	489	389	1420	113	626	110	110
25	22				91	458	349	1100	107	543	94	155
26	22				238	436	326	925	106	470	91	235
27	21				762	399	323	687	106	365	86	305
28	22				765	374	309	519	121	300	84	284
29	21				---	351	285	421	117	260	81	220
30	21				---	337	278	355	154	220	80	173
31	21				---	302	---	310	---	190	81	---
TOTAL	771				3749	63018	9934	13163	4846	18513	3066	3528
MEAN	24.9				134	2033	331	425	162	597	98.9	118
MAX	28				765	7000	970	1420	267	4130	199	305
MIN	21				58	302	152	186	106	172	50	68
AC-FT	1530				7440	125000	19700	26110	9610	36720	6080	7000

## HEART RIVER BASIN

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06348000 HEART RIVER NEAR LARK, ND--CONTINUED

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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											
05...	1205	23	--	--	10.0	6.5	--	--	--	--	--
MAR											
03...	1525	6800	750	--	10.5	1.0	--	--	--	--	--
05...	1710	5720	730	--	10.5	2.0	--	--	--	--	--
11...	1350	2850	720	8.11	9.0	2.5	180	24	35	22	85
MAY											
07...	1105	213	1140	--	4.5	9.0	--	--	--	--	--
JUN											
18...	1245	146	1250	--	28.0	25.5	--	--	--	--	--
JUL											
16...	1515	984	1080	--	28.0	25.0	--	--	--	--	--
31...	1530	195	1310	--	26.0	21.0	--	--	--	--	--
SEP											
09...	1415	87	1220	8.40	20.0	15.0	310	93	60	39	150

DATE	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINIT LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR											
11...	49	3	9.1	150	220	8.4	0.2	5.3	500	480	0.68
SEP											
09...	50	4	10	220	390	7.9	0.3	5.6	783	810	1.1

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)
MAR										
11...	1	130	120	<1	14	30	0.5	2	<1	420
SEP										
09...	1	170	20	<1	32	<1	0.2	5	<1	690

## HEART RIVER BASIN

06349000 HEART RIVER NEAR MANDAN, ND  
(National stream-quality accounting network station)

LOCATION.--Lat 46°50'02", long 100°58'27", in NW¼NE¼ sec.25, T.139 N., R.82 W., Morton County, Hydrologic Unit 10130203, on left bank near downstream wingwall of bridge on county highway, 3 mi west of Mandan, and 4 mi downstream from Sweetbriar Creek.

DRAINAGE AREA.--3,310 mi<sup>2</sup>, approximately.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--April to September 1924, March 1928 to June 1933, August 1937 to current year. Published as "at Sunny" 1924, 1928-33.

REVISED RECORDS.--WSP 926: 1938. WSP 1209: Drainage area. WSP 1239: 1924, 1928-29, 1948.

GAGE.--Water-stage recorder. Datum of gage is 1,638.70 ft above National Geodetic Vertical Datum of 1929, and 1,623.03 ft above Burlington Northern Railway datum. See WSP 1729 or 1917 for history of changes prior to June 30, 1958.

REMARKS.--Estimated daily discharges: Nov. 8 to Mar. 6. Records good except those for period of estimated daily discharges, which are poor. Flow regulated by Lake Tschida (station 06346000) 105 mi upstream since 1949. Some diversions above station.

AVERAGE DISCHARGE.--53 years (water years 1929-32, 1938-86), 268 ft<sup>3</sup>/s, 194,200 acre-ft/yr; median of yearly mean discharges, 210 ft<sup>3</sup>/s, 152,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, about 30,500 ft<sup>3</sup>/s, Apr. 19, 1950, gage height, 23.64 ft; maximum gage height, 25.75 ft, Apr. 4, 1952, ice jam; no flow for many days in some years.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, about 1,200 ft<sup>3</sup>/s, Mar. 4, gage height, 23.42 ft, backwater from ice; minimum daily discharge, 12 ft<sup>3</sup>/s, Jan. 6-10.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	39	29	15	18	22	1300	359	370	405	177	295	108
2	38	28	16	18	22	2500	335	354	355	241	262	108
3	39	29	17	17	22	3600	336	325	313	263	232	109
4	42	29	18	16	22	11500	309	283	276	347	210	111
5	39	30	18	15	22	8000	317	257	248	320	188	109
6	39	29	18	12	22	6200	320	254	227	270	173	110
7	39	30	19	12	22	5160	308	263	222	229	164	104
8	42	30	19	12	22	4510	291	311	241	218	165	102
9	40	29	18	12	21	4260	274	358	231	201	144	98
10	38	29	18	12	20	4120	252	570	279	265	138	97
11	37	27	17	14	20	3840	235	874	295	248	125	97
12	38	29	16	15	20	3200	220	901	298	237	110	97
13	38	31	16	15	21	2640	216	678	272	202	105	97
14	36	32	15	16	21	2250	353	504	251	180	103	97
15	38	32	15	16	21	1910	304	421	240	210	128	97
16	39	30	15	17	21	1630	223	388	225	234	128	97
17	40	29	15	17	21	1400	375	363	205	1570	117	97
18	37	27	15	18	21	1200	361	343	188	4530	114	96
19	34	26	15	18	20	1030	610	319	174	2790	111	86
20	34	24	15	18	19	911	1200	291	169	2410	127	85
21	34	21	15	19	19	810	1430	266	167	1800	276	101
22	34	20	15	20	19	729	1060	246	163	1390	176	119
23	33	19	15	20	19	674	756	264	156	1120	208	97
24	31	19	15	20	20	642	599	320	147	927	194	120
25	30	19	15	21	20	596	526	1630	139	796	152	152
26	30	19	15	21	110	547	487	2100	129	676	122	148
27	29	18	16	21	330	523	468	1460	123	570	110	195
28	29	17	16	21	600	484	446	966	117	494	118	257
29	30	16	17	21	---	443	417	712	161	431	113	321
30	28	15	18	22	---	413	391	568	175	380	108	257
31	28	---	18	22	---	387	---	473	---	334	108	---
TOTAL	1102	762	505	536	1559	77409	13778	17432	6591	24060	4824	3769
MEAN	35.5	25.4	16.3	17.3	55.7	2497	459	562	220	776	156	126
MAX	42	32	19	22	600	11500	1430	2100	405	4530	295	321
MIN	28	15	15	12	19	387	216	246	117	177	103	85
AC-FT	2190	1510	1000	1060	3090	153500	27330	34580	13070	47720	9570	7480
CAL YR 1985	TOTAL	30068.3	MEAN	82.4	MAX	850	MIN	2.5	AC-FT	59640		
WTR YR 1986	TOTAL	152327	MEAN	417	MAX	11500	MIN	12	AC-FT	302100		



## HEART RIVER BASIN

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06349000 HEART RIVER NEAR MANDAN, ND--CONTINUED  
(National stream-quality accounting network station)

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1946-50, 1971-76, 1978 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	TUR- BID- ITY (NTU) (00076)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)
NOV											
05...	1155	30	1490	8.50	12.0	6.0	2.1	11.6	94	10	95
DEC											
20...	1325	15	2050	8.08	-10.0	0.5	0.6	4.0	27	ND	32
JAN											
28...	1130	22	1800	8.27	-0.5	0.5	--	6.3	44	1	140
MAR											
05...	1340	7820	710	--	6.0	1.0	--	--	--	--	--
13...	1335	2650	640	8.02	7.5	3.5	260	11.4	86	K10	4300
MAY											
06...	1310	254	1170	8.51	6.5	9.0	--	10.3	89	--	--
JUN											
19...	1320	173	1320	8.49	30.5	29.5	20	7.4	96	--	--
AUG											
05...	1000	188	1240	8.54	23.0	23.0	--	7.7	90	--	--
SEP											
18...	1250	97	1280	8.63	12.5	13.5	5.5	10.1	96	87	130

DATE	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	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)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)
NOV											
05...	340	0	58	46	230	59	6	7.2	--	2.3	440
DEC											
20...	480	420	90	61	290	56	6	9.0	--	0.9	580
JAN											
28...	--	--	--	--	--	--	--	--	--	5.4	--
MAR											
13...	160	0	31	19	76	50	3	8.6	--	3.0	180
JUN											
19...	330	31	62	42	180	54	4	9.9	289	1.7	440
SEP											
18...	310	26	60	38	170	54	4	8.0	294	1.2	380

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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)
NOV										
05...	19	0.4	3.4	966	1000	1.3	78	<0.01	<0.10	0.05
DEC										
20...	21	0.5	9.5	1360	1100	1.8	55	0.01	0.30	0.25
13...	4.9	0.2	5.4	428	420	0.58	3060	0.03	0.90	0.30
JUN										
19...	11	0.3	4.3	910	950	1.2	425	<0.01	<0.10	0.03
SEP										
18...	11	0.3	5.7	960	860	1.3	251	<0.01	<0.10	0.07

K - Results based on colony count outside the acceptable range (non-ideal colony count).  
ND - Not detected.

## HEART RIVER BASIN

06349000 HEART RIVER NEAR MANDAN, ND--CONTINUED  
(National stream-quality accounting network station)

## WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS NH4) (71846)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS- PHORUS, TOTAL (MG/L AS P) (00665)	PHOS- PHORUS TOTAL (MG/L AS PO4) (71886)	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)
NOV 05...	0.04	0.05	0.5	0.02	--	<0.01	<0.01	--	<1	68
DEC 20...	0.25	0.32	0.9	0.01	0.03	<0.01	0.01	--	--	--
DEC 13...	0.27	0.35	2.2	0.31	--	0.03	<0.01	20	1	47
JUN 19...	0.02	0.03	0.7	0.05	--	<0.01	<0.01	--	--	--
SEP 18...	0.03	0.04	0.4	0.03	--	0.01	<0.01	10	1	86
DATE	BERYL- LIUM, DIS- SOLVED (UG/L AS BE) (01010)	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)
NOV 05...	<0.5	<1	<1	<3	1	3	<1	61	13	<0.1
MAR 13...	<0.5	<1	<1	<3	2	47	1	13	10	<0.1
SEP 18...	<0.5	<1	<1	<3	2	5	7	47	4	<0.1
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)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	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)
NOV 05...	<10	1	<1	<1	760	<6	<3	15	1.2	94
JAN 28...	--	--	--	--	--	--	--	7	0.4	82
MAR 13...	<10	4	<1	<1	360	<6	29	1020	7300	46
SEP 18...	<10	4	<1	7	670	<6	<3	--	--	--

## MISSOURI RIVER MAIN STEM

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06349070 MISSOURI RIVER BELOW MANDAN, ND

LOCATION.--Lat 46°44'32", long 100°49'54", at midsection of west half sec.30, T.138 N., R.80 W., Morton County, Hydrologic Unit 10130102, on right bank 1 mi south of Fort Lincoln State Park, 6 mi southeast of Mandan, and at mile 1,309.

DRAINAGE AREA.--189,800 mi<sup>2</sup>, approximately.

## GAGE-HEIGHT RECORDS

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

GAGE.--Water-stage recorder. Datum of gage is 1,600.00 ft above National Geodetic Vertical Datum of 1929 (U.S. Army Corps of Engineers bench mark).

REMARKS.--Stage regulated by Garrison Dam (station 06338490) 80.9 mi upstream.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily gage height recorded, 29.71 ft, Mar. 17, 1972; minimum daily recorded, 17.40 ft, Apr. 1, 1968.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	20.84	20.29	25.69	27.45	26.77	26.55	23.84	20.96	20.17	22.19	---	23.42
2	20.53	20.21	26.02	27.52	26.92	28.04	23.89	20.69	20.45	22.01	---	23.27
3	20.42	20.31	25.72	27.55	27.12	28.37	24.00	20.72	20.32	22.25	---	22.77
4	20.41	20.19	25.73	27.53	26.89	27.19	24.05	20.55	19.96	22.13	---	22.43
5	20.35	20.22	26.02	27.54	26.84	26.32	23.98	20.42	20.01	22.04	---	22.58
6	20.36	---	26.12	27.38	26.83	25.37	23.64	20.49	20.11	22.12	23.38	22.54
7	20.35	---	26.30	26.97	26.78	24.59	23.06	20.60	20.31	22.05	23.17	22.29
8	20.43	---	26.42	26.87	26.45	25.08	22.76	20.70	20.84	22.13	23.14	22.25
9	20.41	---	26.32	27.59	26.03	25.52	22.76	21.14	21.07	22.13	23.23	22.24
10	20.31	---	26.22	27.79	26.35	24.84	22.60	21.13	21.23	22.13	23.39	22.33
11	20.24	---	26.19	27.54	26.25	24.62	22.75	20.63	21.28	---	23.22	22.14
12	20.20	---	25.93	27.28	25.83	24.49	22.61	20.92	21.04	---	23.29	22.07
13	20.14	---	25.58	27.19	26.66	24.60	22.32	20.85	21.23	---	23.28	22.02
14	20.40	---	25.60	27.29	26.50	24.51	21.85	20.79	21.27	---	23.34	21.96
15	20.34	---	26.25	27.37	26.40	24.46	21.75	20.80	21.37	---	23.34	21.97
16	20.24	---	26.53	27.32	26.66	24.34	21.48	20.59	21.07	---	23.34	21.97
17	20.17	---	26.55	27.28	26.47	24.33	21.67	20.58	21.45	---	23.58	22.09
18	20.27	---	26.42	27.30	26.89	24.52	21.59	20.51	21.29	---	23.46	22.08
19	20.23	---	26.51	27.23	26.72	24.27	21.89	20.56	21.31	---	23.33	22.50
20	20.18	---	26.71	27.19	26.64	24.08	21.76	20.68	21.28	---	23.48	22.48
21	20.13	---	26.87	27.20	26.42	24.06	21.74	20.68	21.13	---	23.39	22.48
22	20.18	---	27.04	27.05	26.73	23.90	22.02	20.82	21.25	---	23.37	22.39
23	20.23	---	27.23	27.11	27.06	24.06	21.76	20.53	21.21	---	23.45	22.70
24	20.25	---	27.17	27.11	27.09	23.95	21.58	20.53	21.74	---	23.33	22.18
25	20.14	---	26.70	26.98	27.44	23.98	21.15	20.45	21.16	---	---	22.27
26	20.24	---	26.64	26.88	27.64	23.88	20.89	20.65	21.97	---	---	22.78
27	20.06	---	27.21	26.13	27.89	23.98	20.93	20.66	21.92	---	23.24	22.65
28	20.07	---	26.97	26.18	27.30	23.91	21.14	20.62	21.84	---	23.25	22.75
29	20.08	---	26.62	26.94	---	23.81	21.33	20.53	21.98	---	23.28	22.83
30	20.12	---	26.64	27.03	---	23.79	20.98	20.53	21.98	---	23.57	23.02
31	20.25	---	27.25	26.88	---	23.66	---	20.31	---	---	23.60	---
MEAN	20.28	---	26.42	27.18	26.77	24.81	22.26	20.67	21.11	---	---	22.45
MAX	20.84	---	27.25	27.79	27.89	28.37	24.05	21.14	21.98	---	---	23.42
MIN	20.06	---	25.58	26.13	25.83	23.66	20.89	20.31	19.96	---	---	21.96

## APPLE CREEK BASIN

06349500 APPLE CREEK NEAR MENOKEN, ND

LOCATION.--Lat 46°47'40", long 100°39'25", in NW¼NE¼ sec.9, T.138 N., R.79 W., Burleigh County, Hydrologic Unit 10130103, on left bank 75 ft downstream from bridge on county highway, 4 mi upstream from Hay Creek, 6.3 mi west of Menoken, and 6.4 mi east of Bismarck.

DRAINAGE AREA.--1,680 mi<sup>2</sup>, approximately, of which about 500 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--March to June 1905, October 1945 to current year. Published as "near Bismarck" 1905.

REVISED RECORDS.--WSP 1209: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,638.61 ft above National Geodetic Vertical Datum of 1929. See WSP 1729 or 1917 for history of changes prior to Sept. 30, 1953.

REMARKS.--Estimated daily discharges: Oct. 1 to Mar. 4. Records fair except those for period of estimated daily discharges, which are poor.

AVERAGE DISCHARGE.--41 years, 33.3 ft<sup>3</sup>/s, 24,130 acre-ft/yr; median of yearly mean discharges, 23 ft<sup>3</sup>/s, 16,700 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,750 ft<sup>3</sup>/s, Apr. 18, 1950, gage height, 17.07 ft; maximum gage height, 17.46 ft, Apr. 19, 1979; no flow at times in some years.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 200 ft<sup>3</sup>/s and maximum (\*):

Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)	Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)
Mar. 5	1600	*1500	*14.98	Apr. 21	0500	354	8.10

Minimum daily discharge, .09 ft<sup>3</sup>/s, Aug. 30 to Sept. 1.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.15	.82	.80	.86	1.9	150	85	88	35	13	4.9	.09
2	.15	.84	1.0	1.0	1.8	450	80	78	32	12	3.8	.19
3	.15	.84	1.1	1.1	1.7	750	93	74	30	11	3.1	.43
4	.16	.82	1.2	1.2	1.6	960	96	70	28	9.5	2.3	.41
5	.17	.80	1.4	1.4	1.5	1200	95	66	26	8.2	1.6	.29
6	.20	.78	1.5	1.5	1.4	920	94	65	25	6.3	1.4	.26
7	.21	.78	1.6	1.6	1.3	700	99	60	28	5.0	1.8	.17
8	.25	.80	1.7	1.7	1.3	559	102	64	32	4.3	1.6	.14
9	.30	.80	1.8	1.8	1.2	371	100	73	24	4.0	1.3	.12
10	.35	.80	1.9	1.9	1.1	332	97	76	25	6.1	1.1	.11
11	.38	.82	1.9	1.9	1.1	277	91	79	24	9.5	1.1	.18
12	.60	.82	2.0	2.0	1.1	257	85	88	22	10	.98	.47
13	.70	.84	2.0	2.0	1.0	230	78	89	20	8.2	.99	.53
14	.80	.82	2.0	2.0	1.0	207	82	80	16	7.2	1.1	.56
15	.84	.82	2.0	2.0	1.0	186	54	76	21	7.1	1.1	.95
16	.86	.80	2.0	2.0	1.0	168	44	68	23	12	.86	1.7
17	.88	.80	2.0	2.0	1.1	150	57	61	20	20	.46	2.7
18	.88	.78	2.0	2.0	1.2	139	104	56	17	17	.35	3.5
19	.86	.78	2.0	2.0	1.3	128	128	53	16	18	.25	3.3
20	.82	.76	2.0	2.0	1.4	117	243	51	15	18	.33	1.8
21	.82	.74	1.9	1.9	1.5	110	342	51	15	16	.28	3.3
22	.80	.72	1.9	1.9	1.5	108	248	48	14	13	.24	6.2
23	.80	.68	1.9	1.9	1.6	101	171	55	13	11	.22	6.2
24	.79	.62	2.0	2.0	1.7	96	136	55	11	9.3	.12	4.7
25	.80	.58	2.0	2.0	3.0	94	117	53	9.4	7.7	.11	6.4
26	.78	.58	2.0	2.0	7.0	89	108	53	7.5	6.5	.10	10
27	.76	.60	2.0	2.0	15	83	100	53	6.0	6.3	.10	12
28	.78	.62	2.0	2.0	60	85	93	54	5.4	6.3	.10	7.7
29	.80	.64	1.9	2.0	---	81	90	52	6.4	6.2	.10	9.2
30	.80	.66	1.8	1.9	---	86	92	40	12	6.4	.09	12
31	.80	---	1.8	1.8	---	82	---	36	---	5.8	.09	---
TOTAL	18.44	22.56	55.10	55.36	117.3	9266	3404	1965	578.7	300.9	31.97	95.60
MEAN	.59	.75	1.78	1.79	4.19	299	113	63.4	19.3	9.71	1.03	3.19
MAX	.88	.84	2.0	2.0	60	1200	342	89	35	20	4.9	12
MIN	.15	.58	.80	.86	1.0	81	44	36	5.4	4.0	.09	.09
AC-FT	37	45	109	110	233	18380	6750	3900	1150	597	63	190
CAL YR 1985	TOTAL	4162.36	MEAN	11.4	MAX	400	MIN	.13	AC-FT	8260		
WTR YR 1986	TOTAL	15910.93	MEAN	43.6	MAX	1200	MIN	.09	AC-FT	31560		

06349500 APPLE CREEK NEAR MENOKEN, ND---CONTINUED

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1974 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	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)	PERCENT SODIUM (00932)
OCT 23...	1210	0.8	1430	--	13.0	10.5	--	--	--	--	--
JAN 06...	1200	1.5	1680	--	-19.0	0.0	--	--	--	--	--
MAR 03...	1130	719	--	--	7.0	1.0	--	--	--	--	--
06...	1710	923	--	--	-6.0	0.0	--	--	--	--	--
14...	1210	216	289	7.35	--	2.0	76	17	8.0	26	39
APR 30...	1150	109	879	--	10.5	10.0	--	--	--	--	--
MAY 01...	1000	73	870	--	7.0	9.0	--	--	--	--	--
02...	1059	81	870	--	7.0	--	--	--	--	--	--
JUN 19...	1500	16	1050	--	31.0	26.5	--	--	--	--	--
JUL 11...	1135	9.7	990	--	--	--	--	--	--	--	--
SEP 18...	1545	3.4	1350	8.07	--	12.0	210	34	31	220	68
DATE		SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR 14...	1	9.5	92	44	1.6	0.1	9.7	185	170	0.25	
SEP 18...	7	11	450	230	20	0.2	4.8	855	840	1.2	
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)
MAR 14...	1	160	270	1	15	120	0.1	1	<1	120	
SEP 18...	6	510	40	<1	110	10	0.2	2	<1	340	



## MISSOURI RIVER MAIN STEM

06349700 MISSOURI RIVER NEAR SCHMIDT, ND

LOCATION.--Lat 46°39'22", long 100°44'18", in SW¼NE¼ sec.26, T.137 N., R.80 W., Morton County, Hydrologic Unit 10130102, on right bank 2 mi southeast of abandoned townsite of Schmidt, 13 mi southeast of Mandan, and at mile 1,298.

DRAINAGE AREA.--191,700 mi<sup>2</sup>, approximately.

## GAGE-HEIGHT RECORDS

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

GAGE.--Water-stage recorder. Datum of gage is 1,600.00 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Stage regulated by releases from Garrison Dam (station 06338490) 91.1 mi upstream, and backwater from Lake Oahe.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily gage height recorded, 23.56 ft, Dec. 9, 1976; minimum daily recorded, 7.92 ft, May 30, 1967.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	13.85	13.08	19.30	20.67	19.86	19.97	17.31	16.86	17.65	17.94	17.27	16.70
2	13.45	13.01	19.63	20.76	19.90	20.98	17.21	18.31	17.95	17.21	16.68	
3	13.27	13.08	19.47	20.73	20.11	21.63	17.52	17.59	17.97	18.42	17.32	16.25
4	13.22	12.98	19.38	20.69	20.05	21.66	17.59	17.30	17.51	18.00	17.47	15.78
5	13.20	12.96	19.55	20.68	19.95	22.10	17.67	17.25	17.83	17.90	17.47	15.86
6	13.20	12.98	19.75	20.56	19.94	20.94	17.48	16.82	17.65	18.00	17.71	15.81
7	13.21	13.16	19.91	20.25	19.90	19.93	16.99	17.04	17.35	17.96	17.38	15.71
8	13.24	13.17	20.06	19.95	19.72	21.15	16.66	17.07	17.71	17.93	17.40	15.68
9	13.27	---	20.07	20.46	19.26	21.96	16.72	18.64	17.91	18.08	17.33	15.59
10	13.14	---	19.99	20.81	19.43	20.13	16.65	18.47	17.55	18.01	17.34	15.58
11	13.05	13.15	19.92	20.68	19.53	18.64	16.74	18.47	17.79	17.92	17.29	15.44
12	13.02	---	19.68	20.40	18.95	18.01	16.50	18.47	17.57	17.80	17.33	15.32
13	12.97	---	19.33	20.29	19.67	17.98	16.51	18.77	17.92	17.82	17.26	15.25
14	13.15	---	19.15	20.32	19.82	17.90	15.70	18.65	17.84	17.87	17.22	15.24
15	13.20	---	19.68	20.40	19.59	17.82	16.02	18.82	17.90	17.70	17.19	15.25
16	13.10	---	20.05	20.39	19.85	17.72	16.18	18.34	17.65	17.77	17.08	15.24
17	12.96	---	20.15	20.34	19.73	17.65	16.48	18.52	18.15	17.73	17.15	15.28
18	13.07	---	20.02	20.34	20.02	17.82	15.99	18.61	17.86	18.05	17.21	15.26
19	13.03	---	20.04	20.32	20.01	17.67	16.40	18.76	17.81	17.86	17.11	15.52
20	12.97	---	20.18	20.25	19.89	17.46	16.43	18.79	17.60	17.73	16.95	15.62
21	12.92	---	20.34	20.28	19.64	17.41	16.61	18.97	17.59	17.82	17.05	15.63
22	12.93	---	20.46	20.15	19.82	17.24	17.16	18.95	17.65	17.74	17.07	15.54
23	12.98	---	20.68	20.15	20.17	17.35	16.94	18.36	17.57	17.83	17.12	15.64
24	13.04	---	20.69	20.20	20.27	17.38	16.68	18.12	18.10	17.66	17.22	15.30
25	12.96	---	20.38	20.04	20.58	17.34	16.60	18.19	18.25	17.79	16.87	15.69
26	13.00	---	20.10	19.99	20.83	17.24	16.27	18.25	17.88	17.81	16.78	15.69
27	12.91	---	20.45	19.39	21.20	17.38	16.36	18.28	17.80	17.64	16.75	15.59
28	12.88	---	20.48	19.11	21.04	17.31	16.72	18.21	17.82	17.62	16.83	15.59
29	12.81	---	20.08	19.79	---	17.21	17.08	18.16	17.93	17.72	16.80	15.63
30	12.90	19.05	19.96	20.05	---	17.26	16.79	18.09	17.95	17.54	16.89	15.80
31	13.02	---	20.38	19.95	---	17.15	---	18.00	---	17.42	16.94	---
MEAN	13.09	---	19.98	20.27	19.95	18.69	16.75	18.13	17.80	17.84	17.16	15.64
MAX	13.85	---	20.69	20.81	21.20	22.10	17.67	18.97	18.31	18.42	17.71	16.70
MIN	12.81	---	19.15	19.11	18.95	17.15	15.70	16.82	17.35	17.42	16.75	15.24

## CANNONBALL RIVER BASIN

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06350000 CANNONBALL RIVER AT REGENT, ND

LOCATION.--Lat 46°25'36", long 102°33'05", in NE1/4NE1/4 sec.13, T.134 N., R.95 W., Hettinger County, Hydrologic Unit 10130204, on right bank 400 ft from bridge on county highway, and 0.3 mi north of Regent.

DRAINAGE AREA.--580 mi<sup>2</sup>, approximately.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--September 1950 to current year.

GAGE.--Water-stage recorder. Datum of gage is 2,422.90 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated discharges: Nov. 19 to Mar. 4. Records good except those for period of estimated daily discharges, which are poor.

AVERAGE DISCHARGE.--36 years, 48.4 ft<sup>3</sup>/s, 35,000 acre-ft/yr; median of yearly mean discharges, 33 ft<sup>3</sup>/s, 23,900 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,000 ft<sup>3</sup>/s, Mar. 27, 1978, gage height, 20.55 ft; no flow at times.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage known since 1914, 26.1 ft, Apr. 16, 1950, from floodmarks, discharge, 20,300 ft<sup>3</sup>/s, on basis of slope-area measurement at site 4 mi downstream.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 400 ft<sup>3</sup>/s and maximum (\*):

Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)	Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)
Mar. 2	ice jam	*4200	ab*15.22	July 18	0200	633	6.55
June 30	0515	555	6.21				

Minimum daily discharge, 3.0 ft<sup>3</sup>/s, Nov. 29 to Dec. 2, 13-15.

a - Backwater from ice

b - From floodmark

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.2	4.2	3.0	3.4	5.2	1800	28	29	14	215	27	5.3
2	4.7	4.2	3.0	3.6	4.8	2400	28	26	12	100	20	6.0
3	4.8	4.3	3.2	3.8	5.0	2800	28	23	11	54	16	6.3
4	5.5	4.4	3.2	3.6	5.2	2610	28	22	10	51	13	6.4
5	5.7	4.4	3.4	3.4	5.5	1780	28	20	9.9	40	12	6.4
6	6.0	4.1	3.6	3.4	5.5	899	29	21	9.5	29	11	6.4
7	7.2	4.3	3.8	3.4	5.5	506	29	19	9.4	22	12	6.2
8	6.7	4.3	3.6	3.6	5.5	352	28	20	9.4	18	9.5	6.0
9	5.7	4.2	3.6	3.6	5.6	280	27	25	9.9	15	8.6	5.7
10	5.6	4.1	3.4	3.8	5.6	212	25	49	10	15	8.1	6.0
11	5.7	4.1	3.4	4.0	5.6	162	25	86	9.4	14	7.8	6.4
12	5.9	4.0	3.2	4.2	5.8	143	24	74	8.6	12	7.2	6.1
13	5.7	4.1	3.0	4.4	5.8	124	24	105	8.4	12	6.8	5.9
14	5.4	4.1	3.0	4.6	5.6	115	19	79	8.7	10	6.8	6.0
15	5.4	4.1	3.0	4.8	5.8	104	16	60	8.5	9.1	6.7	6.1
16	5.4	4.1	3.2	4.8	5.8	96	32	48	7.8	9.2	6.3	6.7
17	5.4	4.2	3.2	5.0	6.0	89	41	40	7.4	316	5.8	6.8
18	5.1	4.1	3.2	5.2	6.0	79	56	34	7.4	425	5.7	6.9
19	5.0	4.1	3.2	5.2	5.8	70	70	30	7.5	162	5.7	7.9
20	4.8	4.0	3.2	5.2	5.8	62	72	29	8.2	98	5.7	9.4
21	4.7	4.0	3.4	5.0	5.8	57	111	26	7.4	90	5.5	10
22	4.6	3.8	3.6	4.8	6.0	53	105	23	6.8	65	5.5	10
23	4.6	3.6	3.8	4.6	6.2	49	77	25	6.2	174	5.4	9.2
24	4.6	3.4	3.8	4.8	7.0	46	58	26	6.3	87	5.4	8.4
25	4.3	3.4	3.6	5.2	8.0	44	46	27	6.1	50	5.1	16
26	4.4	3.3	3.8	5.2	50	43	43	26	6.2	35	5.3	24
27	4.2	3.3	3.6	5.0	1000	42	40	23	6.0	28	5.4	77
28	4.3	3.2	3.6	4.8	1400	38	35	20	5.9	23	5.2	150
29	4.4	3.0	3.6	5.0	---	36	32	18	62	18	5.1	109
30	4.4	3.0	3.4	5.2	---	33	31	17	455	15	5.2	71
31	4.4	---	3.4	5.4	---	32	---	16	---	18	5.2	---
TOTAL	158.8	117.4	105.0	138.0	2594.4	15156	1235	1086	754.9	2229.3	260.0	613.5
MEAN	5.12	3.91	3.39	4.45	92.7	489	41.2	35.0	25.2	71.9	8.39	20.4
MAX	7.2	4.4	3.8	5.4	1400	2800	111	105	455	425	27	150
MIN	4.2	3.0	3.0	3.4	4.8	32	16	16	5.9	9.1	5.1	5.3
AC-FT	315	233	208	274	5150	30060	2450	2150	1500	4420	516	1220
CAL YR 1985	TOTAL	4923.2		MEAN	13.5	MAX	227	MIN	1.5	AC-FT	9770	
WTR YR 1986	TOTAL	24448.3		MEAN	67.0	MAX	2800	MIN	3.0	AC-FT	48490	

CANNONBALL RIVER BASIN  
06350000 CANNONBALL RIVER AT REGENT, ND--CONTINUED  
WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1964-66, 1971 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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 26...	1435	3.3	2150	--	-20.0	0.0	--	--	--	--	--
JAN 14...	1215	4.6	1830	--	2.0	0.0	--	--	--	--	--
MAR 04...	1200	2780	410	7.90	12.5	0.5	97	19	19	12	40
MAR 14...	1535	114	1220	--	7.0	4.0	--	--	--	--	--
MAY 05...	1655	19	2430	--	4.0	12.0	--	--	--	--	--
MAY 28...	1510	20	2490	--	25.5	22.5	--	--	--	--	--
JUL 07...	1605	21	1980	--	24.0	21.0	--	--	--	--	--
AUG 25...	1655	4.9	1690	8.50	21.0	19.5	440	85	85	54	240
DATE	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR 04...	45	2	8.6	78	120	5.1	0.1	6.6	267	260	0.36
AUG 25...	54	5	9.5	350	570	8.1	0.4	6.2	1210	1200	1.6
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)	
MAR 04...	<1	60	60	<1	5	120	0.1	2	<1	170	
AUG 25...	1	380	20	<1	38	100	0.1	4	<1	1200	

06351680 WHITE BUTTE FORK CEDAR CREEK NEAR SCRANTON, ND

LOCATION.--Lat 46°19'20", long 102°59'45", in NW¼ sec.21, T.133 N., R.98 W., Slope County, Hydrologic Unit 10130205, on left bank 1,200 ft downstream from county highway bridge, and 13 mi northeast of Scranton.

DRAINAGE AREA.--42.9 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--March 1965 to current year (seasonal records only since 1984).

GAGE.--Water-stage recorder. Elevation of gage is 2,825 ft above National Geodetic Vertical Datum from topographic map.

REMARKS.--Estimated daily discharges: Feb. 1 to Mar. 10. Records good except those for period of estimated daily discharges, which are fair.

AVERAGE DISCHARGE.--18 years (water years 1966-83), 4.45 ft<sup>3</sup>/s, 3,220 acre-ft/yr; median of yearly mean discharges, 4.54 ft<sup>3</sup>/s, 3,290 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 645 ft<sup>3</sup>/s, May 8, 1970, gage height, 7.20 ft; maximum gage height, 7.76 ft, May 8, 1967; no flow for many days each year.

EXTREMES FOR CURRENT YEAR.--Maximum observed discharge, 130 ft<sup>3</sup>/s, Feb. 28, gage height, 8.35 ft from floodmark, backwater from ice; no flow for many days.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1					.00	85	1.2	1.8	.35	.16	.00	.00
2					.00	70	1.0	1.5	.32	.20	.00	.00
3					.00	55	1.3	1.4	.31	.14	.00	.00
4					.00	45	1.4	1.2	.31	.10	.00	.00
5					.00	40	1.6	1.1	.32	.06	.00	.00
6					.00	30	1.7	1.1	.29	.04	.00	.00
7					.00	25	1.4	.96	.26	.02	.00	.00
8					.00	20	1.6	1.5	.24	.01	.00	.00
9					.00	18	1.8	10	.26	.00	.00	.00
10					.00	16	1.9	50	.26	.00	.00	.00
11					.00	12	2.0	39	.26	.01	.00	.00
12					.00	34	1.7	14	.23	.01	.00	.00
13					.00	26	1.3	7.6	.19	.00	.00	.00
14					.00	11	.37	5.6	.16	.00	.00	.00
15					.00	7.5	1.2	3.8	.15	.00	.00	.00
16					.00	4.2	1.2	2.9	.10	.00	.00	.00
17					.00	3.5	5.4	2.3	.07	.00	.00	.00
18					.00	3.7	7.2	2.0	.04	.00	.00	.00
19					.00	3.1	35	1.7	.03	.00	.00	.00
20					.00	2.7	19	1.4	.05	.00	.00	.00
21					.00	2.2	11	.98	.09	.00	.00	.00
22					.00	2.1	8.5	.99	.05	.00	.00	.03
23					.00	2.0	4.8	1.2	.05	.00	.00	.17
24					.00	1.6	3.2	1.1	.10	.00	.00	.19
25					.00	1.9	2.7	.98	.09	.00	.00	1.1
26					5.0	1.8	2.6	.94	.05	.00	.00	.81
27					20	1.4	2.5	.87	.02	.00	.00	.25
28					125	1.5	2.1	.73	.01	.00	.00	.18
29					---	1.3	1.9	.54	.10	.00	.00	.25
30					---	1.3	1.8	.52	.11	.00	.00	.08
31					---	1.3	---	.43	---	.00	.00	---
TOTAL					150.00	530.1	130.37	159.94	4.87	.75	.00	3.06
MEAN					5.36	17.1	4.35	5.16	.16	.02	.00	.10
MAX					125	85	35	50	.35	.20	.00	1.1
MIN					.00	1.3	.37	.43	.01	.00	.00	.00
AC-FT					298	1050	259	317	9.7	1.5	.00	6.1

## CANNONBALL RIVER BASIN

06351680 WHITE BUTTE FORK CEDAR CREEK NEAR SCRANTON, ND--CONTINUED

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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)
MAR 13...	1215	22	481	7.80	5.5	3.5	140	49	27	17	37
MAY 08...	1455	1.4	3350	--	7.0	6.0	--	--	--	--	--
JUN 02...	1720	0.29	3310	--	30.5	26.0	--	--	--	--	--
JUL 10...	1115	0.01	4990	8.80	24.0	20.0	1600	1400	180	270	790
DATE	PERCENT SODIUM RATIO (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINEITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR 13...	34	1	14	89	130	5.9	0.1	12	322	300	0.44
JUL 10...	52	9	12	120	3000	19	0.4	1.1	4510	4400	6.1
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)	
MAR 13...	1	130	150	<1	10	80	0.2	1	<1	310	
JUL 10...	2	1400	30	2	110	190	<0.1	2	2	2600	



## CANNONBALL RIVER BASIN

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06352000 CEDAR CREEK NEAR HAYNES, ND

LOCATION.--Lat 46°09'15", long 102°28'25", in W1/2 sec.20, T.131 N., R.94 W., Adams County, Hydrologic Unit 10130205, on left bank 30 ft downstream from bridge on State Highway 8, and 12.5 mi north of Haynes.

DRAINAGE AREA.--553 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1950 to current year.

GAGE.--Water-stage recorder. Datum of gage is 2,472.90 ft above National Geodetic Vertical Datum of 1929, North Dakota Highway Department benchmark. Prior to May 20, 1951, nonrecording gage on former bridge 400 ft upstream at same datum.

REMARKS.--Estimated daily discharges: Nov. 6, Nov. 9 to Mar. 5, and Mar. 7. Records good except those for periods of estimated daily discharges, which are poor.

AVERAGE DISCHARGE.--36 years, 38.0 ft<sup>3</sup>/s, 27,530 acre-ft/yr; median of yearly mean discharges, 30 ft<sup>3</sup>/s, 21,700 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,870 ft<sup>3</sup>/s, Apr. 7, 1952, gage height, 21.25 ft; maximum gage height, 22.05 ft, Mar. 28, 1978, backwater from ice and snow; no flow at times in some years.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 17, 1950 reached a stage of about 23 ft, discharge, 26,900 ft<sup>3</sup>/s, by slope-area measurement at site 9 mi upstream.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,070 ft<sup>3</sup>/s, Mar. 5, gage height, 19.15 ft, only peak above base of 400 ft<sup>3</sup>/s; minimum daily, 0.90 ft<sup>3</sup>/s, Dec. 2, 3.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.3	3.7	1.0	2.5	5.0	135	42	34	16	6.2	2.7	2.1
2	2.3	3.7	.90	3.0	5.0	700	39	30	15	5.7	2.6	2.5
3	2.4	3.5	.90	3.0	5.5	1400	37	29	14	9.2	2.5	3.0
4	3.0	3.5	1.0	3.0	5.5	2000	34	27	14	11	2.5	2.9
5	3.2	3.6	1.5	3.0	5.5	2800	34	24	12	9.1	2.7	2.5
6	3.0	3.6	1.5	3.5	5.5	3600	35	21	13	7.0	2.6	2.7
7	3.0	3.7	1.5	3.5	5.5	2450	35	20	17	6.0	2.2	2.8
8	3.3	3.5	1.5	3.5	5.5	1920	36	24	14	5.3	2.2	3.0
9	3.5	3.5	1.5	4.0	5.5	1090	36	35	12	5.0	2.2	3.0
10	3.5	3.5	1.5	4.0	5.5	718	34	40	12	10	1.8	3.0
11	3.5	3.5	1.0	4.0	5.5	510	33	68	9.9	16	2.0	3.5
12	3.5	3.5	1.0	4.0	5.5	431	31	138	9.7	13	2.0	3.4
13	3.5	3.5	1.1	4.0	5.5	329	31	260	9.4	7.2	2.1	3.0
14	3.7	3.5	1.2	4.5	5.5	288	26	191	10	5.2	4.8	2.9
15	3.8	3.0	1.3	5.0	5.5	255	31	125	12	4.3	9.0	3.4
16	3.7	3.0	1.5	5.0	5.5	206	37	87	10	3.7	6.7	4.1
17	3.7	3.0	1.5	5.0	5.5	173	43	64	8.9	3.5	4.4	4.2
18	3.7	3.0	1.5	5.0	5.5	150	59	48	8.4	5.7	3.4	4.7
19	3.7	3.0	1.5	5.5	5.5	134	86	39	7.4	58	3.2	6.2
20	3.5	2.5	1.5	5.5	6.0	110	97	32	6.6	24	3.8	8.0
21	3.7	2.5	1.5	5.5	6.0	95	131	28	6.6	13	2.9	8.5
22	4.8	2.4	2.0	5.5	6.0	88	160	25	6.4	8.0	2.5	8.4
23	3.8	2.0	2.0	5.0	6.5	82	119	26	14	5.7	2.4	8.8
24	3.4	1.5	2.0	5.0	7.0	75	86	26	11	4.5	2.3	8.4
25	3.3	1.5	2.0	5.0	7.5	70	66	26	8.4	3.9	2.0	14
26	3.3	1.3	2.0	5.0	10	64	54	28	7.3	3.2	2.1	13
27	3.3	1.2	2.0	5.0	15	61	46	26	7.6	3.0	1.7	25
28	3.3	1.0	2.5	4.5	35	58	42	23	7.1	3.4	1.9	65
29	3.3	1.0	2.5	4.5	---	51	39	21	6.6	3.6	2.0	43
30	3.3	1.2	2.5	5.0	---	46	37	19	6.4	3.5	2.0	28
31	3.4	---	2.5	5.0	---	44	---	18	---	3.2	2.0	---
TOTAL	104.7	82.9	49.40	135.5	202.5	20133	1616	1602	312.7	270.1	89.2	293.0
MEAN	3.38	2.76	1.59	4.37	7.23	649	53.9	51.7	10.4	8.71	2.88	9.77
MAX	4.8	3.7	2.5	5.5	35	3600	160	260	17	58	9.0	65
MIN	2.3	1.0	.90	2.5	5.0	44	26	18	6.4	3.0	1.7	2.1
AC-FT	208	164	98	269	402	39930	3210	3180	620	536	177	581
CAL YR 1985	TOTAL	4649.45		MEAN	12.7	MAX	600	MIN	.45	AC-FT	9220	
WTR YR 1986	TOTAL	24891.00		MEAN	68.2	MAX	3600	MIN	.90	AC-FT	49370	

06352000 CEDAR CREEK NEAR HAYNES, ND--CONTINUED

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1971 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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											
08...	1530	3.6	2240	--	-2.0	3.5	--	--	--	--	--
NOV											
22...	1325	2.4	2770	--	-17.0	0.0	--	--	--	--	--
JAN											
14...	1535	4.4	2460	--	1.5	0.0	--	--	--	--	--
MAR											
01...	1505	131	660	--	8.0	0.5	--	--	--	--	--
04...	1725	1870	545	8.00	8.0	0.5	160	76	28	21	46
14...	1310	310	1100	--	6.5	1.5	--	--	--	--	--
MAY											
06...	1010	20	2350	--	7.0	7.0	--	--	--	--	--
28...	1830	23	2840	--	23.0	23.5	--	--	--	--	--
JUL											
08...	1020	5.1	2800	--	24.0	20.5	--	--	--	--	--
AUG											
26...	1055	1.9	1650	8.40	16.5	17.5	410	92	63	62	230
DATE	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR											
04...	37	2	10	81	180	5.8	0.1	7.4	375	350	0.51
AUG											
26...	54	5	10	320	590	9.3	0.4	3.2	1190	1200	1.6
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)	
MAR											
04...	1	130	100	<1	9	120	0.2	1	<1	280	
AUG											
26...	1	350	30	<1	55	40	0.1	5	<1	980	

## CANNONBALL RIVER BASIN

289

06353000 CEDAR CREEK NEAR RALEIGH, ND

LOCATION.--Lat 46°05'30", long 101°20'00", in NE1/4SE1/4 sec.8, T.130 N., R.85 W., Grant County, Hydrologic Unit 10130205, on left bank at upstream side of bridge on N.D. Highway 31, 6 mi upstream from mouth, and 19 mi south of Raleigh.

DRAINAGE AREA.--1,750 mi<sup>2</sup>, approximately.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--April to September 1939, March 1962 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,881.23 ft above National Geodetic Vertical Datum of 1929. Prior to June 6, 1962, nonrecording gage at same site and datum, and June 6, 1962, to Sept. 7, 1972, at site 1 mi upstream at datum 9.58 ft higher.

REMARKS.--Estimated daily discharges: Nov. 11 to Mar. 3. Records good except those for period of estimated daily discharges, which are fair.

AVERAGE DISCHARGE.--24 years (water years 1963-85), 103 ft<sup>3</sup>/s, 74,620 acre-ft/yr; median of yearly mean discharges, 80 ft<sup>3</sup>/s, 58,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 13,400 ft<sup>3</sup>/s, Mar. 28, 1978, gage height, 13.70 ft; no flow at times in most years.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage known since 1950, about 18 ft, Apr. 18, 1950; discharge 45,000 ft<sup>3</sup>/s, on basis of slope-area measurement 5 mi upstream.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 700 ft<sup>3</sup>/s and maximum (\*):

Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)	Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)
Mar. 8	0800	*2950	*7.58	May 23	1230	2260	2.85
Apr. 19	0015	942	4.80	June 8	1800	874	4.74
May 9	0700	2400	6.99				

Minimum .26 ft<sup>3</sup>/s, Oct. 2.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.32	6.1	4.8	8.2	13	400	136	222	106	33	14	43
2	.26	6.1	4.0	8.6	13	700	127	189	93	33	13	24
3	.28	6.3	4.3	8.6	13	1000	129	170	84	32	12	14
4	.39	6.0	4.6	8.4	12	1220	128	148	77	30	11	11
5	.52	5.4	5.0	8.2	11	1920	151	129	70	28	10	9.2
6	.54	6.9	5.4	8.0	11	2050	156	115	109	27	10	7.4
7	.74	6.0	5.8	7.0	11	2410	131	106	255	26	9.4	6.6
8	1.1	5.6	6.2	6.6	10	2350	121	345	637	26	8.6	6.1
9	.85	5.0	5.9	7.4	9.6	2190	115	1660	651	27	8.2	5.7
10	.75	4.8	5.6	8.0	8.8	2270	109	884	515	34	7.5	6.1
11	.75	4.5	6.0	8.8	8.4	1990	100	745	539	33	7.4	7.1
12	.71	4.3	6.4	9.6	8.0	1520	96	484	397	30	7.5	7.0
13	.92	4.4	6.2	9.8	7.6	1170	94	362	300	29	9.0	7.4
14	.97	4.6	6.2	9.9	7.2	884	87	281	196	34	7.5	7.5
15	1.8	4.8	6.4	10	7.0	702	105	246	138	34	6.6	8.1
16	2.3	4.6	6.6	11	7.6	583	128	255	109	28	6.3	9.0
17	2.8	4.4	6.7	12	8.0	498	174	303	90	25	6.5	13
18	2.9	4.2	6.6	12	9.0	443	593	253	77	23	6.2	13
19	2.9	4.0	6.5	13	10	384	663	214	68	22	7.1	17
20	3.1	3.8	6.4	13	11	338	520	177	60	24	6.0	22
21	3.1	3.7	6.4	13	12	302	501	151	56	21	5.7	29
22	3.7	3.6	6.6	13	13	278	414	138	51	19	5.8	27
23	4.3	3.5	7.0	12	14	269	341	1390	47	26	5.4	21
24	3.9	3.4	7.8	12	16	254	285	1060	44	25	5.4	21
25	4.6	3.2	8.2	12	15	228	282	589	41	20	5.7	74
26	5.0	3.3	8.4	11	440	209	311	442	39	19	5.6	42
27	4.9	3.3	8.2	11	300	194	361	310	36	28	5.6	39
28	5.2	3.4	8.2	11	202	179	276	227	33	24	6.4	55
29	5.4	3.5	8.6	12	---	165	230	173	36	21	8.2	49
30	5.5	3.6	8.8	12	---	155	240	140	37	17	7.8	37
31	6.2	---	8.4	12	---	143	---	120	---	15	14	---
TOTAL	76.70	136.3	202.2	319.1	1208.2	27398	7104	12028	4991	813	249.4	638.2
MEAN	2.47	4.54	6.52	10.3	43.1	884	237	388	166	26.2	8.05	21.3
MAX	6.2	6.9	8.8	13	440	2410	663	1660	651	34	14	74
MIN	.26	3.2	4.0	6.6	7.0	143	87	106	33	15	5.4	5.7
AC-FT	152	270	401	633	2400	54340	14090	23860	9900	1610	495	1270
CAL YR 1985	TOTAL	16973.70		MEAN	46.5	MAX	2000	MIN	.00	AC-FT	33670	
WTR YR 1986	TOTAL	55164.10		MEAN	151	MAX	2410	MIN	.26	AC-FT	109400	

## CANNONBALL RIVER BASIN

06353000 CEDAR CREEK NEAR RALEIGH, ND--CONTINUED

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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 05...	0955	3.6	--	--	11.0	7.0	--	--	--	--	--
DEC 17...	1340	6.7	3180	--	-12.0	0.5	--	--	--	--	--
JAN 30...	1250	11	3200	--	-5.0	0.5	--	--	--	--	--
MAR 04...	1735	1220	730	--	12.5	0.5	--	--	--	--	--
MAR 14...	1220	975	800	8.09	7.5	2.0	240	98	43	31	79
MAY 07...	1320	106	2450	--	6.0	9.5	--	--	--	--	--
JUN 18...	1505	68	2050	--	33.0	22.0	--	--	--	--	--
JUL 31...	1145	17	2570	--	23.0	19.5	--	--	--	--	--
SEP 09...	1100	5.8	2630	8.52	19.0	15.0	530	200	70	86	370
DATE	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR 14...	41	2	9.9	140	290	6.9	0.2	7.6	558	550	0.76
SEP 09...	60	7	13	330	950	14	0.5	4.9	1790	1700	2.4
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)	
MAR 14...	<1	100	70	<1	23	50	0.3	1	<1	510	
SEP 09...	1	500	20	<1	100	10	0.1	9	1	1200	



## CANNONBALL RIVER BASIN

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06354000 CANNONBALL RIVER AT BREIEN, ND  
(National stream-quality accounting network station)

LOCATION.--Lat 46°22'33", long 100°56'03", in sec.36, T.134 N., R.82 W., Morton County, Hydrologic Unit 10130206, on left bank at downstream side of bridge on State Highway 6, 1,100 ft downstream from Dogtooth Creek, and 0.6 mi southeast of Breien.

DRAINAGE AREA.--4,100 mi<sup>2</sup>, approximately.

## WATER-DISCHARGE RECORDS

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

REVISED RECORDS.--WSP 786: 1934. WSP 1146: 1943. WSP 1279: 1936-37(M), 1947(M). WSP 1509: 1955(M).

GAGE.--Water-stage recorder. Datum of gage is 1,673.54 ft above National Geodetic Vertical Datum of 1929. From June 12, 1973, to July 1, 1985, at site 450 ft downstream. Prior to June 12, 1973, at site 50 ft upstream at datum 3.00 ft higher. June 13, 1973, to April 8, 1980, at datum 2.00 ft higher.

REMARKS.--Estimated daily discharges: Nov. 9 to Mar. 3. Records good except those for period of estimated daily discharges, which are fair. Some storage in several small lakes above station.

AVERAGE DISCHARGE.--52 years, 393 ft<sup>3</sup>/s, 185,500 acre-ft/yr; median of yearly mean discharges, 197 ft<sup>3</sup>/s, 143,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 94,800 ft<sup>3</sup>/s, Apr. 19, 1950, gage height, 22.30 ft, from floodmarks, from rating curve extended above 16,000 ft<sup>3</sup>/s on basis of slope area and contracted-opening measurements of peak flow, site and datum then in use; no flow at times in some years.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,000 ft<sup>3</sup>/s and maximum (\*):

Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)	Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)
Mar. 4	2130	*9940	*13.19	July 2	2400	1150	5.83
Apr. 19	1445	1840	6.69	July 17	1215	1070	5.68
May 9	1800	4820	9.59	July 20	1545	1210	5.87
May 24	0430	2990	7.94				

Minimum daily discharge, 9.2 ft<sup>3</sup>/s, Oct. 1.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.2	19	10	15	24	1450	315	531	319	157	141	28
2	10	19	10	15	24	2250	299	473	279	673	122	202
3	9.9	19	10	14	23	2900	292	426	247	987	108	193
4	11	19	10	13	24	6650	301	390	227	729	97	121
5	11	19	11	12	24	9160	314	351	207	512	88	76
6	11	19	11	11	24	8040	313	321	189	365	91	53
7	14	19	12	10	23	6130	305	293	206	286	87	40
8	19	19	12	10	23	4550	276	481	300	240	67	30
9	32	19	12	10	22	3840	257	3330	619	202	62	25
10	28	19	12	11	22	3380	245	2070	608	188	56	27
11	24	18	12	12	21	3180	228	1480	578	182	54	31
12	22	18	12	13	21	2700	210	1130	608	156	54	28
13	20	18	11	14	20	2200	200	799	452	133	53	25
14	19	17	12	14	20	1840	180	615	368	115	52	26
15	21	17	11	14	19	1490	200	510	284	125	61	44
16	21	17	11	15	19	1250	270	450	229	177	54	47
17	20	17	11	15	19	1070	322	403	198	717	41	66
18	20	17	10	16	18	946	733	409	175	617	37	79
19	21	16	10	17	18	853	1670	371	154	577	35	81
20	21	16	10	18	16	768	1430	330	140	757	38	99
21	22	16	10	20	17	707	1200	296	128	886	41	225
22	22	16	11	22	16	644	1050	258	114	725	62	239
23	21	16	12	23	16	595	920	816	105	553	38	181
24	20	15	13	22	17	558	799	2760	97	427	31	144
25	20	14	12	22	18	515	705	2070	91	333	32	198
26	20	13	12	23	150	475	672	1430	85	275	30	284
27	19	12	13	23	1400	436	699	1010	78	234	25	223
28	19	12	13	24	1500	407	677	732	82	247	25	524
29	18	11	14	24	---	382	593	559	105	229	25	511
30	19	11	14	24	---	358	548	456	161	191	23	343
31	19	---	14	23	---	334	---	381	---	165	23	---
TOTAL	583.1	497	358	519	3558	70058	16223	25931	7433	12160	1753	4193
MEAN	18.8	16.6	11.5	16.7	127	2260	541	836	248	392	56.5	140
MAX	32	19	14	24	1500	9160	1670	3330	619	987	141	524
MIN	9.2	11	10	10	16	334	180	258	78	115	23	25
AC-FT	1160	986	710	1030	7060	139000	32180	51430	14740	24120	3480	8320
CAL YR 1985	TOTAL	42840.90		MEAN	117	MAX	3500	MIN	.00	AC-FT	84970	
WTR YR 1986	TOTAL	143266.1		MEAN	393	MAX	9160	MIN	9.2	AC-FT	284200	



## CANNONBALL RIVER BASIN

06354000 CANNONBALL RIVER AT BREIEN, ND--CONTINUED  
(National stream-quality accounting network station)

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1946-50, (partial-record station), 1970-72, 1974 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	TUR- BID- ITY (NTU) (00076)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	COLI- FORM, FECAL, O.7 UM-MF (COLS./ 100 ML) (31625)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)
OCT 30...	1445	20	1920	8.50	15.0	6.0	13	11.5	93	16000	35
NOV 29...	1505	11	2910	--	-16.0	0.0	--	--	--	--	--
DEC 30...	1300	14	3000	8.15	2.5	0.5	--	9.0	63	--	--
JAN 29...	1155	20	2680	8.36	-8.5	0.5	10	9.7	66	K4	120
FEB 27...	1450	1360	190	--	--	--	--	--	--	--	--
MAR 04...	1310	5800	360	--	13.0	0.5	--	--	--	--	--
12...	1415	2860	670	7.90	6.0	2.0	--	11.7	85	--	--
27...	1225	428	1380	--	20.0	7.5	--	--	--	--	--
APR 29...	1150	597	1600	8.43	15.0	10.0	--	10.2	90	--	--
MAY 29...	1250	558	1570	--	23.5	22.0	--	--	--	--	--
JUN 23...	1115	102	1880	8.57	23.5	22.5	--	8.1	93	--	--
JUL 25...	1135	347	930	8.32	26.0	24.0	--	7.4	88	--	--
SEP 02...	1030	144	1150	--	16.0	16.5	--	--	--	--	--
17...	1245	69	1530	8.57	17.0	13.5	98	10.0	96	1200	4600
29...	1115	515	1340	--	13.5	--	--	--	--	--	--

DATE	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	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)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)
OCT 30...	410	32	62	62	300	61	7	9.1	378	2.3	680
DEC 30...	--	--	--	--	--	--	--	--	--	8.2	--
JAN 29...	630	69	100	93	420	59	7	10	--	4.7	970
SEP 17...	340	62	58	46	220	58	5	8.6	293	1.3	530

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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)
OCT 30...	15	0.4	3.5	1420	1400	1.9	78	0.02	<0.10	0.04
JAN 29...	52	0.6	8.0	1990	2000	2.7	105	<0.01	0.49	0.12
SEP 17...	9.4	0.4	6.5	1060	1100	1.4	197	<0.01	0.10	0.01

K - Results based on colony count outside the acceptable range (non-ideal colony count).

## CANNONBALL RIVER BASIN

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06354000 CANNONBALL RIVER AT BREIEN, ND--CONTINUED  
(National stream-quality accounting network station)

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS NH4) (71846)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS- PHORUS, TOTAL (MG/L AS P) (00665)	PHOS- PHORUS TOTAL (MG/L AS PO4) (71886)	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)
OCT 30...	0.04	0.05	0.7	0.03	0.09	<0.01	<0.01	10	1	59
JAN 29...	0.13	0.17	0.6	0.02	--	0.01	0.03	20	1	<100
SEP 17...	0.03	0.04	1.0	0.03	--	0.02	<0.01	<10	1	89
DATE	BERYL- LIUM, DIS- SOLVED (UG/L AS BE) (01010)	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)
OCT 30...	<0.5	<1	<1	<3	2	9	<1	74	13	<0.1
JAN 29...	<10	<1	<1	4	<1	10	<1	100	40	<0.1
SEP 17...	<0.5	<1	<1	<3	3	4	<5	68	4	0.2
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)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	SEDI- MENT, DIS- SUS- PENDE (MG/L) (80154)	SEDI- MENT, DIS- CHARGE, SUS- PENDE (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
OCT 30...	<10	5	<1	<1	960	<6	9	105	5.8	100
JAN 29...	4	4	1	<1	1500	<1	20	53	2.8	99
MAR 12...	--	--	--	--	--	--	--	2000	15400	46
SEP 17...	<10	5	<1	1	760	<6	12	261	48	100
DATE	TIME	DEPTH TO TOP OF SAMPLE INTER- VAL (FT) (72015)	TEMPER- ATURE (DEG C) (00010)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	OXYGEN, DIS- SOLVED (MG/L) (00300)				
SEP 17...	1242	0.0	14.5	--	--	--				
17...	1243	0.0	14.5	--	--	--				
17...	1245	0.0	13.5	1530	8.57	10.0				
17...	1247	0.0	14.5	--	--	--				
17...	1249	0.0	14.5	--	--	--				
17...	1251	0.0	14.5	--	--	--				
17...	1253	0.0	14.0	1530	8.60	10.0				
17...	1255	0.0	14.0	--	--	--				
17...	1257	0.0	14.0	--	--	--				
17...	1259	0.0	14.0	--	--	--				
17...	1301	0.0	14.0	--	--	--				
17...	1301	0.0	14.0	--	--	--				
17...	1303	0.0	14.0	1530	8.60	10.1				
17...	1305	0.0	--	--	--	--				
17...	1307	0.0	14.0	--	--	--				
17...	1309	0.0	14.0	--	--	--				
17...	1311	0.0	14.0	--	--	--				
17...	1313	0.0	13.5	--	--	--				
17...	1315	0.0	13.5	--	--	--				
17...	1317	0.0	13.5	--	--	--				

## BEAVER CREEK BASIN

06354500 BEAVER CREEK AT LINTON, ND

LOCATION.--Lat 46°15'27", long 100°13'58", on line between secs.17 and 18, T.132 N., R.76 W., Emmons County, Hydrologic Unit 10130104, on left bank 60 ft downstream from bridge on U.S. Highway 83, 0.7 mi south of railway station in Linton, and 1 mi upstream from Spring Creek.

DRAINAGE AREA.--717 mi<sup>2</sup>, of which about 100 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--August 1949 to current year.

REVISED RECORDS.--WSP 1209: Drainage area. WSP 1239: 1950(M).

GAGE.--Water-stage recorder. Datum of gage is 1,690.55 ft above National Geodetic Vertical Datum of 1929. Prior to June 18, 1958, nonrecording gage at site 60 ft upstream at same datum.

REMARKS.--Estimated daily discharges: Nov. 22 to Mar. 16. Records poor.

AVERAGE DISCHARGE.--37 years, 40.5 ft<sup>3</sup>/s, 29,340 acre-ft/yr; median of yearly mean discharges, 27 ft<sup>3</sup>/s, 19,600 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9,800 ft<sup>3</sup>/s, Apr. 8, 1952, gage height, 17.50 ft; no flow at times in some years.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 200 ft<sup>3</sup>/s and maximum (\*):

Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)	Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)
Mar. 4	----	a650	bc12.3	Apr. 21	2330	316	9.33
Mar. 14	----	a*725	ice jam	May 10	1415	232	8.71

Minimum daily .08 ft<sup>3</sup>/s, Oct. 01.

a - About

b - Backwater from ice

c - From flood mark

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.08	1.9	1.2	1.3	2.3	50	96	121	60	7.8	6.4	5.6
2	.08	1.8	1.2	1.3	2.3	100	91	113	55	7.8	5.4	6.9
3	.11	1.7	1.2	1.3	2.4	300	89	107	51	7.5	5.3	7.9
4	.12	1.8	1.2	1.2	2.3	650	88	102	49	6.9	5.6	8.0
5	.12	2.1	1.2	1.2	2.2	600	91	98	41	6.4	6.0	7.3
6	.11	1.9	1.2	1.2	2.2	525	95	93	26	5.7	6.3	6.8
7	.15	1.9	1.2	1.2	2.1	500	98	89	25	5.6	6.7	6.3
8	.18	1.7	1.2	1.2	2.1	350	101	91	22	5.8	6.2	5.9
9	.18	1.6	1.2	1.2	2.0	275	97	142	22	6.1	5.9	5.7
10	.17	1.5	1.3	1.1	2.0	300	92	208	23	7.2	5.4	5.6
11	.17	1.5	1.3	1.1	2.0	350	86	201	23	6.6	5.1	5.7
12	.18	1.5	1.5	1.1	1.9	600	79	196	21	6.6	5.0	5.4
13	.19	1.5	1.6	1.1	1.9	700	77	150	20	6.4	5.1	5.0
14	.31	1.5	1.7	1.1	1.8	675	69	123	17	5.7	4.9	5.0
15	.37	1.5	1.8	1.1	1.7	639	48	111	16	5.5	4.6	5.6
16	.47	1.5	1.8	1.1	1.7	416	50	103	15	5.4	4.3	7.9
17	.88	1.5	1.8	1.1	1.6	339	65	98	13	5.3	4.0	17
18	1.2	1.5	1.7	1.2	1.6	257	79	94	12	5.7	4.1	27
19	1.3	1.5	1.7	1.2	1.6	205	101	90	11	6.4	4.0	105
20	1.2	1.5	1.7	1.4	1.6	191	201	87	10	5.7	3.9	100
21	1.1	1.5	1.6	1.5	1.6	169	279	84	9.9	6.1	3.7	77
22	1.0	1.5	1.6	1.7	1.7	163	293	81	9.4	13	3.9	61
23	1.5	1.4	1.5	2.2	1.7	153	221	82	9.1	17	3.7	46
24	3.2	1.4	1.5	2.5	1.8	158	185	80	8.6	15	3.7	38
25	3.4	1.3	1.4	2.7	1.8	149	160	78	8.3	12	3.8	34
26	2.8	1.3	1.4	2.7	1.9	134	141	77	7.9	10	4.2	42
27	2.3	1.3	1.3	2.5	2.0	124	136	77	7.9	9.2	4.9	40
28	2.2	1.3	1.3	2.3	4.0	116	133	77	8.1	9.9	6.8	38
29	2.2	1.3	1.3	2.2	---	111	131	76	7.8	9.5	6.6	40
30	2.0	1.2	1.3	2.2	---	106	128	72	7.7	9.4	6.1	38
31	1.9	---	1.3	2.2	---	102	---	66	---	7.9	5.8	---
TOTAL	31.17	46.4	44.2	48.4	55.8	9507	3600	3267	616.7	245.1	157.4	803.6
MEAN	1.01	1.55	1.43	1.56	1.99	307	120	105	20.6	7.91	5.08	26.8
MAX	3.4	2.1	1.8	2.7	4.0	700	293	208	60	17	6.8	105
MIN	.08	1.2	1.2	1.1	1.6	50	48	66	7.7	5.3	3.7	5.0
AC-FT	62	92	88	96	111	18860	7140	6480	1220	486	312	1590
CAL YR 1985	TOTAL	4355.17		MEAN	11.9	MAX	300	MIN	.02	AC-FT	8640	
WTR YR 1986	TOTAL	18422.77		MEAN	50.5	MAX	700	MIN	.08	AC-FT	36540	

## 06354500 BEAVER CREEK AT LINTON, ND--CONTINUED

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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)	
DEC 16...	1310	1.7	1400	--	-11.5	0.5	--	--	--	--	--	
FEB 06...	1140	2.2	1300	--	-7.5	0.5	--	--	--	--	--	
MAR 04...	1243	633	145	7.89	10.0	1.0	42	2	10	4.0	9.0	
MAR 10...	1255	298	220	--	6.5	0.5	--	--	--	--	--	
APR 28...	1250	133	670	--	11.5	7.5	--	--	--	--	--	
JUN 17...	1300	13	975	--	25.5	21.0	--	--	--	--	--	
JUL 30...	1215	9.4	990	--	24.0	20.0	--	--	--	--	--	
SEP 23...	1515	43	1060	7.52	--	20.0	100	--	21	12	67	
DATE		PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINEITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR 04...	28	0.6	7.6	40		21	0.6	0.1	5.7	97	82	0.13
SEP 23...	56	3	10	160		94	4.7	0.1	9.0	322	320	0.44
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)	
MAR 04...		1	70	280		1	12	10	0.2	<1	<1	59
SEP 23...		2	190	310		<1	61	10	0.1	3	<1	140

## GRAND RIVER BASIN

06354988 BOWMAN-HALEY LAKE NEAR HALEY, ND

LOCATION.--Lat 45°59'06", long 103°14'43", in NE¼ sec.24, T.129 N., R.101 W., Bowman County, Hydrologic Unit 10130301, at dam on North Fork Grand River, and 6 mi west of Haley.

DRAINAGE AREA.--446 mi<sup>2</sup>, approximately.

## RESERVOIR-ELEVATION AND CONTENTS RECORDS

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

GAGE.--Water-stage recorder. Datum of gage is at National Geodetic Vertical Datum of 1929.

REMARKS.--Reservoir is formed by a rolled earth-fill dam; storage began Aug. 22, 1966; dam completed April 1967. Total capacity is 93,000 acre-ft at maximum pool, elevation, 2,777.0 ft. Dead storage is 4,280 acre-ft below lowest point of outlet, elevation, 2,740.0 ft. Normal operating storage is 20,100 acre-ft at elevation 2,755.0 ft, crest of spillway. Figures given herein represent total contents. Controlled releases are through a 30-inch or 8-inch gate valve. The spillway is uncontrolled "glory hole" type and discharges through a conduit 9 ft in diameter. The reservoir is for flood control, water supply, and recreation.

COOPERATION.--Records of elevations and contents furnished by U.S. Army Corps of Engineers. Elevations affected by wind.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 37,540 acre-ft, Mar. 28, 1978, elevation, 2,762.66 ft; minimum since first reaching spillway level, 12,660 acre-ft, Sept. 16-20, 1982, elevation, 2,749.93 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 23,040 acre-ft, Mar. 7, elevation, 2,757.08 ft; minimum, 14,560 acre-ft, Jan. 1, elevation, 2,752.10 ft (estimated).

## MONTHEND ELEVATION AND CONTENTS AT 2400, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30-----	2,753.12	16,040	--
Oct. 31-----	2,752.45	15,070	-970
Nov. 30-----	*2,752.13	14,610	-460
Dec. 31-----	*2,752.20	14,710	+100
CAL YR 1985-----	--	--	-3,070
Jan. 31-----	*2,752.20	14,710	0
Feb. 28-----	2,753.00	15,860	+1,150
Mar. 31-----	2,755.58	20,160	+4,300
Apr. 30-----	2,755.60	20,200	+40
May 31-----	2,755.30	19,650	-550
June 30-----	2,755.00	19,100	-550
July 31-----	2,754.49	18,240	-860
Aug. 31-----	2,754.25	17,840	-400
Sept. 30-----	2,755.00	19,100	+1,260
WTR YR 1986-----	--	--	+3,060

\* - Estimated



## GRAND RIVER BASIN

297

06355000 NORTH FORK GRAND RIVER AT HALEY, ND

LOCATION.--Lat 45°57'39", long 103°07'09", at southwest corner of sec.30, T.129 N., R.99 W., Bowman County, Hydrologic Unit 10130301, on left bank 10 ft downstream from county highway bridge, 300 ft south of post office at Haley, and 1 mi north of South Dakota state line.

DRAINAGE AREA.--509 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--May 1908 to September 1917, October 1945 to current year. Monthly discharge only for some periods, published in WSP 1309.

REVISED RECORDS (WATER YEARS).--WSP 1239: 1908-10, 1913-15(M), 1917(M).

GAGE.--Water-stage recorder. Datum of gage is 2,658.60 ft above National Geodetic Vertical Datum of 1929. Oct. 23, 1945 to June 18, 1951, nonrecording gage on downstream side of bridge near left abutment at present datum. See WSP 1729 or 1917 for history of changes prior to Oct. 23, 1945.

REMARKS.--Estimated daily discharges: Nov. 8 to Mar. 11, Apr. 15, June 16, 20. Records good except those for period of ice effect, Nov. 8 to Mar. 11, which are poor. Flow regulated since August 1966 by Bowman-Haley Lake (station 06354988) 8 mi upstream.

AVERAGE DISCHARGE.--50 years (water years 1908-17, 1946-86), 27.5 ft<sup>3</sup>/s, 19,900 acre-ft/yr; median of yearly mean discharges, 21 ft<sup>3</sup>/s, 15,200 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 14,100 ft<sup>3</sup>/s, Apr. 7, 1952, gage height, 17.03 ft, from rating curve extended above 4,500 ft<sup>3</sup>/s on basis of discharge measurement at gage height, 15.09 ft, half of which was indirect measurement of flow over roadway outside of main channel; maximum gage height, 17.10 ft, Apr. 15, 1950; no flow at times.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, about 750 ft<sup>3</sup>/s, Mar. 7, gage height, 11.10 ft, backwater from ice; minimum daily discharge, .40 ft<sup>3</sup>/s, Dec. 2, 11, 12.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.5	49	.50	1.0	4.0	10	51	46	24	3.4	1.7	1.0
2	1.5	50	.40	1.1	3.8	13	47	38	22	2.9	1.6	1.0
3	1.5	43	.50	1.2	3.9	20	47	34	23	3.1	1.5	1.2
4	1.6	46	.60	1.4	4.6	16	45	33	20	2.9	1.3	1.3
5	1.6	51	.90	1.6	5.5	200	47	35	19	3.7	1.5	1.3
6	1.6	50	1.1	1.4	6.0	500	48	51	17	3.4	1.5	1.5
7	1.6	50	.90	1.1	5.2	700	48	25	16	3.2	1.5	1.5
8	1.6	40	.80	.90	5.0	700	48	26	14	2.2	1.5	1.5
9	1.6	17	.60	1.5	5.0	600	49	43	14	2.1	1.5	1.5
10	1.8	8.5	.50	2.1	4.9	550	49	202	13	2.0	1.5	1.5
11	1.5	5.5	.40	1.5	4.7	350	48	409	12	2.0	1.5	1.6
12	1.3	5.0	.40	2.1	4.7	344	47	394	11	2.0	1.5	1.8
13	1.6	3.5	.60	2.0	4.8	344	40	324	9.9	2.0	1.8	1.9
14	1.3	4.0	.90	1.8	5.0	317	24	276	8.6	2.2	1.8	2.0
15	1.1	3.5	1.1	2.2	5.1	281	20	223	8.1	2.2	1.8	2.0
16	1.3	3.0	1.2	2.0	5.5	254	37	180	11	2.2	1.8	2.0
17	1.2	2.5	.90	2.2	6.0	229	32	141	8.1	2.2	1.7	2.0
18	1.1	2.0	.50	2.5	5.2	205	40	114	7.7	2.0	1.6	2.0
19	1.3	1.5	.50	2.2	4.7	181	64	97	6.2	1.8	1.6	2.0
20	1.9	1.0	.60	2.8	4.4	159	85	84	9.6	1.8	1.5	2.2
21	1.0	1.1	.70	4.0	5.5	142	88	73	8.3	1.8	1.5	2.4
22	.76	1.0	1.0	3.0	6.0	126	86	64	8.1	1.8	1.5	2.4
23	25	.90	1.3	2.5	7.0	113	82	61	9.0	35	1.5	2.4
24	47	.80	1.5	2.5	6.0	104	75	54	7.2	62	1.5	2.7
25	48	.80	1.5	2.8	5.5	99	68	46	5.9	15	1.5	2.8
26	49	.80	1.4	3.2	6.8	90	64	41	5.9	4.5	1.3	3.3
27	49	.80	1.1	3.1	7.8	61	59	37	5.6	3.2	1.2	3.7
28	48	.80	.90	2.9	9.0	59	54	33	4.9	2.7	1.1	3.7
29	49	.70	1.0	3.1	---	57	50	31	4.6	2.2	1.0	3.6
30	49	.60	1.2	4.2	---	56	48	28	4.0	1.8	1.0	3.9
31	49	---	1.1	4.4	---	55	---	26	---	1.8	1.0	---
TOTAL	444.26	444.30	26.60	70.30	151.6	6935	1590	3269	337.7	181.1	45.8	63.7
MEAN	14.3	14.8	.86	2.27	5.41	224	53.0	105	11.3	5.84	1.48	2.12
MAX	49	51	1.5	4.4	9.0	700	88	409	24	62	1.8	3.9
MIN	.76	.60	.40	.90	3.8	10	20	25	4.0	1.8	1.0	1.0
AC-FT	881	881	53	139	301	13760	3150	6480	670	359	91	126
CAL YR 1985	TOTAL	2415.84		MEAN	6.62	MAX	90	MIN	.17	AC-FT	4790	
WTR YR 1986	TOTAL	13559.36		MEAN	37.1	MAX	700	MIN	.40	AC-FT	26890	

## GRAND RIVER BASIN

06355000 NORTH FORK GRAND RIVER AT HALEY, ND--CONTINUED

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1951, 1972 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	OXYGEN, DIS- SOLVED (MG/L) (00300)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	
DATE	TIME											
OCT												
10...	1650	1.7	2760	8.20	13.0	7.0	12.4	--	--	--	--	
NOV												
04...	1400	50	2740	--	20.5	7.0	--	--	--	--	--	
21...	1435	0.99	3100	--	-10.0	0.0	--	--	--	--	--	
JAN												
17...	1500	2.3	2680	--	2.0	0.0	--	--	--	--	--	
MAR												
*12...	1315	342	1210	8.00	2.5	6.5	--	180	16	27	27	
12...	1316	342	1210	8.00	2.5	6.5	--	190	190	33	26	
MAY												
08...	1130	26	1920	--	5.0	5.5	--	--	--	--	--	
30...	1145	29	1950	--	28.0	22.0	--	--	--	--	--	
JUL												
08...	1640	2.2	2440	--	28.0	27.0	--	--	--	--	--	
AUG												
*27...	1730	1.1	2630	8.70	21.0	21.5	--	340	--	56	48	
27...	1731	1.1	2630	8.70	21.0	21.5	--	320	320	52	45	
DATE		SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTITU- ENTS, DIS- SOLVED (MG/L) (70301)
MAR												
*12...	190	69	6	8.7	160	420	8.5	0.2	4.7	799	780	
12...	190	67	6	8.0	150	400	5.8	0.2	5.0	794	760	
AUG												
*27...	490	75	12	12	430	1000	9.3	0.6	4.8	1860	1900	
27...	510	77	13	8.9	420	950	11	0.6	4.4	1980	1800	
DATE		SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	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												
*12...	1.1	1	330	50	<1	17	70	0.1	3	<1	280	
12...	1.1	2	300	140	<1	19	48	--	4	<1	270	
AUG												
*27...	2.5	1	910	30	1	56	20	0.2	8	1	800	
27...	2.7	1	1400	<10	<5	60	10	--	10	<1	840	

\*Split sample - analysis by North Dakota State Water Commission Laboratory.

## GRAND RIVER BASIN

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## 06355310 BUFFALO CREEK TRIBUTARY NEAR GASCOYNE, ND

LOCATION.--Lat 46°06'40", long 103°02'20", in SE1/4NE1/4 sec.3, T.130 N., R.99 W., Bowman County, Hydrologic Unit 10130301, on left bank 46 ft downstream from Chicago, Milwaukee, St. Paul, Pacific Railway bridge, and 1.8 mi east of Gascoyne.

DRAINAGE AREA.--15.7 mi<sup>2</sup>.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1974 to current year.

REVISED RECORDS.--WDR ND-76-1: 1975.

GAGE.--Water-stage recorder. Elevation of gage is 2,725 ft, from topographic map.

REMARKS.--Estimated daily discharges: Nov. 7 to Mar. 5. Records good except those for Feb. 26 to Mar. 6, which are poor. Some regulation by strip mine upstream from station.

AVERAGE DISCHARGE.--12 years, 1.12 ft<sup>3</sup>/s, 811 acre-ft/yr; median of yearly mean discharges, .9 ft<sup>3</sup>/s, 650 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 100 ft<sup>3</sup>/s, May 9, 1975, gage height, 8.41 ft; no flow at times most years.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 70 ft<sup>3</sup>/s, Mar. 5, gage height, 7.49 ft; no flow for many days.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.05	.00	.00	.00	12	.65	.26	.15	.00	.00	.00
2	.00	.07	.00	.00	.00	15	.59	.13	.08	.00	.00	.02
3	.00	.08	.00	.00	.00	17	.64	.10	.13	.00	.00	.08
4	.00	.11	.00	.00	.00	20	.75	.10	.13	.00	.00	.12
5	.00	.12	.00	.00	.00	30	1.1	.07	.06	.00	.00	.08
6	.00	.08	.00	.00	.00	24	.82	.05	.09	.00	.00	.07
7	.00	.08	.00	.00	.00	9.7	.50	.18	.29	.00	.00	.05
8	.00	.08	.00	.00	.00	7.0	.28	1.7	.19	.00	.00	.05
9	.00	.07	.00	.00	.00	7.5	.16	8.1	.11	.00	.00	.04
10	.00	.06	.00	.00	.00	5.4	.11	7.4	.11	.00	.00	.07
11	.00	.05	.00	.00	.00	4.8	.11	2.6	.09	.70	.00	.26
12	.00	.04	.00	.00	.00	7.2	.06	2.8	.05	.47	.00	.27
13	.00	.03	.00	.00	.00	6.5	.06	1.4	.03	.20	.00	.19
14	.00	.03	.00	.00	.00	5.1	.07	.73	.03	.11	.17	.15
15	.00	.02	.00	.00	.00	4.1	.13	.43	.03	.88	.15	.15
16	.00	.02	.00	.00	.00	3.2	.63	.26	.03	1.4	.07	.15
17	.00	.02	.00	.00	.00	3.2	1.6	.16	.03	1.2	.04	.18
18	.00	.01	.00	.00	.00	3.6	5.0	.10	.03	1.2	.03	.24
19	.01	.01	.00	.00	.00	3.5	2.9	.07	.02	1.0	.03	.65
20	.01	.00	.00	.00	.00	3.4	1.0	.05	.01	1.1	.03	2.4
21	.02	.00	.00	.00	.00	3.2	.52	.04	.04	1.3	.01	1.6
22	.02	.00	.00	.00	.00	2.8	.37	.04	.03	.63	.01	.63
23	.02	.00	.00	.00	.00	2.3	.26	.12	.03	.29	.00	.43
24	.03	.00	.00	.00	.00	2.2	.15	.10	.01	.15	.00	.50
25	.04	.00	.00	.00	.00	1.9	.22	.09	.02	.06	.00	4.2
26	.04	.00	.00	.00	2.0	1.1	.28	.06	.00	.04	.00	1.5
27	.04	.00	.00	.00	6.0	1.6	.50	.04	.00	.03	.00	.70
28	.06	.00	.00	.00	10	1.3	.67	.03	.00	.03	.00	.47
29	.05	.00	.00	.00	---	.97	.62	.11	.00	.02	.00	.75
30	.04	.00	.00	.00	---	.76	.53	.17	.00	.00	.00	2.2
31	.06	---	.00	.00	---	.89	---	.25	---	.00	.00	---
TOTAL	.44	1.03	.00	.00	18.00	211.22	21.28	27.74	1.82	10.81	.54	18.20
MEAN	.01	.03	.00	.00	.64	6.81	.71	.89	.06	.35	.02	.61
MAX	.06	.12	.00	.00	10	30	5.0	8.1	.29	1.4	.17	4.2
MIN	.00	.00	.00	.00	.00	.76	.06	.03	.00	.00	.00	.00
AC-FT	.9	2.0	.00	.00	36	419	42	55	3.6	21	1.1	36
CAL YR 1985	TOTAL	120.72		MEAN	.33	MAX	21	MIN	.00	AC-FT	239	
WTR YR 1986	TOTAL	311.08		MEAN	.85	MAX	30	MIN	.00	AC-FT	617	

## GRAND RIVER BASIN

06355310 BUFFALO CREEK TRIBUATRY NEAR GASCOYNE, ND--CONTINUED

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1974 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	
MAR	05...	1240	20	1120	8.00	8.0	1.5	11.6	92	250	150	41	37
MAY	06...	1445	0.05	6600	8.60	10.0	12.5	12.7	136	1800	1400	210	310
SEP	05...	1445	0.06	6100	8.70	8.0	12.5	9.4	99	1200	710	120	220
		SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	PERCENT SODIUM RATIO (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	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)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L) (70301)
MAR	05...	150	55	4	10	106	2.0	410	3.9	0.4	10	772	730
MAY	06...	1200	59	12	17	450	2.1	3800	14	0.7	0.8	6450	5800
SEP	05...	1300	70	17	22	499	1.9	3500	25	1.1	1.0	5000	5500
		SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)	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)	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BERYL- LIUM, TOTAL RECOV- ERABLE (UG/L AS BE) (01012)	BERYL- LIUM, DIS- SOLVED (UG/L AS BE) (01010)	BORON, DIS- SOLVED (UG/L AS B) (01020)
MAR	05...	1.0	41	2.00	0.11	1.5	0.35	0.24	3	2	<10	<0.5	350
MAY	06...	8.8	0.87	0.40	0.10	2.2	0.08	0.02	--	--	--	--	3700
SEP	05...	6.8	0.81	<0.10	0.09	4.1	0.19	0.03	9	7	<10	<10	4400
		CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD) (01027)	CADMIUM DIS- SOLVED (UG/L AS CD) (01025)	CHRO- MIUM, TOTAL RECOV- ERABLE (UG/L AS CR) (01034)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR) (01030)	COPPER, DIS- SOLVED (UG/L AS CU) (01040)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	LEAD, TOTAL RECOV- ERABLE (UG/L AS PB) (01051)	LEAD, DIS- SOLVED (UG/L AS PB) (01049)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MERCURY TOTAL RECOV- ERABLE (UG/L AS HG) (71900)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)	
MAR	05...	<1	<1	<10	<10	4	49	1	1	99	--	--	
MAY	06...	--	--	--	--	--	50	--	--	120	--	--	
SEP	05...	<1	<1	<10	<10	<1	70	<5	<5	40	0.1	<0.1	
		NICKEL, TOTAL RECOV- ERABLE (UG/L AS NI) (01067)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, TOTAL SOLVED (UG/L AS SE) (01147)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN) (01092)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C) (00681)	CYANIDE TOTAL (MG/L AS CN) (00720)	PHENOLS TOTAL (UG/L) (32730)	SEDI- MENT, SUS- PENDE (MG/L) (80154)	SEDI- MENT, DIS- CHARGE, SUS- PENDE (T/DAY) (80155)	
MAR	05...	16	<1	1	1	30	6	13	<0.01	1	116	6.2	
MAY	06...	--	--	--	--	--	--	50	--	--	38	0.01	
SEP	05...	12	9	<1	<1	40	20	60	<0.01	3	31	0.0	



## 06439980 LAKE OAHE NEAR PIERRE, SD

LOCATION.--Lat 44°27'30", long 100°23'29", in NE¼ sec.1, T.111 N., R.80 W., 5th principal meridian, Hughes County, Hydrologic Unit 10130105, in Pier A of Control Tower No. 1 of powerhouse intake structure of dam on Missouri River, 6.0 mi northwest of Pierre, 7.1 mi upstream from Bad River, and at mile 1,072.3.

DRAINAGE AREA.--243,500 mi<sup>2</sup>, approximately.

## RESERVOIR-ELEVATION AND CONTENTS RECORDS

PERIOD OF RECORD.--August 1958 to current year (monthend contents only). Prior to October 1967, published as Oahe Reservoir near Pierre.

GAGE.--Water-stage recorder. Datum of gage is National Geodetic Vertical Datum of 1929. Prior to Jan. 14, 1958, nonrecording gages at various locations upstream from outlet works, Jan. 14, 1959, to Sept. 30, 1962, recorder in Tower No. 1 of outlet works, all at same datum.

REMARKS.--Reservoir is formed by an earthfill dam; storage began in August 1958. Maximum capacity, 23,338,000 acre-ft below elevation 1,620.0 ft (top of spillway gates). Normal maximum, 22,240,000 acre-ft below 1,617.0 ft, of which about 2,390,000 acre-ft is designated for flood control. Inactive storage, 5,451,000 acre-ft below elevation 1,540.0 ft. Dead storage, 1,970 acre-ft below elevation 1,425.0 ft (invert of lowest outlet tunnel). Figures given herein represent elevations at powerhouse intake structure and total contents adjusted for wind effect.

The spillway consists of a gated chute with flat crest at elevation 1,596.5 ft, 8 gates, 50 by 23.5 ft each; design capacity, 300,000 ft<sup>3</sup>/s. The outlet works consist of 7 turbines with a generating capacity of 85,000 kilowatts each. Water is used for flood control, navigation, power, and incidental uses.

COOPERATION.--Records of elevation and contents provided by U.S. Army Corps of Engineers.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 22,764,000 acre-ft, May 14, 1986, affected by wind; minimum since initial filling, 14,815,000 acre-ft, Sept. 25, 1981.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 22,764,000 acre-ft, May 14; minimum contents, 16,366,000 acre-ft, Dec. 14.

## MONTHEND ELEVATION AND CONTENTS AT 2400 HOURS, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30 . . . . .	1,601.70	17,335,000	-
Oct. 31 . . . . .	1,601.16	17,127,000	-208,000
Nov. 30 . . . . .	1,599.20	16,597,000	-530,000
Dec. 31 . . . . .	1,598.92	16,543,000	-54,000
CAL YR 1985 . . . . .	-	-	-1,780,000
Jan. 31 . . . . .	1,601.43	17,246,000	+703,000
Feb. 28 . . . . .	1,603.86	17,953,000	+707,000
Mar. 31 . . . . .	1,611.88	20,390,000	+2,437,000
Apr. 30 . . . . .	1,616.43	21,964,000	+1,574,000
May 31 . . . . .	1,617.44	22,424,000	+460,000
June 30 . . . . .	1,616.96	22,204,000	-220,000
July 31 . . . . .	1,615.42	21,653,000	-551,000
Aug. 31 . . . . .	1,612.71	20,683,000	-970,000
Sept. 30 . . . . .	1,610.77	20,087,000	-596,000
WTR YR 1986 . . . . .	-	-	+2,752,000

NOTE.--Lake frozen over Dec. 31 to Mar. 30.



## JAMES RIVER BASIN

06467600 JAMES RIVER NEAR MANFRED, ND

LOCATION.--Lat 47°38'40", long 99°49'40", near midpoint of north line sec.15, T.148 N., R.72 W., Wells County, Hydrologic Unit 10160001, on right upstream wingwall of bridge on county highway, and 5 mi southwest of Manfred.

DRAINAGE AREA.--253 mi<sup>2</sup>, of which about 197 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1954 to August 1957 (annual maximum only), September 1957 to current year (seasonal records only from 1982 to 1985).

GAGE.--Water-stage recorder. Datum of gage is 1,605.73 ft above National Geodetic Vertical Datum of 1929. Prior to Sept. 16, 1957, crest-stage gage only on downstream side of bridge at same datum.

REMARKS.--Estimated daily discharges: Nov. 5-29, Feb. 25 to Mar. 10, and Apr. 14-16. Records good except those for periods of estimated daily discharges, which are poor.

AVERAGE DISCHARGE.--26 years (water years 1958-82, 1986), 3.66 ft<sup>3</sup>/s, 2,650 acre-ft/yr; median of yearly mean discharges, 3.4 ft<sup>3</sup>/s, 2,500 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, about 2,000 ft<sup>3</sup>/s, Apr. 18 or 19, 1979, gage height, 9.2 ft, from highwater mark, backwater from snow; no flow for long periods each year.

EXTREMES FOR CURRENT YEAR.--Peaks greater than a base of 30 ft<sup>3</sup>/s and maximum (\*):

Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)	Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)
Mar. 4	Unknown	*220	*ab6.10	Apr. 20	0800	100	3.45
Mar. 10	----	105	ice jam				

No flow for several months.

a - ice jam

b - floodmark

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.12	1.6	.00	.00	.00	.10	6.9	16	1.1	3.8	.54	.00
2	.11	1.5	.00	.00	.00	5.0	6.9	14	.93	2.7	.35	.00
3	.13	1.5	.00	.00	.00	100	9.8	12	.84	2.5	.22	.00
4	.16	1.7	.00	.00	.00	150	11	11	.65	2.3	.14	.00
5	.16	1.8	.00	.00	.00	100	11	10	.46	2.7	.09	.00
6	.18	1.9	.00	.00	.00	70	11	9.2	.43	2.1	.07	.00
7	.34	2.0	.00	.00	.00	65	9.9	8.9	.37	1.1	.06	.00
8	1.8	1.9	.00	.00	.00	60	9.0	8.9	.27	.69	.05	.00
9	4.5	1.7	.00	.00	.00	70	8.2	9.8	.29	.40	.01	.00
10	2.7	1.5	.00	.00	.00	100	7.5	9.4	.46	.50	.00	.00
11	2.1	1.2	.00	.00	.00	90	7.4	9.2	.49	.55	.00	.00
12	2.1	1.0	.00	.00	.00	74	7.1	8.6	.40	.90	.04	.00
13	5.3	.92	.00	.00	.00	81	7.0	7.8	.32	1.9	.00	.00
14	7.8	.86	.00	.00	.00	61	6.8	7.2	.73	2.1	.00	.00
15	6.3	.82	.00	.00	.00	58	6.5	6.5	1.3	2.1	.00	.00
16	4.5	.80	.00	.00	.00	55	6.2	5.9	1.5	2.1	.00	.00
17	3.5	.80	.00	.00	.00	51	20	5.9	1.4	1.9	.00	.00
18	3.1	.70	.00	.00	.00	44	38	5.3	1.3	1.5	.00	.00
19	2.6	.60	.00	.00	.00	32	50	5.1	.96	1.2	.00	.00
20	2.0	.50	.00	.00	.00	26	97	4.7	.84	.80	.00	.00
21	1.5	.40	.00	.00	.00	25	89	4.1	.89	.58	.00	.00
22	1.4	.30	.00	.00	.00	17	72	3.5	.69	.42	.00	.00
23	3.9	.20	.00	.00	.00	14	56	3.3	.65	.22	.00	.00
24	5.3	.15	.00	.00	.00	13	42	3.2	1.6	.10	.00	.00
25	4.8	.12	.00	.00	.01	12	32	3.2	2.7	.06	.00	.00
26	3.6	.10	.00	.00	.02	11	27	3.1	3.9	.10	.00	.00
27	3.3	.10	.00	.00	.03	9.8	22	2.9	4.7	2.2	.00	.00
28	3.0	.08	.00	.00	.05	9.2	20	2.6	2.9	1.5	.00	.00
29	2.3	.05	.00	.00	---	8.8	17	2.3	3.0	1.3	.00	.00
30	2.0	.00	.00	.00	---	8.1	17	1.9	4.1	.98	.00	.00
31	1.7	---	.00	.00	---	7.4	---	1.5	---	.74	.00	---
TOTAL	82.30	26.80	.00	.00	.11	1427.40	731.2	207.0	40.17	42.04	1.57	.00
MEAN	2.65	.89	.00	.00	.00	46.0	24.4	6.68	1.34	1.36	.05	.00
MAX	7.8	2.0	.00	.00	.05	150	97	16	4.7	3.8	.54	.00
MIN	.11	.00	.00	.00	.00	.10	6.2	1.5	.27	.06	.00	.00
AC-FT	163	53	.00	.00	.2	2830	1450	411	80	83	3.1	.00
WTR YR 1986	TOTAL	2558.59		MEAN	7.01	MAX	150	MIN	.00	AC-FT	5070	

## JAMES RIVER BASIN

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06467600 JAMES RIVER NEAR MANFRED, ND--CONTINUED

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1959-60, 1962-64, 1972 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	TUR- BID- ITY (NTU) (00076)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED SATUR- ATION (00301)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)
NOV 04...	1100	1.7	1060	8.22	3.0	3.5	3.3	13.4	102	280	0	57
MAR 03...	1205	73	250	--	4.0	1.0	--	--	--	--	--	--
27...	1430	9.5	580	8.34	20.0	6.0	15	13.2	105	200	0	42
APR 24...	1330	44	850	--	12.0	11.5	3.0	10.3	94	310	45	53
JUN 03...	1000	0.9	1180	8.20	22.0	20.0	3.0	5.8	64	340	0	64
JUL 10...	1030	0.5	960	7.92	20.0	21.0	4.0	4.6	52	280	0	55

DATE	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	SILICA, DIS- SOLVED (MG/L AS SiO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)
NOV 04...	33	130	50	3	8.1	397	4.6	170	15	14	699
MAR 27...	23	49	33	2	11	--	0	92	7.0	16	383
APR 24...	42	66	31	2	15	260	--	200	7.7	18	583
JUN 03...	43	130	45	3	11	466	5.7	170	11	9.4	759
JUL 10...	35	120	47	3	11	--	0	140	10	13	597

DATE	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	SOLIDS, RESIDUE AT 105 DEG. C, SUS- PENDED (MG/L) (00530)	NITRO- GEN, NITRITE TOTAL (MG/L AS N) (00615)	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)	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)
NOV 04...	670	0.95	3.2	9	--	<0.01	--	<0.10	--	0.02	0.006
MAR 27...	--	0.52	9.8	5	<0.01	<0.01	<0.10	<0.10	0.15	0.10	0.074
APR 24...	560	0.79	69	--	--	0.01	--	<0.10	--	0.05	0.023
JUN 03...	720	1.0	1.8	3	--	<0.01	--	<0.10	--	0.25	0.25
JUL 10...	--	0.81	0.81	13	--	<0.01	--	<0.10	--	0.18	0.155

DATE	ANTI- MONY, TOTAL (UG/L AS SB) (01097)	ANTI- MONY, DIS- SOLVED (UG/L AS SB) (01095)	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BARIUM, TOTAL RECOV- ERABLE (UG/L AS BA) (01007)	BARIUM, DIS- SOLVED (UG/L AS BA) (01005)	BERYL- LIUM, TOTAL RECOV- ERABLE (UG/L AS BE) (01012)	BERYL- LIUM, DIS- SOLVED (UG/L AS BE) (01010)	BORON, TOTAL RECOV- ERABLE (UG/L AS B) (01022)	BORON, DIS- SOLVED (UG/L AS B) (01020)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD) (01027)
MAR 27...	<1	<1	2	2	<100	55	<10	<0.5	130	110	<1
APR 24...	--	<1	--	2	--	86	--	<0.5	--	130	--
JUN 03...	--	<1	--	6	--	87	--	<0.5	--	400	--
JUL 10...	--	<1	--	4	--	100	--	<0.5	--	410	--

06467600 JAMES RIVER NEAR MANFRED, ND--CONTINUED

## WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

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)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)	NICKEL, TOTAL RECOV- ERABLE (UG/L AS NI) (01067)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, TOTAL (UG/L AS SE) (01147)
NOV 04...	--	--	--	1	44	1	52	0.2	--	--	--
MAR 27...	<1	<1	<3	3	80	1	34	--	1	4	<1
APR 24...	<1	<1	<3	2	33	<1	9	0.1	--	1	--
JUN 03...	<1	<1	<3	4	52	<1	300	0.1	--	5	--
JUL 10...	<1	1	<3	1	47	<5	230	0.1	--	2	--
DATE	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG) (01077)	SILVER, DIS- SOLVED (UG/L AS AG) (01075)	THAL- LIUM, TOTAL (UG/L AS TL) (01059)	THAL- LIUM, DIS- SOLVED (UG/L AS TL) (01057)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	CYANIDE TOTAL (MG/L AS CN) (00720)	CYANIDE DIS- SOLVED (MG/L AS CN) (00723)	SEDI- MENT, DIS- SUS- PENDE (MG/L) (80154)	SEDI- MENT, DIS- CHARGE, SUS- PENDE (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN (70331)
NOV 04...	<1	--	--	--	--	3	--	--	--	--	--
MAR 27...	<1	<1	<1	<1	<1	11	<0.01	<0.01	2	0.06	54
APR 24...	<1	--	<1	--	<1	16	--	<0.01	5	0.59	83
JUN 03...	<1	--	<1	--	--	8	--	--	47	0.11	83
JUL 10...	<1	--	<1	--	<1	9	--	<0.01	13	0.02	100

06468170 JAMES RIVER NEAR GRACE CITY, ND

LOCATION.--Lat 47°33'29", long 98°51'45", in NW1/4NW1/4NW1/4 sec.17, T.147 N., R.64 W., Foster County, Hydrologic Unit 10160001, on left bank on downstream side of county highway bridge, and 2.5 mi northwest of Grace City.

DRAINAGE AREA.--1,060 mi<sup>2</sup>, approximately, of which about 650 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--June 1968 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,457.60 ft, above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Nov. 1 to Mar. 21 and July 10 to Sept. 30. Records fair except those for periods of estimated discharge, which are poor.

AVERAGE DISCHARGE.--17 years, 31.8 ft<sup>3</sup>/s, 23,090 acre-ft/yr; median of yearly mean discharges, 26 ft<sup>3</sup>/s, 18,800 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,100 ft<sup>3</sup>/s, Apr. 13, 1969, gage height, 12.00 ft; no flow at times most years.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 200 ft<sup>3</sup>/s and maximum (\*):

Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)	Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)
Mar. 15	0215	*900	a*10.33	Apr. 27	1330	204	6.26

No flow for many days.

a - Backwater from ice

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.24	.09	.00	.00	.00	.25	100	156	9.9	3.4	.80	.00
2	.21	.09	.00	.00	.00	.35	98	146	11	3.4	.75	.00
3	.19	.09	.00	.00	.00	.45	95	128	8.1	3.2	.70	.00
4	.32	.08	.00	.00	.00	.48	100	108	6.9	3.0	.65	.00
5	.64	.08	.00	.00	.00	.50	100	98	6.8	2.8	.65	.00
6	.77	.08	.00	.00	.00	.50	95	94	5.8	2.5	.65	.00
7	.90	.07	.00	.00	.00	.60	90	86	7.0	2.0	.60	.00
8	2.2	.06	.00	.00	.00	.70	85	81	6.2	1.5	.55	.00
9	2.7	.05	.00	.00	.00	.80	83	80	4.5	1.0	.50	.00
10	3.6	.04	.00	.00	.00	.90	80	68	3.6	1.5	.45	.00
11	2.8	.03	.00	.00	.00	1.0	78	75	3.1	1.5	.40	.00
12	2.7	.03	.00	.00	.00	10	76	77	2.5	2.0	.35	.00
13	2.2	.02	.00	.00	.00	50	74	67	2.3	2.5	.30	.00
14	2.5	.02	.00	.00	.00	300	72	59	2.7	2.6	.25	.00
15	3.0	.01	.00	.00	.00	800	70	56	2.3	2.6	.20	.00
16	2.5	.01	.00	.00	.00	650	68	49	2.2	2.5	.15	.00
17	2.0	.01	.00	.00	.00	600	85	44	2.5	2.3	.10	.00
18	1.0	.00	.00	.00	.00	550	100	42	2.4	2.1	.00	.00
19	.80	.00	.00	.00	.00	500	130	39	2.0	1.9	.00	.00
20	.70	.00	.00	.00	.00	440	160	35	3.1	1.7	.00	.00
21	.70	.00	.00	.00	.00	380	200	32	4.0	1.5	.00	.00
22	.80	.00	.00	.00	.05	320	180	31	4.0	1.3	.00	.00
23	1.0	.00	.00	.00	.10	280	165	29	3.4	1.0	.00	.00
24	.90	.00	.00	.00	.20	250	150	26	3.9	.90	.00	.00
25	.80	.00	.00	.00	.22	220	154	24	4.2	.80	.00	.10
26	.60	.00	.00	.00	.24	200	163	24	4.2	1.0	.00	.05
27	.50	.00	.00	.00	.25	193	198	22	3.8	1.3	.00	.00
28	.40	.00	.00	.00	.23	158	204	20	3.7	1.2	.00	.00
29	.20	.00	.00	.00	---	147	194	18	3.4	1.0	.00	.00
30	.10	.00	.00	.00	---	130	167	13	3.4	.90	.00	.00
31	.10	---	.00	.00	---	115	---	11	---	.85	.00	---
TOTAL	38.07	.86	.00	.00	1.29	6299.53	3614	1838	132.9	57.75	8.05	.15
MEAN	1.23	.03	.00	.00	.05	203	120	59.3	4.43	1.86	.26	.00
MAX	3.6	.09	.00	.00	.25	800	204	156	11	3.4	.80	.10
MIN	.10	.00	.00	.00	.00	.25	68	11	2.0	.80	.00	.00
AC-FT	76	1.7	.00	.00	2.6	12500	7170	3650	264	115	16	.3
CAL YR 1985	TOTAL	3394.88		MEAN	9.30	MAX	144	MIN	.00	AC-FT	6730	
WTR YR 1986	TOTAL	11990.60		MEAN	32.9	MAX	800	MIN	.00	AC-FT	23780	



## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	TUR- BID- ITY (NTU) (00076)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED SATUR- ATION (00301)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCARB TOT FLD MG/L AS (00902)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)
MAR												
17...	1400	601	350	--	5.0	1.0	--	--	--	--	--	--
27...	1145	202	360	8.39	10.0	3.5	22	12.6	93	130	0	27
APR												
24...	0900	147	640	--	10.0	10.0	2.3	9.0	79	230	19	43
JUN												
03...	1615	7.8	1000	9.05	28.0	24.0	2.5	11.5	136	320	0	55
JUL												
09...	1600	1.0	940	9.92	250.0	24.0	13	10.8	127	210	0	25
		MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)
MAR												
27...		15	18	21	0.7	14	130	1.0	54	1.8	13	239
APR												
24...		30	46	29	1	12	212	--	130	9.5	13	427
JUN												
03...		45	100	39	2	15	358	0.6	190	17	2.0	693
JUL												
09...		37	130	55	4	16	--	0	190	25	4.3	632
		SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	SOLIDS, RESIDUE AT 105 DEG. C, SUS- PENDED (MG/L) (00530)	NITRO- GEN, NITRITE TOTAL (MG/L AS N) (00615)	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)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P) (00665)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHORUS, ORTHO, DIS- SOLVED (MG/L AS P) (00671)
MAR												
27...		220	0.33	130	--	--	<0.01	--	<0.10	--	0.14	0.089
APR												
24...		410	0.58	169	1	0.01	0.01	<0.10	<0.10	0.14	0.11	0.085
JUN												
03...		640	0.94	15	<1	--	<0.01	--	<0.10	--	0.26	0.084
JUL												
09...		--	0.86	1.7	27	--	<0.01	--	<0.10	--	0.15	0.113
		ANTI- MONY, TOTAL (UG/L AS SB) (01097)	ANTI- MONY, DIS- SOLVED (UG/L AS SB) (01095)	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BARIUM, TOTAL RECOV- ERABLE (UG/L AS BA) (01007)	BARIUM, DIS- SOLVED (UG/L AS BA) (01005)	BERYL- LIUM, TOTAL RECOV- ERABLE (UG/L AS BE) (01012)	BERYL- LIUM, DIS- SOLVED (UG/L AS BE) (01010)	BORON, TOTAL RECOV- ERABLE (UG/L AS B) (01022)	BORON, DIS- SOLVED (UG/L AS B) (01020)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD) (01027)
MAR												
27...		--	<1	--	2	--	48	--	<0.5	--	50	--
APR												
24...		<1	<1	3	2	100	62	<10	<0.5	50	70	<1
JUN												
03...		--	<1	--	6	--	66	--	<0.5	--	150	--
JUL												
09...		--	<1	--	9	--	49	--	<0.5	--	180	--



## JAMES RIVER BASIN

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06468170 JAMES RIVER NEAR GRACE CITY, ND--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

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)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)	NICKEL, TOTAL RECOV- ERABLE (UG/L AS NI) (01067)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, TOTAL (UG/L AS SE) (01147)
MAR 27...	<1	<1	<3	3	55	<1	19	0.2	--	1	--
APR 24...	<1	1	<3	2	35	1	13	0.1	10	2	<1
JUN 03...	<1	<1	<3	2	19	<1	55	0.1	--	3	--
JUL 09...	<1	<1	<3	1	6	<5	8	0.1	--	2	--
DATE	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG) (01077)	SILVER, DIS- SOLVED (UG/L AS AG) (01075)	THAL- LIUM, TOTAL (UG/L AS TL) (01059)	THAL- LIUM, DIS- SOLVED (UG/L AS TL) (01057)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	CYANIDE TOTAL (MG/L AS CN) (00720)	CYANIDE DIS- SOLVED (MG/L AS CN) (00723)	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)
MAR 27...	<1	--	<1	--	<1	10	--	<0.01	6	3.3	86
APR 24...	<1	<1	<1	<1	<1	8	<0.01	<0.01	4	1.4	87
JUN 03...	<1	--	<1	--	--	6	--	--	7	0.14	92
JUL 09...	<1	--	<1	--	<1	7	--	<0.01	21	0.06	100

## JAMES RIVER BASIN

06468190 LAKE JUANITA TRIBUTARY NEAR GRACE CITY, ND

LOCATION.--Lat 47°32'54", long 98°45'31", in SW1/4NE1/4SE1/4 sec.13, T.147 N., R.64 W., Foster County, Hydrologic Unit 10160001, on left bank 1,000 ft upstream from Lake Juanita, 2 mi east of Grace City.

DRAINAGE AREA.--94 mi<sup>2</sup>, approximately, of which about 54 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--March 1986 to September 1986.

GAGE.--Water-stage recorder. Datum of gage is 1,460.00 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Mar. 23-26, Apr. 14, 15, Apr. 17-22, Apr. 27 to May 2, May 13, 14, July 12-20, and July 26-28. Records poor.

EXTREMES FOR CURRENT PERIOD.--Peak discharges greater than base of 30 ft<sup>3</sup>/s and maximum (\*):

Date	Time	Discharge (ft <sup>3</sup> /s)	Gage Height (ft)	Date	Time	Discharge (ft <sup>3</sup> /s)	Gage Height (ft)
Mar. 13	0715	*62	*19.34	Mar. 19	1630	36	19.17

No flow for several months.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1						.00	1.3	9.0	.04	.00	.05	.00
2						.00	1.3	8.0	.02	.00	.02	.00
3						.02	2.0	6.5	.00	.00	.00	.00
4						.32	2.4	4.0	.00	.00	.00	.00
5						.74	2.7	2.3	.00	.00	.00	.00
6						1.1-	2.9	1.5	.00	.00	.00	.00
7						3.5	2.9	1.1	.00	.00	.00	.00
8						5.7	2.3	1.0	.00	.00	.00	.00
9						7.5	1.9	1.6	.00	.00	.00	.00
10						7.1	1.8	2.1	.00	.76	.00	.00
11						6.2	1.6	3.6	.00	.32	.00	.00
12						11	1.5	7.9	.00	7.8	.00	.00
13						34	1.4	11	.00	11	.00	.02
14						7.0	1.3	10	.00	12	.00	.02
15						12	1.2	7.1	.00	10	.00	.02
16						14	1.1	3.6	.00	12	.00	.00
17						19	7.0	1.6	.00	11	.00	.00
18						22	10	.77	.00	10	.00	.02
19						14	14	.45	.00	10	.00	.05
20						11	12	.19	.00	10	.00	.05
21						9.4	10	.06	.00	10	.00	.13
22						8.6	8.0	.03	.00	6.1	.00	.26
23						7.0	6.4	.02	.00	4.1	.00	.30
24						5.0	3.9	.02	.00	2.6	.00	.21
25						4.0	3.3	.02	.00	1.5	.00	.42
26						3.0	4.4	.03	.00	3.5	.00	.43
27						2.8	9.0	.04	.00	10	.00	.49
28						2.5	11	.02	.00	11	.00	.41
29						1.9	10	.02	.00	1.4	.00	.34
30						1.7	9.5	.03	.00	.72	.00	.30
31						1.7	---	.07	---	.31	.00	---
TOTAL						223.78	148.1	83.67	.06	146.11	.07	3.47
MEAN						7.22	4.94	2.70	.00	4.71	.00	.12
MAX						34	14	11	.04	12	.05	.49
MIN						.00	1.1	.02	.00	.00	.00	.00

06468190 LAKE JUANITA TRIBUTARY NEAR GRACE CITY, ND--CONTINUED

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--March 1986 to September 1986.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	TUR- BID- ITY (NTU) (00076)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	
MAR 27...	0900	3.1	400	7.75	3.0	2.0	12	10.2	73	160	0	
APR 23...	1600	6.4	710	--	25.0	16.0	1.9	12.4	126	230	0	
DATE	TIME	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)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION (MG/L AS K) (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)
MAR 27...	38	15	22	22	0.8	7.2	161	5.5	35	6.0	15	
APR 23...	46	29	62	36	2	7.2	239	--	120	24	23	
DATE	TIME	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHORUS, ORTHO, DIS- SOLVED (MG/L AS P) (00671)	ANTI- MONY, DIS- SOLVED (UG/L AS SB) (01095)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	
MAR 27...	255	240	0.35	2.1	<0.01	<0.10	0.05	0.021	<1	<1		
APR 23...	464	450	0.63	8.0	0.01	<0.10	0.02	0.008	<1	<1		
DATE	TIME	BARIUM, DIS- SOLVED (UG/L AS BA) (01005)	BERYL- LIUM, DIS- SOLVED (UG/L AS BE) (01010)	BORON, DIS- SOLVED (UG/L AS B) (01020)	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)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	
MAR 27...	62	<0.5	40	<1	<1	<3	2	130	1	71		
APR 23...	62	<0.5	60	<1	<1	<3	4	77	<1	22		
DATE	TIME	MERCURY DIS- SOLVED (UG/L AS HG) (71890)	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)	THAL- LIUM, DIS- SOLVED (UG/L AS TL) (01057)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	CYANIDE DIS- SOLVED (MG/L AS CN) (00723)	SEDI- MENT, DIS- SUS- PENDE (MG/L) (80154)	SEDI- MENT, DIS- CHARGE, SUS- PENDE (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)	
MAR 27...	0.2	<1	<1	<1	<1	<1	11	<0.01	1	0.01	67	
APR 23...	0.1	2	<1	<1	<1	<1	6	<0.01	7	0.12	--	

06468250 JAMES RIVER ABOVE ARROWWOOD LAKE NEAR KENSAL, ND

LOCATION.--Lat 47°23'59", long 98°47'50", in SW1/4SW1/4SW1/4 sec.2, T.145 N., R.64 W., Foster County, Hydrologic Unit 10160003, on right bank 30 ft upstream from bridge on county road 8 mi northwest of Kensal.

DRAINAGE AREA.--1,200 mi<sup>2</sup>, approximately, of which about 750 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1985 to September 1986.

GAGE.--Water-stage recorder. Elevation of gage is 1,440.00 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Feb. 15 to Mar. 9 and Apr. 14-17. Records good except those for periods of estimated daily discharges, which are fair.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 763 ft<sup>3</sup>/s, Mar. 16, 1986, gage height 7.75 ft; no flow at times most years.

EXTREMES FOR CURRENT PERIOD.--Peak discharges greater than base of 200 ft<sup>3</sup>/s and maximum (\*):

Date	Time	Discharge (ft <sup>3</sup> /s)	Gage Height (ft)	Date	Time	Discharge (ft <sup>3</sup> /s)	Gage Height (ft)
Mar. 16	1445	*763	*7.75	Apr. 30	0745	233	4.20

No flow Oct. 1-12.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.81	1.6	.73	.55	.70	160	222	26	.37	2.8	.47
2	.00	.63	1.5	.73	.53	2.0	136	198	24	1.3	2.4	1.6
3	.00	.56	1.5	.73	.58	10	129	174	18	5.1	.68	2.2
4	.00	.52	1.5	.73	.59	13	115	145	14	1.1	.31	1.0
5	.00	.56	1.4	.73	.59	14	100	138	15	.24	.21	1.1
6	.00	.73	1.3	.73	.63	13	90	104	14	2.3	.24	.81
7	.00	.68	1.2	.69	.66	12	82	108	13	3.2	1.5	.98
8	.00	.50	1.2	.61	.66	11	79	102	13	1.0	.91	1.1
9	.00	.48	1.2	.59	.66	10	73	99	12	.53	1.7	.94
10	.00	.56	1.2	.64	.66	8.3	66	84	10	4.0	2.7	1.2
11	.00	.56	1.2	.73	.67	20	62	83	8.6	10	.88	1.6
12	.00	.52	1.1	.87	.68	19	61	85	8.1	8.6	.50	2.7
13	.18	.45	1.1	.89	.65	31	59	101	5.4	7.0	.64	2.7
14	.30	.50	.99	.85	.69	70	55	94	5.0	5.5	.93	1.9
15	.28	.52	.97	.81	.68	101	50	82	4.7	4.4	.80	1.7
16	.21	.77	.97	.78	.68	550	45	76	4.6	4.0	.68	1.8
17	.29	.63	.97	.77	.68	681	40	71	2.8	3.7	.61	3.2
18	1.4	.63	.87	.77	.68	660	66	67	3.0	3.2	.44	4.1
19	.94	.72	.81	.77	.68	580	79	61	3.0	1.8	.36	3.1
20	.73	.76	.81	.77	.70	609	78	56	2.4	2.0	.57	2.5
21	.85	.81	.78	.77	.70	514	81	53	1.8	1.4	.36	2.8
22	.90	.85	.77	.77	.70	427	114	49	1.6	1.5	.25	4.3
23	1.2	1.0	.89	.77	.70	382	151	46	1.4	2.2	.24	4.2
24	1.2	1.2	.84	.77	.82	362	170	45	.79	1.7	.16	1.2
25	.80	1.1	.74	.77	.77	323	169	45	.46	1.1	.15	5.4
26	.73	1.4	.76	.75	.74	270	172	43	.39	1.5	.15	5.6
27	.70	1.6	.81	.66	.72	255	186	40	.21	4.8	.15	3.8
28	.64	1.9	.81	.60	.70	242	210	37	.16	3.5	.14	2.0
29	.77	1.8	.79	.59	---	228	226	34	.13	3.3	.29	1.6
30	.67	1.7	.77	.59	---	201	231	32	.31	3.6	.37	2.0
31	.64	---	.75	.58	---	180	---	30	---	3.2	.42	---
TOTAL	13.43	25.45	32.10	22.54	18.75	6799.00	3335	2604	213.85	97.14	22.54	69.60
MEAN	.43	.85	1.04	.73	.67	219	111	84.0	7.13	3.13	.73	2.32
MAX	1.4	1.9	1.6	.89	.82	681	231	222	26	10	2.8	5.6
MIN	.00	.45	.74	.58	.53	.70	40	30	.13	.24	.14	.47
WTR YR 1986	TOTAL	13253.40		MEAN	36.3	MAX	681	MIN	.00			

06468250 JAMES RIVER ABOVE ARROWWOOD LAKE NEAR KENSAL, ND

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--June 1985 to September 1985.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	COLOR (PLAT- INUM- COBALT UNITS) (00080)	TUR- BID- ITY (NTU) (00076)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED CENT SATUR- ATION (00301)	HARD- NESS (MG/L AS CACO3) (00900)
OCT 30...	1800	0.6	960	8.13	5.0	5.0	--	6.0	--	--	310
JAN 07...	1000	0.7	1660	7.60	-22.0	0.5	--	4.8	3.8	25	550
MAR 04...	1010	13	480	--	-2.0	0.5	--	--	--	--	--
APR 02...	1100	136	460	8.28	8.0	7.0	--	--	9.7	79	--
23...	1400	158	660	--	20.0	12.0	--	4.2	12.8	119	220
JUN 04...	0900	13	980	8.47	18.0	19.0	--	10	6.5	69	330
JUL 09...	1400	0.4	890	8.88	25.0	23.0	--	15	8.0	92	250
AUG 19...	0930	0.3	810	7.76	23.0	19.5	--	6.4	2.3	25	200
DATE	HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	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)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB AS CACO3 (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)
OCT 30...	0	55	42	93	38	2	15	--	0	170	23
JAN 07...	0	99	74	210	44	4	21	567	28	350	58
APR 23...	0	42	27	52	33	2	13	217	--	120	13
JUN 04...	0	63	43	86	35	2	16	358	2.3	160	17
JUL 09...	0	41	37	100	44	3	16	333	0.8	130	21
AUG 19...	0	31	29	98	50	3	15	258	8.7	120	20
DATE	SILICA, DIS- SOLVED (MG/L AS SiO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	SOLIDS, RESIDUE AT 105 DEG. C, SUS- PENDE (MG/L) (00530)	NITRO- GEN, NITRITE TOTAL (MG/L AS N) (00615)	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 TOTAL (MG/L AS N) (00610)
OCT 30...	18	609	--	0.83	0.99	22	--	<0.01	--	<0.10	--
JAN 07...	45	1140	1200	1.6	2.2	13	<0.01	<0.01	<0.10	<0.10	--
APR 23...	13	415	410	0.56	177	3	<0.01	0.01	<0.10	<0.10	--
JUN 04...	16	662	620	0.9	23	12	--	<0.01	--	<0.10	--
JUL 09...	29	605	570	0.82	0.65	41	--	<0.01	--	<0.10	--
AUG 19...	39	580	510	0.79	0.47	7	0.02	<0.01	<0.10	<0.10	--



## JAMES RIVER BASIN

06468250 JAMES RIVER ABOVE ARROWWOOD LAKE NEAR KENSAL, ND--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

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)	ANTI- MONY, TOTAL (UG/L AS SB) (01097)	ANTI- MONY, DIS- SOLVED (UG/L AS SB) (01095)	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BARIUM, TOTAL RECOV- ERABLE (UG/L AS BA) (01007)	BARIUM, DIS- SOLVED (UG/L AS BA) (01005)	BERYL- LIUM, TOTAL RECOV- ERABLE (UG/L AS BE) (01012)	BERYL- LIUM, DIS- SOLVED (UG/L AS BE) (01010)
OCT 30...	--	0.03	0.015	--	--	--	--	--	--	--	--
JAN 07...	--	0.08	0.067	--	<1	2	2	100	130	<10	0.6
APR 23...	0.16	0.10	0.071	<1	<1	2	2	100	60	<10	<0.5
JUN 04...	--	0.16	0.161	--	<1	--	5	--	83	--	<0.5
JUL 09...	--	0.20	0.15	--	<1	--	9	--	75	--	<0.5
AUG 19...	0.41	0.08	0.043	<1	<1	7	5	100	82	<10	1

DATE	BORON, TOTAL RECOV- ERABLE (UG/L AS B) (01022)	BORON, DIS- SOLVED (UG/L AS B) (01020)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD) (01027)	CADMIUM DIS- SOLVED (UG/L AS CD) (01025)	CHRO- MIUM, TOTAL RECOV- ERABLE (UG/L AS CR) (01034)	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)
OCT 30...	--	180	--	--	--	--	--	<1	14	<1
JAN 07...	--	290	<1	1	5	<1	--	1	18	1
APR 23...	110	90	<1	<1	--	<1	<3	2	26	<1
JUN 04...	--	170	--	<1	--	<1	<3	2	9	1
JUL 09...	--	220	--	<1	--	<1	<3	1	9	<5
AUG 19...	200	200	<1	<1	--	<1	<3	2	30	<5

DATE	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)	NICKEL, TOTAL RECOV- ERABLE (UG/L AS NI) (01067)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, TOTAL (UG/L AS SE) (01147)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG) (01077)	SILVER, DIS- SOLVED (UG/L AS AG) (01075)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)
OCT 30...	--	4	0.3	--	--	--	<1	--	--	--
JAN 07...	--	490	0.2	<1	--	--	<1	<1	<1	--
APR 23...	--	9	0.1	8	2	<1	<1	<1	<1	--
JUN 04...	--	8	0.3	--	3	--	<1	--	<1	--
JUL 09...	--	210	0.2	--	2	--	<1	--	<1	--
AUG 19...	--	190	0.4	5	2	<1	<1	<1	<1	--

## 06468250 JAMES RIVER ABOVE ARROWWOOD LAKE NEAR KENSAL, ND--CONTINUED

## WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		THAL- LIUM, TOTAL (UG/L AS TL) (01059)	THAL- LIUM, DIS- SOLVED (UG/L AS TL) (01057)	VANA- DIUM, DIS- SOLVED (UG/L AS V) (01085)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN) (01092)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	CYANIDE TOTAL (MG/L AS CN) (00720)	CYANIDE DIS- SOLVED (MG/L AS CN) (00723)	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 30...		--	--	--	--	6	--	--	4	0.01	96	
JAN 07...			--	--	--	9	<0.01	<0.01	42	0.08	92	
APR 02...		--	--	--	--	--	--	--	20	7.3	96	
23...		<1	<1	--	--	8	<0.01	<0.01	9	3.8	91	
JUN 04...		--	--	--	--	4	--	--	12	0.42	96	
JUL 09...		--	<1	--	--	9	--	<0.01	26	0.03	100	
AUG 19...		<1	<1	--	--	10	<0.01	<0.01	15	0.01	89	
DATE	TIME	ALDRIN, DIS- SOLVED (UG/L) (39331)	ALDRIN, TOTAL (UG/L) (39330)	AME- TRYNE TOTAL (82184)	ATRA- ZINE, TOTAL (UG/L) (39630)	CHLOR- DANE, DIS- SOLVED (UG/L) (39352)	CHLOR- DANE, TOTAL (UG/L) (39350)	CYAN- AZINE TOTAL (UG/L) (81757)	DDD, DIS- SOLVED (UG/L) (39361)	DDD, TOTAL (UG/L) (39360)	DDE, DIS- SOLVED (UG/L) (39366)	
APR 23...	1400	<0.01	<0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	
JUL 09...	1400	<0.01	<0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	
DATE		DDE, TOTAL (UG/L) (39365)	DDT, DIS- SOLVED (UG/L) (39371)	DDT, TOTAL (UG/L) (39370)	DI- AZINON, DIS- SOLVED (UG/L) (39572)	DI- AZINON, TOTAL (UG/L) (39570)	DI- ELDRIN DIS- SOLVED (UG/L) (39381)	DI- ELDRIN TOTAL (UG/L) (39380)	ENDO- SULFAN, TOTAL (UG/L) (39388)	ENDRIN, DIS- SOLVED (UG/L) (39391)	ENDRIN, TOTAL (UG/L) (39390)	ETHION, TOTAL (UG/L) (39398)
APR 23...		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
JUL 09...		<0.01	<0.01	<0.01	--	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
DATE		HEPTA- CHLOR, DIS- SOLVED (UG/L) (39411)	HEPTA- CHLOR, TOTAL (UG/L) (39410)	HEPTA- CHLOR EPOXIDE DIS- SOLVED (UG/L) (39421)	HEPTA- CHLOR EPOXIDE TOTAL (UG/L) (39420)	LINDANE DIS- SOLVED (UG/L) (39341)	LINDANE TOTAL (UG/L) (39340)	MALA- THION, DIS- SOLVED (UG/L) (39532)	MALA- THION, TOTAL (UG/L) (39530)	METH- OXY- CHLOR DISSOLV (UG/L) (82350)	METH- OXY- CHLOR, TOTAL (UG/L) (39480)	METHYL PARA- THION, DIS- SOLVED (UG/L) (39602)
APR 23...		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
JUL 09...		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	--	<0.01	<0.01	<0.01	--
DATE		METHYL PARA- THION, TOTAL (UG/L) (39600)	MIREX, DIS- SOLVED (UG/L) (39756)	MIREX, TOTAL (UG/L) (39755)	METHYL TRI- THION, TOTAL (UG/L) (39790)	METHYL- TRI- THION DISSOLV (UG/L) (82344)	NAPH- THA- LENES, POLY- CHLOR. TOTAL (UG/L) (39250)	PARA- THION, DIS- SOLVED (UG/L) (39542)	PARA- THION, TOTAL (UG/L) (39540)	PCB, DIS- SOLVED (UG/L) (39517)	PCB, TOTAL (UG/L) (39516)	PCN DISSOLV (UG/L) (82360)
APR 23...		<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	<0.01	<0.01	<0.1	<0.1	<0.1
JUL 09...		<0.01	<0.01	<0.01	<0.01	--	<0.1	--	<0.01	<0.1	<0.1	<0.1
DATE		PER- THANE DISSOLV (UG/L) (82348)	PER- THANE TOTAL (UG/L) (39034)	PROME- TONE TOTAL (UG/L) (39056)	PROME- TRYNE TOTAL (UG/L) (39057)	PRO- PAZINE TOTAL (UG/L) (39024)	SIMA- ZINE TOTAL (UG/L) (39055)	SIME- TRYNE TOTAL (UG/L) (39054)	2,4-D, TOTAL (UG/L) (39730)	2, 4-DP TOTAL (UG/L) (82183)	2,4,5-T TOTAL (UG/L) (39740)	SILVEX, TOTAL (UG/L) (39760)
APR 23...		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.01	<0.01	<0.01
JUL 09...		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.05	<0.01	<0.01	<0.01

## JAMES RIVER BASIN

06468300 KELLY CREEK BELOW NICCUM RESERVOIR NEAR BORDULAC, ND

LOCATION.--Lat 47°24'01", long 98°49'43", in SW1/4SW1/4SE1/4 sec.4, T.145 N., R.64 W., Foster County, Hydrologic Unit 10160001, on right bank 300 ft upstream from culvert on county road 6.5 mi east of Bordulac.

DRAINAGE AREA.--188 mi<sup>2</sup>, approximately, of which about 77 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--March 1986 to September 1986.

GAGE.--Water-stage recorder. Elevation of gage is 1,460.00 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Mar. 1-3 and July 29 to Sept. 30. Records good except those for periods of estimated daily discharges, which are poor. Slight amount of regulation by Niccum Reservoir.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 20 ft<sup>3</sup>/s, Mar. 14, 1986, gage height, 1.69 ft; no flow at times most years.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 20 ft<sup>3</sup>/s, Mar. 14, gage height, 1.69 ft; no flow for several months.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1						1.0	7.8	9.0	.09	.00	6.0	.00
2						5.0	7.2	8.3	.00	.00	5.5	.20
3						10	8.1	7.2	.00	.00	5.0	.30
4						15	7.9	6.7	.00	.00	4.5	.25
5						9.2	7.8	5.8	.00	.00	4.8	.20
6						6.0	7.3	7.5	.00	.00	5.0	.15
7						3.6	6.4	8.6	.00	.00	4.0	.10
8						3.0	5.2	8.4	.00	.00	3.0	.05
9						3.0	4.4	8.2	.00	.00	2.0	.03
10						3.1	3.9	7.6	.00	.00	1.5	.05
11						4.7	3.7	6.2	.00	.05	1.0	.10
12						6.0	2.9	5.4	.00	.80	.30	.20
13						11	2.4	4.5	.00	.98	.50	.20
14						18	3.3	3.7	.00	.80	1.0	.20
15						17	3.6	3.1	.00	.80	.50	.15
16						16	3.8	2.5	.00	.80	.30	.15
17						15	4.2	2.2	.00	.89	.10	.50
18						13	6.9	1.9	.00	.89	.05	.50
19						9.6	10	1.6	.00	.89	.00	.45
20						8.3	11	1.2	.00	.50	.00	.45
21						6.6	9.4	.86	.00	.30	.00	.60
22						7.4	8.0	.46	.00	.17	.00	.80
23						8.3	11	.38	.00	.23	.00	.80
24						11	12	.80	.00	.30	.00	.70
25						11	11	1.4	.00	.13	.00	.85
26						9.9	10	2.0	.00	.63	.00	1.0
27						11	11	2.0	.00	9.9	.00	.90
28						10	12	1.5	.00	8.7	.00	.85
29						11	11	1.2	.00	7.5	.00	.85
30						9.6	11	.80	.00	8.0	.00	.80
31						8.9	---	.37	---	7.0	.00	---
TOTAL						282.2	224.2	121.37	.09	50.26	45.05	12.38
MEAN						9.10	7.47	3.92	.00	1.62	1.45	.41
MAX						18	12	9.0	.09	9.9	6.0	1.0
MIN						1.0	2.4	.37	.00	.00	.00	.00

## 06468300 KELLY CREEK BELOW NICCUM RESERVOIR NEAR BORDULAC, ND--CONTINUED

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--March 1986 to September 1986.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	TUR- BID- ITY (NTU) (00076)	OXYGEN, DIS- SOLVED (MG/L) (00300)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	
MAR 04...	0915	13	490	--	-2.0	0.5	--	--	--	--	--	
MAR 26...	1630	9.6	350	7.87	5.0	3.0	20	7.8	130	0	28	
APR 24...	1100	12	550	--	11.0	9.5	4.0	9.8	220	0		
DATE	TIME	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	SILICA, DIS- SOLVED (MG/L AS SiO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)
MAR 26...	15	20	23	0.8	10	145	3.8	27	4.9	10	218	
APR 24...	26	35	25	1	11	238	--	64	9.1	14	357	
DATE	TIME	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	SOLIDS, RESIDUE AT 105 DEG. C, SUS- PENDED (MG/L) (00530)	NITRO- GEN, NITRITE TOTAL (MG/L AS N) (00615)	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)	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)
MAR 26...	200	0.3	5.7	--	--	<0.01	--	<0.10	--	0.10	0.068	
APR 24...	350	0.49	12	5	<0.01	0.01	<0.10	<0.10	0.10	0.03		
DATE	TIME	ANTI- MONY, TOTAL (UG/L AS SB) (01097)	ANTI- MONY, DIS- SOLVED (UG/L AS SB) (01095)	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BARIUM, TOTAL RECOV- ERABLE (UG/L AS BA) (01007)	BARIUM, DIS- SOLVED (UG/L AS BA) (01005)	BERYL- LIUM, TOTAL RECOV- ERABLE (UG/L AS BE) (01012)	BERYL- LIUM, DIS- SOLVED (UG/L AS BE) (01010)	BORON, TOTAL RECOV- ERABLE (UG/L AS B) (01022)	BORON, DIS- SOLVED (UG/L AS B) (01020)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD) (01027)
MAR 26...	--	<1	--	2	--	70	--	<0.5	--	50	--	--
APR 24...	<1	<1	2	2	100	81	<10	<0.5	60	70	<1	
DATE	TIME	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)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)	NICKEL, TOTAL RECOV- ERABLE (UG/L AS NI) (01067)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, TOTAL (UG/L AS SE) (01147)
MAR 26...	<1	<1	<3	2	190	1	280	0.2	--	<1	--	
APR 24...	<1	<1	<3	1	64	<1	3	0.1	10	<1	<1	
DATE	TIME	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG) (01077)	SILVER, DIS- SOLVED (UG/L AS AG) (01075)	THAL- LIUM, TOTAL (UG/L AS TL) (01059)	THAL- LIUM, DIS- SOLVED (UG/L AS TL) (01057)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	CYANIDE TOTAL (MG/L AS CN) (00720)	CYANIDE DIS- SOLVED (MG/L AS CN) (00723)	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)
MAR 26...	<1	--	<1	--	<1	8	--	<0.01	3	0.08	56	
APR 24...	<1	<1	<1	<1	<1	11	<0.01	<0.01	17	0.54	81	



## JAMES RIVER BASIN

06468500 JAMES RIVER NEAR PINGREE, ND

LOCATION.--Lat 47°08'30", long 98°47'00", in SW1/4SW1/4 sec.3, T.142 N., R.64 W., Stutsman County, Hydrologic Unit 10160001, on right bank 500 ft upstream from dam at outlet of DePuy Marsh, 6.5 mi southeast of Pingree, and 6.25 mi northeast of Buchanan.

DRAINAGE AREA.--1,670 mi<sup>2</sup>, approximately, of which about 900 mi<sup>2</sup> is probably noncontributing.

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1965, 1979 to current year.

REMARKS.--Current sampling site is located at bridge 2 mi upstream from former stream-gaging station.

## WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	COLOR (PLAT- INUM- COBALT UNITS) (00080)	TUR- BID- ITY (NTU) (00076)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (MG/L) (00301)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS (MG/L AS CACO3) (00902)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)
MAR 26...	1345	780	8.99	5.0	4.5	--	30	19.0	143	230	0	35
APR 23...	1100	600	--	17.0	9.0	50	5.8	13.0	113	180	0	32
JUN 04...	1030	690	8.43	19.0	19.5	30	2.0	7.4	79	230	0	43
JUL 09...	1230	740	8.35	25.0	22.0	--	--	6.8	76	--	--	--
AUG 19...	1100	730	8.55	24.0	21.0	10	23	7.4	82	250	0	46
DATE	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	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)
MAR 26...	34	82	42	2	13	--	0	170	10	--	10	525
APR 23...	25	53	37	2	13	188	--	120	12	0.1	8.9	389
JUN 04...	30	52	31	2	16	240	1.7	110	9.6	0.1	19	453
AUG 19...	33	57	31	2	19	254	1.4	120	11	0.2	14	560
DATE	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	SOLIDS, RESIDUE AT 105 DEG. C, SUS- PENDE (MG/L) (00530)	NITRO- GEN, NITRITE TOTAL (MG/L AS N) (00615)	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)	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)
MAR 26...	--	0.71	0.0	9	<0.01	<0.01	<0.10	<0.10	0.26	0.04	0.012	--
APR 23...	380	0.53	0.0	6	<0.01	0.01	<0.10	<0.10	0.13	0.03	0.004	--
JUN 04...	420	0.62	0.0	<1	--	0.03	--	<0.10	--	0.12	0.089	--
AUG 19...	450	0.76	0.0	64	0.01	<0.01	<0.10	<0.10	0.33	0.09	0.085	30
DATE	ANTI- MONY, TOTAL (UG/L AS SB) (01097)	ANTI- MONY, DIS- SOLVED (UG/L AS SB) (01095)	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BARIUM, TOTAL RECOV- ERABLE (UG/L AS BA) (01007)	BARIUM, DIS- SOLVED (UG/L AS BA) (01005)	BERYL- LIUM, TOTAL RECOV- ERABLE (UG/L AS BE) (01012)	BERYL- LIUM, DIS- SOLVED (UG/L AS BE) (01010)	BORON, TOTAL RECOV- ERABLE (UG/L AS B) (01022)	BORON, DIS- SOLVED (UG/L AS B) (01020)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD) (01027)	CADMIUM DIS- SOLVED (UG/L AS CD) (01025)
MAR 26...	<1	<1	2	2	100	51	<10	<0.5	100	100	<1	<1
APR 23...	<1	<1	1	1	100	50	<10	<0.5	80	90	<1	<1
JUN 04...	--	<1	--	3	--	61	--	<0.5	--	120	--	<1
AUG 19...	--	<1	8	6	<100	<76	--	1	--	150	--	<1



## JAMES RIVER BASIN

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06468500 JAMES RIVER NEAR PINGREE, ND--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	CHROMIUM, DIS-SOLVED (UG/L AS CR) (01030)	COBALT, DIS-SOLVED (UG/L AS CO) (01035)	COPPER, DIS-SOLVED (UG/L AS CU) (01040)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	LITHIUM, DIS-SOLVED (UG/L AS LI) (01130)	MANGANESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY, DIS-SOLVED (UG/L AS HG) (71890)	MOLYBDENUM, DIS-SOLVED (UG/L AS MO) (01060)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI) (01067)	NICKEL, DIS-SOLVED (UG/L AS NI) (01065)	SELENIUM, TOTAL (UG/L AS SE) (01147)
MAR 26...	<1	<3	4	13	1	--	270	0.2	--	3	7	<1
APR 23...	<1	<3	3	13	<1	--	7	0.1	--	1	2	<1
JUN 04...	<1	<3	2	10	<1	--	500	0.2	--	--	2	--
AUG 19...	<1	<3	2	4	<5	40	32	--	<1	--	4	<1
DATE	SELENIUM, DIS-SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOVERABLE (UG/L AS AG) (01077)	SILVER, DIS-SOLVED (UG/L AS AG) (01075)	STRONTIUM, DIS-SOLVED (UG/L AS SR) (01080)	THALLIUM, TOTAL (UG/L AS TL) (01059)	THALLIUM, DIS-SOLVED (UG/L AS TL) (01057)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)	CYANIDE TOTAL (MG/L AS CN) (00720)	CYANIDE DIS-SOLVED (MG/L AS CN) (00723)	SEDIMENT, SUSPENDED (MG/L) (80154)	SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)	
MAR 26...	<1	<1	<1	--	<1	<1	10	<0.01	<0.01	2	83	
APR 23...	<1	<1	<1	--	<1	<1	11	<0.01	<0.01	9	99	
JUN 04...	<1	--	<1	--	--	--	6	--	--	5	100	
JUL 09...	--	--	--	--	--	--	--	--	--	8	100	
AUG 19...	<1	--	<1	310	<1	<1	8	<0.01	<0.01	38	98	

## JAMES RIVER BASIN

06469000 JAMESTOWN RESERVOIR NEAR JAMESTOWN, ND

LOCATION.--Lat 46°55'50", long 98°42'23", in SE1/4NW1/4 sec.24, T.140 N., R.64 W., Stutsman County, Hydrologic Unit 10160001, on left bank in control house below Jamestown Dam on James River, 1.7 mi north of Jamestown Post Office, and 3.3 mi upstream from Pipestem Creek.

DRAINAGE AREA.--1,760 mi<sup>2</sup>, approximately, of which about 1,010 mi<sup>2</sup> is probably noncontributing.

## RESERVOIR-ELEVATION AND CONTENTS RECORDS

PERIOD OF RECORD.--November 1953 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,400.00 ft above National Geodetic Vertical Datum of 1929; gage readings have been reduced to elevations NGVD. June 22, 1959, to June 3, 1971 at site 0.2 mi upstream at same datum. Prior to June 22, 1959, nonrecording gages at different locations.

REMARKS.--Reservoir is formed by earth-fill dam, completed Oct. 1, 1953. Closure made May 7, 1953, and filling of dead storage started. Gates initially closed Feb. 8, 1954. Usable capacity, 229,470 acre-ft between elevations 1,400 ft, sill of outlet and 1,454 ft, crest of spillway. Dead storage below elevation 1,400 ft, 820 acre-ft. Maximum design pool, 389,000 acre-ft, elevation, 1,464.6 ft. Figures given herein represent total contents based on capacity table dated Oct. 1, 1965. Reservoir is used for flood control and municipal supply. Elevations are adjusted for wind effect.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 103,100 acre-ft, May 1, 1969, elevation, 1,443.60 ft; minimum since initial filling of reservoir, 18,220 acre-ft, Mar. 4, 5, 1965, elevation, 1,423.66 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 40,640 acre-ft, May 14, elevation, 1,434.52 ft; minimum 28,540 acre-ft, Feb. 25, elevation, 1,429.62 ft.

## MONTHEND ELEVATION AND CONTENTS AT 2400, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30-----	29.83	28,970	
Oct. 31-----	29.81	28,930	-40
Nov. 30-----	29.80	28,910	-20
Dec. 31-----	29.69	28,680	-230
CAL YR 1985-----	--	--	+570
Jan. 31-----	29.65	28,600	-80
Feb. 29-----	29.63	28,560	-40
Mar. 31-----	30.26	29,890	+1,330
Apr. 30-----	34.23	39,780	+9,890
May 31-----	34.41	40,310	+530
June 30-----	32.46	35,010	-5,300
July 31-----	32.54	35,220	+210
Aug. 31-----	32.09	34,080	-1,140
Sept. 30-----	31.93	33,690	-390
WTR YR 1986-----	--	--	+4,720

06469000 JAMESTOWN RESERVOIR NEAR JAMESTOWN, ND--CONTINUED

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1960 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	OXYGEN, DIS- SOLVED (MG/L) (00300)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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)	PERCENT SODIUM (00932)
OCT												
24...	1124	660	8.49	9.0	8.0	10.3	220	220	44	27	57	34
JAN												
07...	1214	790	8.52	-16.5	1.5	9.2	260	260	51	32	67	34
MAY												
14...	1000	670	8.51	15.5	11.0	10.1	210	210	43	26	57	35
JUL												
29...	1230	670	8.33	29.5	24.0	7.1	220	220	42	27	61	36

DATE	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	BORON, DIS- SOLVED (UG/L AS B) (01020)
OCT											
24...	2	15	230	110	12	0.2	18	423	420	0.58	120
JAN											
07...	2	16	271	120	9.6	0.2	19	482	480	0.66	120
MAY											
14...	2	14	228	110	14	0.1	12	428	410	0.58	100
JUL											
29...	2	15	227	120	12	0.1	15	442	430	0.6	110

DATE	TIME	SAM- PLING DEPTH (FEET) (00003)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE (DEG C) (00010)	OXYGEN, DIS- SOLVED (MG/L) (00300)
OCT						
24...	1120	0.0	660	8.48	8.0	10.4
24...	1122	1.60	660	8.49	8.0	10.4
24...	1124	3.30	660	8.49	8.0	10.3
24...	1126	6.60	660	8.49	8.0	10.3
24...	1128	13.2	660	8.50	8.0	10.3
24...	1130	19.8	660	8.50	8.0	10.3
24...	1132	26.4	660	8.49	8.0	10.3
24...	1134	33.0	660	8.50	8.0	10.2
24...	1136	40.0	660	8.50	8.0	10.2
JAN						
07...	1210	0.0	780	8.44	0.5	9.8
07...	1212	1.60	--	--	0.5	9.7
07...	1214	3.30	790	8.52	1.5	9.2
07...	1216	6.60	740	8.51	2.5	8.7
07...	1218	13.2	740	8.48	3.5	5.9
07...	1220	19.8	740	8.40	3.0	6.2
07...	1222	26.4	760	8.34	3.5	4.8
07...	1224	33.0	770	8.25	4.0	2.9
07...	1226	36.0	770	8.11	4.0	1.2
MAY						
14...	0956	0.0	680	8.35	11.0	10.0
14...	0958	1.60	670	8.49	11.0	10.1
14...	1000	3.30	670	8.51	11.0	10.1
14...	1002	6.60	670	8.50	11.0	10.1
14...	1004	13.2	670	8.52	11.0	10.1
14...	1006	19.8	670	8.49	11.0	10.0
14...	1008	26.4	670	8.51	11.0	10.1
14...	1010	33.0	--	--	11.0	10.1
JUL						
29...	1210	0.0	670	8.34	24.0	7.2
29...	1220	1.60	670	8.34	24.0	7.2
29...	1230	3.30	670	8.33	24.0	7.1
29...	1235	6.60	670	8.33	23.5	7.1
29...	1240	13.2	670	8.30	23.0	6.6
29...	1245	19.8	670	8.25	23.0	6.1
29...	1250	26.4	670	8.21	23.0	5.9
29...	1300	33.0	670	8.10	23.0	5.6

## JAMES RIVER BASIN

06469400 PIPESTEM CREEK NEAR PINGREE, ND

LOCATION.--Lat 47°10'03", long 98°58'07", in NE1/4NE1/4NW1/4 sec.31, T.143 N., R.65 W., Stutsman County, Hydrologic Unit 10160002, on right bank on downstream side of State Highway 36 bridge, and 3 mi west of Pingree.

DRAINAGE AREA.--700 mi<sup>2</sup>, of which about 440 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1973 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,500.63 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Feb. 24 to June 4 and June 21 to Sept. 30. Records poor.

AVERAGE DISCHARGE.--13 years, 26.9 ft<sup>3</sup>/s, 19,490 acre-ft/yr; median of yearly mean discharges, 20 ft<sup>3</sup>/s, 14,500 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,520 ft<sup>3</sup>/s, Apr. 20, 1979, gage height, 11.60 ft, backwater from ice; no flow at times.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 100 ft<sup>3</sup>/s and maximum (\*):

Date	Time	Discharge (ft <sup>3</sup> /s)	Gage Height (ft)	Date	Time	Discharge (ft <sup>3</sup> /s)	Gage Height (ft)
Mar. 2	----	200	ice jam	Apr. 20	----	220	Unknown
Mar. 15	0915	*350	*8.05				

No flow for many months.

a - About

b - Backwater from ice

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.00	100	35	45	6.0	.25	.70	.03
2	.00	.00	.00	.00	.00	180	30	40	5.5	.20	.65	.07
3	.00	.00	.00	.00	.00	160	28	35	5.0	.18	.65	.08
4	.00	.00	.00	.00	.00	145	26	30	4.7	.16	.60	.05
5	.00	.00	.00	.00	.00	140	25	25	4.6	.14	.55	.03
6	.00	.00	.00	.00	.00	100	24	22	4.4	.12	.50	.03
7	.00	.00	.00	.00	.00	80	23	20	4.4	.10	.45	.02
8	.00	.00	.00	.00	.00	90	22	18	4.1	.10	.43	.02
9	.00	.00	.00	.00	.00	90	21	16	4.1	.10	.40	.02
10	.00	.00	.00	.00	.00	95	20	15	3.6	.50	.35	.10
11	.00	.00	.00	.00	.00	100	20	16	3.6	.60	.30	.50
12	.00	.00	.00	.00	.00	150	19	18	3.2	.60	.25	.50
13	.00	.00	.00	.00	.00	200	18	17	2.5	.55	.20	.60
14	.00	.00	.00	.00	.00	250	17	16	2.1	.55	.25	.70
15	.00	.00	.00	.00	.00	320	16	15	2.3	.50	.20	.80
16	.00	.00	.00	.00	.00	300	15	15	2.1	.50	.15	.90
17	.00	.00	.00	.00	.00	280	20	14	2.1	.45	.10	1.0
18	.00	.00	.00	.00	.00	260	30	13	1.6	.45	.10	1.0
19	.00	.00	.00	.00	.00	200	100	12	1.1	.60	.10	1.2
20	.00	.00	.00	.00	.00	160	200	12	1.2	.80	.08	1.4
21	.00	.00	.00	.00	.00	150	180	11	1.1	.90	.06	2.0
22	.00	.00	.00	.00	.00	130	160	11	1.0	.90	.06	2.1
23	.00	.00	.00	.00	.00	110	150	10	.90	.85	.08	2.0
24	.00	.00	.00	.00	.10	100	130	10	.85	.80	.09	2.0
25	.00	.00	.00	.00	5.0	90	110	9.5	.80	.80	.09	2.1
26	.00	.00	.00	.00	10	82	100	9.0	.70	.85	.09	2.3
27	.00	.00	.00	.00	20	75	85	8.5	.60	.90	.07	2.5
28	.00	.00	.00	.00	40	65	70	8.0	.50	.90	.06	2.5
29	.00	.00	.00	.00	---	55	60	7.0	.40	.80	.05	2.5
30	.00	.00	.00	.00	---	50	50	7.5	.30	.75	.04	2.5
31	.00	---	.00	.00	---	45	---	7.0	---	.70	.03	---
TOTAL	.00	.00	.00	.00	75.10	4352	1804	512.5	75.35	16.60	7.73	31.55
MEAN	.00	.00	.00	.00	2.68	140	60.1	16.5	2.51	.54	.25	1.05
MAX	.00	.00	.00	.00	40	320	200	45	6.0	.90	.70	2.5
MIN	.00	.00	.00	.00	.00	45	15	7.0	.30	.10	.03	.02
AC-FT	.00	.00	.00	.00	149	8630	3580	1020	149	33	15	63
CAL YR 1985	TOTAL	2650.14		MEAN	7.26	MAX	200	MIN	.00	AC-FT	5260	
WTR YR 1986	TOTAL	6874.83		MEAN	18.8	MAX	320	MIN	.00	AC-FT	13640	

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1974 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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)
MAR											
04...	1230	146	225	--	0.0	0.5	--	--	--	--	--
11...	1200	100	--	--	0.0	--	--	--	--	--	--
18...	0955	264	--	--	-3.0	--	--	--	--	--	--
25...	1300	82	450	8.35	2.0	4.0	160	2	33	18	25
		SODIUM AD- SORP- TION (MG/L AS K) PERCENT SODIUM RATIO (00932)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR											
26...	24	0.9	14	160	79	7.8	0.1	16	309	290	0.42
		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)
DATE											
MAR											
26...		2	100	50	<1	21	40	0.5	1	<1	200



## JAMES RIVER BASIN

06470000 JAMES RIVER AT JAMESTOWN, ND

LOCATION.--Lat 46°53'22", long 98°40'58", in NW1/4NE1/4 sec.6, T.139 N., R.63 W., Stutsman County, Hydrologic Unit 10160003, on left bank 200 ft upstream from Interstate 94 bridge at southeast corner of Jamestown, and 3 mi downstream from Pipestem Creek.

DRAINAGE AREA.--2,820 mi<sup>2</sup>, approximately, of which about 1,650 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--June 1928 to September 1933, March to May 1935, August 1937 to September 1939, April 1943 to current year. Monthly discharge only for some periods, published in WSP 1309.

REVISED RECORDS.--WSP 1239: 1938(M). WSP 1917: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,373.27 ft above National Geodetic Vertical Datum of 1929. Oct. 1, 1949 to Sept. 30, 1965, at former bridge 0.5 mi upstream at datum 2.00 ft higher. See WSP 1729 or 1917 for history of changes prior to Oct. 1, 1949.

REMARKS.--Estimated daily discharges: Nov. 19 to Mar. 8 and Apr. 14, 15. Records good except those for estimated daily discharges, which are poor. Flow regulated by Arrowwood, Jim, and Pipestem Lakes, and Jamestown Reservoir, combined capacity, 393,000 acre-ft. Regulation by Jamestown Reservoir (station 06469000) 6 mi upstream since 1953 and by Pipestem Lake, capacity 147,000 acre-ft, since 1973.

AVERAGE DISCHARGE.--50 years (water years 1929-33, 1938-39, 1944-86), 64.0 ft<sup>3</sup>/s, 46,370 acre-ft/yr; median of yearly mean discharges, 34 ft<sup>3</sup>/s, 24,600 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,390 ft<sup>3</sup>/s, May 13, 1950, gage height, 15.82 ft, site and datum then in use; no flow at times in 1933.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 314 ft<sup>3</sup>/s, Apr. 29, gage height, 5.60 ft; minimum daily, 1.8 ft<sup>3</sup>/s, Feb. 20.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.9	2.7	2.5	2.3	4.1	25	89	307	139	40	5.4	17
2	2.4	2.7	2.5	2.7	3.8	45	93	285	135	32	4.8	22
3	2.8	2.2	2.5	3.0	3.4	60	103	198	139	40	4.4	27
4	3.7	2.4	2.6	2.9	3.3	80	96	199	137	53	4.4	34
5	3.7	2.6	2.6	3.1	2.9	50	103	197	134	37	8.2	36
6	3.9	2.6	2.6	3.2	2.6	120	92	196	135	34	5.8	36
7	8.1	2.5	2.6	3.2	2.3	250	89	194	135	30	3.9	36
8	7.8	2.2	2.6	3.1	2.5	235	88	209	135	35	14	36
9	4.6	2.2	2.6	2.9	2.3	212	87	216	134	37	29	37
10	4.3	2.2	2.6	3.1	2.1	232	88	200	134	39	26	39
11	3.2	2.2	2.6	3.3	2.0	201	100	201	133	39	26	42
12	6.3	2.6	2.6	3.2	2.0	196	90	218	133	43	26	41
13	7.8	2.7	2.6	2.9	2.0	189	86	199	132	36	29	38
14	5.2	2.7	2.6	3.0	2.0	176	100	196	137	34	29	38
15	4.2	2.9	2.6	2.6	2.0	153	130	195	145	30	25	44
16	4.2	3.3	2.7	2.5	2.0	116	89	196	134	39	23	63
17	5.5	3.0	2.7	2.6	2.0	97	90	197	133	57	23	82
18	5.2	2.9	2.7	2.5	2.0	95	162	196	133	61	24	41
19	4.4	2.8	2.7	2.3	1.9	91	151	196	132	44	26	40
20	2.8	2.7	2.8	2.4	1.8	94	119	196	132	42	27	40
21	3.4	2.6	2.8	2.5	2.0	95	101	196	140	42	25	42
22	3.5	2.5	2.7	2.3	2.2	97	101	194	134	40	29	42
23	4.7	2.5	2.7	2.2	2.4	93	104	201	126	42	31	39
24	3.6	2.5	2.7	2.0	2.6	92	102	203	125	41	27	38
25	3.4	2.5	2.7	2.1	7.5	94	215	203	77	40	26	104
26	3.1	2.5	2.7	2.3	15	91	224	204	50	48	24	48
27	2.7	2.5	2.8	2.6	25	93	240	198	12	56	21	43
28	2.8	2.5	2.9	2.8	15	92	237	198	25	53	18	45
29	2.7	2.5	2.9	3.2	---	92	309	198	37	17	17	44
30	2.4	2.5	3.0	3.2	---	89	308	196	40	11	19	41
31	2.6	---	2.7	3.4	---	91	---	149	---	6.5	17	---
TOTAL	127.9	77.2	82.9	85.4	120.7	3736	3986	6331	3467	1198.5	617.9	1275
MEAN	4.13	2.57	2.67	2.75	4.31	121	133	204	116	38.7	19.9	42.5
MAX	8.1	3.3	3.0	3.4	25	250	309	307	145	61	31	104
MIN	2.4	2.2	2.5	2.0	1.8	25	86	149	12	6.5	3.9	17
AC-FT	254	153	164	169	239	7410	7910	12560	6880	2380	1230	2530
CAL YR 1985	TOTAL	7793.3		MEAN	21.4	MAX	314	MIN	1.3	AC-FT	15460	
WTR YR 1986	TOTAL	21105.5		MEAN	57.8	MAX	309	MIN	1.8	AC-FT	41860	

## JAMES RIVER BASIN

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06470000 JAMES RIVER AT JAMESTOWN, ND--CONTINUED

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1950-51, 1958 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	TUR- BID- ITY (NTU) (00076)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	
OCT	31...	1100	2.6	1120	7.84	3.0	2.5	7.0	11.2	82	390	55	92
DEC	30...	1100	2.9	1250	7.54	1.0	0.5	4.5	5.6	39	440	26	110
MAR	26...	0900	91	510	8.20	0.0	3.0	3.5	13.2	96	180	0	41
APR	23...	0900	105	580	--	10.0	9.0	15	12.6	109	210	42	48
JUN	04...	1430	136	700	8.28	22.0	19.5	17	9.0	96	220	2	45
JUL	09...	1030	38	750	8.05	20.0	21.0	20	7.0	77	270	0	60
AUG	19...	1500	26	730	8.28	31.0	25.0	10	10.0	119	230	0	47
DATE		MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	SILICA, DIS- SOLVED (MG/L AS SiO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)
OCT	31...	38	94	34	2	8.3	331	9.2	210	37	21	729	700
DEC	30...	41	110	35	2	8.3	418	23	240	44	30	--	840
MAR	26...	20	29	24	1	14	--	0	96	11	10	334	--
APR	23...	23	35	25	1	12	173	--	130	11	8.9	380	370
JUN	04...	27	55	33	2	14	222	2.2	120	11	12	452	420
JUL	09...	30	53	28	1	15	--	0	150	13	7.7	479	--
AUG	19...	27	62	35	2	14	237	2.4	130	16	17	408	460
DATE		SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	SOLIDS, RESIDUE AT 105 DEG. C, SUS- PENDEED (MG/L) (00530)	NITRO- GEN, NITRITE TOTAL (MG/L AS N) (00615)	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)	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)	ANTI- MONY, TOTAL (UG/L AS SB) (01097)	ANTI- MONY, DIS- SOLVED (UG/L AS SB) (01095)
OCT	31...	0.99	5.1	66	--	0.01	--	<0.10	--	0.02	0.013	--	--
DEC	30...	1.1	6.6	11	0.01	0.01	0.10	0.13	--	0.03	0.031		<1
MAR	26...	0.45	82	17	0.04	0.15	0.50	0.54	0.28	0.18	0.137	<1	<1
APR	23...	0.52	108	--	--	0.02	--	0.11	--	0.08	0.061	--	<1
JUN	04...	0.61	166	29	--	0.02	--	0.19	--	0.06	0.058	--	<1
JUL	09...	0.65	49	41	--	0.04	--	0.18	--	0.06	0.052	--	<1
AUG	19...	0.55	29	30	0.02	0.02	0.20	0.15	0.11	0.05	0.04	<1	<1

## JAMES RIVER BASIN

06470000 JAMES RIVER AT JAMESTOWN, ND--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BARIUM, TOTAL RECOV- ERABLE (UG/L AS BA) (01007)	BARIUM, DIS- SOLVED (UG/L AS BA) (01005)	BERYL- LIUM, TOTAL RECOV- ERABLE (UG/L AS BE) (01012)	BERYL- LIUM, DIS- SOLVED (UG/L AS BE) (01010)	BORON, TOTAL RECOV- ERABLE (UG/L AS B) (01022)	BORON, DIS- SOLVED (UG/L AS B) (01020)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD) (01027)	CADMIUM DIS- SOLVED (UG/L AS CD) (01025)	CHRO- MIUM, TOTAL RECOV- ERABLE (UG/L AS CR) (01034)
OCT 31...	--	--	--	--	--	--	--	370	--	--	--
DEC 30...	--	3	100	92	<10	<0.5	--	410	<1	<1	9
MAR 26...	2	2	100	62	<10	<0.5	90	90	<1	<1	--
APR 23...	--	2	--	53	--	<0.5	--	90	--	<1	--
JUN 04...	--	2	--	64	--	<0.5	--	120	--	<1	--
JUL 09...	--	3	--	88	--	<0.5	--	140	--	<1	--
AUG 19...	3	2	100	78	<10	<0.5	200	160	<1	1	--
DATE	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)	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)	NICKEL, TOTAL RECOV- ERABLE (UG/L AS NI) (01067)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, TOTAL (UG/L AS SE) (01147)
OCT 31...	--	--	<1	15	<1	730	0.3	4	--	2	--
DEC 30...	<1	--	<1	180	1	1800	0.5	--	9	--	--
MAR 26...	<1	<3	3	75	3	290	0.5	--	4	5	<1
APR 23...	<1	<3	2	21	<1	160	0.1	--	--	2	--
JUN 04...	<1	<3	2	6	<1	570	0.1	--	--	1	--
JUL 09...	<1	<3	2	8	<5	430	<0.1	--	--	3	--
AUG 19...	<1	<3	1	7	<5	390	0.3	--	1	2	<1
DATE	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG) (01077)	SILVER, DIS- SOLVED (UG/L AS AG) (01075)	THAL- LIUM, TOTAL (UG/L AS TL) (01059)	THAL- LIUM, DIS- SOLVED (UG/L AS TL) (01057)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	CYANIDE TOTAL (MG/L AS CN) (00720)	CYANIDE DIS- SOLVED (MG/L AS CN) (00723)	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 31...	<1	--	<1	--	--	23	--	--	23	0.16	94
DEC 30...	<1	<1	--	--	--	4	<0.01	<0.01	34	0.27	44
MAR 26...	<1	<1	<1	<1	<1	9	<0.01	<0.01	13	3.2	86
APR 23...	<1	--	<1	--	<1	8	--	<0.01	29	8.1	96
JUN 04...	<1	--	<1	--	--	7	--	--	38	14	100
JUL 09...	<1	--	<1	--	<1	9	--	<0.01	43	4.4	100
AUG 19...	<1	<1	<1	<1	<1	15	<0.01	0.01	27	1.9	95

## JAMES RIVER BASIN

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06470500 JAMES RIVER AT LA MOURE, ND

LOCATION.--Lat 46°21'20", long 98°18'15", in NE1/4NE1/4 sec.11, T.133 N., R.61 W., LaMoure County, Hydrologic Unit 10160003, on left bank 80 ft downstream from bridge on State Highway 13, 0.5 mi west of LaMoure, and 12 mi upstream from Cottonwood Creek.

DRAINAGE AREA.--4,390 mi<sup>2</sup>, approximately, of which about 2,600 mi<sup>2</sup> is probably noncontributing.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--April to July 1903 (gage-height record only), April 1950 to current year. Gage-height records for 1902-11 are contained in reports of the National Oceanic and Atmospheric Administration.

REVISED RECORDS.--WSP 1917: Drainage area.

GAGE.--Water-stage recorder and rubble-masonry control. Datum of gage is 1,290.00 ft above National Geodetic Vertical Datum of 1929. See WSP 1729 or 1917 for history of changes prior to Apr. 19, 1950.

REMARKS.--Periods of estimated record include Mar. 6-9, Apr. 14, 15, and June 17-29. Records good except those for period of estimated record, which are poor. Flow regulated by Arrowwood, Jim, and Pipestem Lakes and Jamestown Reservoir, combined capacity, 393,000 acre-ft. Regulation by Jamestown Reservoir (station 06469000) 85 mi upstream since 1953 and by Pipestem Lake, capacity 147,000 acre-ft, since 1973.

AVERAGE DISCHARGE.--36 years (water years 1951-86), 98.5 ft<sup>3</sup>/s, 71,360 acre-ft/yr; median of yearly mean discharges, 72 ft<sup>3</sup>/s, 52,200 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,800 ft<sup>3</sup>/s, Apr. 14, 1969, gage height, 16.17 ft; no flow at times.

EXTREMES OUTSIDE PERIOD OF RECORD.--Prior to flood of Apr. 14, 1969, a long-time resident said that the flood of May 16, 1950, was the highest since 1881, with stage in either 1942 or 1943 being almost as high owing to large ice jam.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 669 ft<sup>3</sup>/s, Apr. 22, gage height, 8.44 ft; maximum gage height, 9.55 ft, Mar. 7, backwater from ice; minimum daily, 2.0 ft<sup>3</sup>/s, Oct. 28.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.0	14	15	10	8.9	8.7	107	467	264	78	70	56
2	9.5	7.2	13	10	9.0	11	112	471	230	78	39	57
3	8.1	10	13	11	9.7	14	125	450	217	66	32	57
4	21	7.4	13	11	9.9	24	111	436	195	94	32	52
5	3.2	16	12	11	9.9	302	132	365	183	81	27	47
6	6.7	8.5	11	11	9.9	450	131	334	183	63	23	48
7	7.4	11	11	10	11	550	129	272	183	66	28	46
8	14	8.7	11	8.7	11	500	129	290	180	66	22	46
9	6.5	9.3	11	10	10	450	118	283	179	58	40	50
10	13	8.7	11	10	9.9	449	117	328	179	63	38	54
11	19	8.7	11	11	8.7	286	128	312	179	63	31	56
12	27	9.6	12	13	7.6	271	106	327	179	69	36	59
13	21	11	11	11	7.6	267	109	313	171	66	43	55
14	20	13	11	11	7.6	262	100	311	166	81	48	56
15	16	14	10	11	7.6	272	70	306	188	78	47	61
16	15	14	11	11	7.6	285	88	291	183	81	88	56
17	24	15	11	11	7.6	312	105	297	190	78	76	71
18	13	16	10	13	8.7	332	179	302	185	66	56	74
19	13	15	11	13	8.7	295	237	300	180	63	49	153
20	15	14	10	13	8.7	241	286	267	200	63	57	366
21	14	13	10	14	7.6	213	441	259	190	66	37	356
22	11	14	11	13	8.7	222	641	248	185	69	56	270
23	9.2	14	13	13	8.7	234	584	250	190	69	65	221
24	19	13	14	14	8.7	228	476	253	190	72	100	180
25	11	14	11	11	8.7	246	421	255	190	72	129	168
26	18	14	11	10	8.7	233	381	256	190	72	116	210
27	4.7	14	11	9.2	8.7	201	392	262	180	72	100	201
28	2.0	14	10	9.2	8.7	177	420	265	120	75	89	204
29	21	14	10	8.9	---	187	435	267	100	75	83	209
30	6.8	14	10	8.7	---	120	454	266	81	75	72	187
31	12	---	10	9.2	---	134	---	265	---	75	65	---
TOTAL	408.1	369.1	350	340.9	248.1	7776.7	7264	9568	5430	2213	1794	3726
MEAN	13.2	12.3	11.3	11.0	8.86	251	242	309	181	71.4	57.9	124
MAX	27	16	15	14	11	550	641	471	264	94	129	366
MIN	2.0	7.2	10	8.7	7.6	8.7	70	248	81	58	22	46
AC-FT	809	732	694	676	492	15430	14410	18980	10770	4390	3560	7390
CAL YR 1985	TOTAL	10496.6		MEAN	28.8	MAX	205	MIN	2.0	AC-FT	20820	
WTR YR 1986	TOTAL	39487.9		MEAN	108	MAX	641	MIN	2.0	AC-FT	78320	



## JAMES RIVER BASIN

06470500 JAMES RIVER AT LAMOURE, ND--CONTINUED

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1957 to current year.

PERIOD OF DAILY RECORDS.--

WATER TEMPERATURE: June 1953 to September 1975, October 1976 to current year.

SPECIFIC CONDUCTANCE: October 1976 to current year.

INSTRUMENTATION.--Temperature recorder from June 1953 to September 1978. Water-quality monitor since October 1982.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum, 33.0°C July 12, 13, 1957; July 23, 1977; minimum, 0.0°C on many days during winter months.

SPECIFIC CONDUCTANCE: Maximum daily, 1,880 microsiemens, Jan. 31, 1979; minimum daily, 200 microsiemens, Mar. 24-26, 1978.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURE: Maximum recorded (more than 20 percent missing record), 27.5°C, July 24; minimum, 0.0°C on many days during winter months.

SPECIFIC CONDUCTANCE: Maximum recorded (more than 20 percent missing record), 1,560 microsiemens, Jan. 7; minimum, 310 microsiemens, Apr. 17.

## WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	COLOR (PLAT- INUM- COBALT UNITS) (00080)	TUR- BID- ITY (NTU) (00076)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED SATUR- ATION (00301)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	
DATE	TIME												
OCT													
02...	1400	15	760	8.62	15.0	6.5	20	9.6	13.2	106	230	3	
NOV													
18...	1400	15	1170	8.48	-10.0	2.5	15	3.3	13.8	100	370	29	
JAN													
08...	1000	10	1550	7.58	-10.0	0.5	20	3.2	6.1	41	470	5	
FEB													
26...	0945	9.9	1400	--	--	0.5	--	--	--	--	--	--	
MAR													
31...	1540	139	530	8.56	12.0	8.5	--	--	11.5	97	--	--	
APR													
21...	1300	439	560	--	8.0	4.0	30	13	16.2	121	210	38	
MAY													
27...	1300	259	710	8.28	25.0	19.0	30	30	9.3	98	250	18	
JUL													
08...	1300	70	750	8.48	20.0	22.0	25	25	6.3	71	270	20	
AUG													
20...	1000	73	820	8.33	21.0	21.5	15	33	6.6	73	280	22	
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)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	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													
02...	50	25	68	38	2	8.5	225		1.0	110	38	0.2	16
NOV													
18...	89	37	94	35	2	10	346		2.2	210	60	0.2	17
JAN													
08...	110	48	180	44	4	13	467		24	290	88	0.7	26
APR													
21...	46	22	34	25	1	11	167		--	110	11	0.1	8.6
MAY													
27...	52	28	54	31	2	13	227		2.3	130	19	0.2	8.8
JUL													
08...	61	29	60	31	2	13	252		1.6	120	19	0.2	18
AUG													
20...	65	29	64	32	2	12	260		2.3	140	30	0.2	17



## 06470500 JAMES RIVER AT LAMOUR, ND--CONTINUED

## WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	SOLIDS, RESIDUE AT 105 DEG. C, SUS- PENDE (MG/L) (00530)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L) AS N) (00615)	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)	PHOS- PHORUS, DIS- SOLVED (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 02...	476	450	0.65	20	20	--	<0.01	--	<0.10	--	0.07	--
NOV 18...	737	730	1.0	30	5	--	0.01	--	0.15	--	0.05	0.027
JAN 08...	1030	1000	1.4	28	5	<0.01	0.01	0.30	0.26	--	0.17	0.163
MAR 31...	--	--	--	--	63	<0.01	--	<0.10	--	0.30	--	--
APR 21...	348	340	0.47	412	23	0.01	<0.01	<0.10	<0.10	0.20	0.06	0.045
MAY 27...	459	440	0.62	321	70	--	0.01	--	<0.10	--	0.06	0.048
JUL 08...	495	470	0.67	94	69	--	<0.01	--	<0.10	--	0.13	0.122
AUG 20...	516	510	0.7	102	71	0.01	<0.01	<0.10	<0.10	0.37	0.11	0.109

DATE	ANTI- MONY, TOTAL (UG/L) AS SB) (01097)	ANTI- MONY, DIS- SOLVED (UG/L) AS SB) (01095)	ARSENIC TOTAL (UG/L) AS AS) (01002)	ARSENIC DIS- SOLVED (UG/L) AS AS) (01000)	BARIUM, TOTAL RECOV- ERABLE (UG/L) AS BA) (01007)	BARIUM, DIS- SOLVED (UG/L) AS BA) (01005)	BERYL- LIUM, TOTAL RECOV- ERABLE (UG/L) AS BE) (01012)	BERYL- LIUM, DIS- SOLVED (UG/L) AS BE) (01010)	BORON, TOTAL RECOV- ERABLE (UG/L) AS B) (01022)	BORON, DIS- SOLVED (UG/L) AS B) (01020)	CADMIUM TOTAL RECOV- ERABLE (UG/L) AS CD) (01027)	CADMIUM DIS- SOLVED (UG/L) AS CD) (01025)
OCT 02...	--	--	--	--	--	--	--	--	--	250	--	--
NOV 18...	--	--	--	--	--	--	--	--	--	350	--	--
JAN 08...	--	<1	2	2	100	92	<10	<0.5	--	550	<1	<1
MAR 31...	--	--	--	--	100	--	<10	--	120	--	<1	--
APR 21...	<1	<1	2	2	100	49	<10	<0.5	60	90	1	<1
MAY 27...	--	<1	--	2	--	70	--	<0.5	--	130	--	2
JUL 08...	--	<1	--	5	--	84	--	<0.5	--	180	--	<1
AUG 20...	<1	<1	5	4	100	82	<10	<0.5	270	210	<1	1

DATE	CHRO- MIUM, TOTAL RECOV- ERABLE (UG/L) AS CR) (01034)	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)	MANGA- NESE, DIS- SOLVED (UG/L) AS MN) (01056)	MERCURY DIS- SOLVED (UG/L) AS HG) (71890)	NICKEL, TOTAL RECOV- ERABLE (UG/L) AS NI) (01067)	NICKEL, DIS- SOLVED (UG/L) AS NI) (01065)	SELE- NIUM, TOTAL (UG/L) AS SE) (01147)
OCT 02...	--	--	--	2	7	<1	5	0.1	--	--	--
NOV 18...	--	--	--	2	35	<5	16	0.1	--	--	--
JAN 08...	7	<1	--	1	7	<1	950	0.2	2	4	<1
MAR 31...	--	--	--	--	--	--	--	--	4	--	--
APR 21...	--	<1	<3	4	11	<1	110	0.3	3	1	<1
MAY 27...	--	<1	<3	1	11	<1	370	0.3	--	3	--
JUL 08...	--	<1	<3	2	13	<5	120	0.2	--	3	--
AUG 20...	--	<1	<3	<1	5	<5	310	0.1	8	3	<1

## JAMES RIVER BASIN

06470500 JAMES RIVER AT LAMOURE, ND--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG) (01077)	SILVER, DIS- SOLVED (UG/L AS AG) (01075)	THAL- LIUM, TOTAL (UG/L AS TL) (01059)	THAL- LIUM, DIS- SOLVED (UG/L AS TL) (01057)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	CYANIDE TOTAL (MG/L AS CN) (00720)	CYANIDE DIS- SOLVED (MG/L AS CN) (00723)	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 02...	<1	--	--	--	--	10	--	--	30	1.2	94
NOV 18...	<1	--	--	--	--	8	--	--	27	1.1	14
JAN 08...	<1	<1	<1	--	--	8	<0.01	<0.01	3	0.08	100
MAR 31...	--	<1	--	<1	--	--	<0.01	--	67	25	96
APR 21...	<1	<1	<1	<1	<1	10	<0.01	<0.01	29	34	99
MAY 27...	<1	--	<1	--	<1	18	--	<0.01	68	47	95
JUL 08...	<1	--	<1	--	<1	10	--	<0.01	65	12	100
AUG 20...	<1	<1	<1	<1	<1	12	<0.01	<0.01	73	14	98

DATE	TIME	SAMPLE LOC- ATION, CROSS SECTION (FT FM L BANK) (00009)	TEMPER- ATURE (DEG C) (00010)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)
AUG				
20...	0930	0.0	21.5	820
20...	0931	10.0	21.5	820
20...	0932	20.0	21.5	820
20...	0933	30.0	21.5	820
20...	0935	40.0	21.5	820
20...	0936	50.0	21.5	820
20...	0937	60.0	21.5	820

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986[illegible]

## JAMES RIVER BASIN

06470500 JAMES RIVER AT LAMOURE, ND--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	JUNE			JULY			AUGUST			SEPTEMBER		
1	23.0	20.5	21.5	22.0	18.5	20.0	23.0	21.0	22.0	20.0	17.5	18.5
2	22.0	20.0	21.0	21.0	20.5	20.5	22.0	20.0	21.0	18.0	17.5	17.5
3	22.0	18.5	20.5	24.5	21.0	23.0	21.5	20.0	20.5	19.0	16.5	17.5
4	21.0	19.5	20.5	25.5	22.5	24.0	22.5	21.0	22.0			
5	21.0	18.0	19.5	25.0	23.5	24.0	23.0	21.5	22.0			
6	20.5	19.5	20.0	24.0	21.5	23.0	21.5	20.5	21.0			
7	21.5	18.5	20.0	24.0	22.0	23.0	22.0	20.0	20.5			
8	20.0	18.5	19.5	23.0	21.5	22.0	23.0	19.5	21.0			
9	20.5	18.5	19.5	24.0	21.0	22.5	22.0	20.5	21.5			
10	20.0	19.0	19.5	25.0	22.5	23.5	20.5	19.0	20.0			
11	19.5	16.0	18.0	24.0	22.5	23.0	20.0	18.5	19.0			
12	20.0	17.5	18.5	23.0	21.5	22.0	21.0	19.5	20.5			
13	21.0	18.0	19.5	22.5	20.0	21.0	22.0	20.0	21.0			
14	22.0	18.5	20.0	25.5	20.5	22.5	22.5	20.0	21.5			
15	23.5	20.0	21.5	25.5	22.5	24.0	23.5	20.5	22.0			
16	22.0	19.0	20.5	25.5	24.0	25.0	23.0	21.0	22.0			
17	20.5	19.5	20.0	26.0	24.5	25.0	21.0	19.5	20.5			
18	20.0	19.0	19.5	26.0	24.0	25.0	21.5	19.5	20.5			
19				26.0	23.5	24.5	23.0	20.5	21.5			
20				25.5	22.5	24.0	23.0	20.5	21.5			
21				25.5	22.5	23.5	20.5	18.5	19.5			
22				25.5	22.5	24.0	19.0	17.5	18.0			
23				26.5	23.0	25.0	19.5	16.5	17.5			
24				27.5	24.5	25.5	19.5	17.5	18.0			
25				26.0	23.5	25.0	20.5	18.0	19.0			
26				26.0	23.5	24.5	19.0	17.5	18.5			
27				26.0	23.5	24.5	19.0	17.0	17.5			
28				25.0	23.0	23.5	19.0	16.0	17.5			
29				25.5	22.5	24.0	19.5	16.0	17.5			
30	19.5	19.0	19.5	24.5	22.5	23.5	19.0	17.0	18.0			
31				23.5	21.5	22.5	20.5	19.0	19.5			
MONTH												
YEAR	27.5	.0	9.0	27.5	18.5	23.5	23.5	16.0	20.0			

SPECIFIC CONDUCTANCE (MICROSIEMENS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCTOBER			NOVEMBER			DECEMBER			JANUARY		
1	770	750	758	1030	1020	1020	1370	1340	1360	1540	1530	1530
2	770	750	761	1040	1020	1030	1390	1360	1380	1540	1530	1540
3	770	760	768	1050	1000	1030	1400	1380	1390	1550	1530	1540
4	780	770	773	1050	1040	1050	1420	1390	1410	1550	1540	1540
5	790	770	777	1060	1050	1050	1430	1410	1420	1550	1540	1550
6	800	780	790	1070	1050	1060	1440	1420	1430	1550	1530	1540
7	810	790	798	1070	1060	1070	1470	1440	1450	1560	1490	1540
8	810	800	806	1080	1070	1070	1470	1450	1470	1560	1540	1550
9	820	800	811	1080	1030	1070	1480	1470	1480	1540	1540	1540
10	830	810	818	1100	1080	1090	1490	1460	1480	1560	1530	1540
11	840	830	836	1100	1090	1100	1500	1480	1490	1550	1530	1540
12	850	840	843	1110	1100	1100	1500	1450	1490	1560	1550	1550
13	860	840	850	1130	1110	1120	1490	1460	1480	1560	1550	1550
14	870	850	863	1140	1120	1130	1490	1480	1490	1550	1540	1550
15	880	860	870	1140	1130	1140	1500	1490	1490	1540	1540	1540
16	890	870	874	1160	1140	1150	1500	1490	1490	1540	1540	1540
17	900	870	883	1170	1160	1160	1500	1490	1490	1540	1540	1540
18	900	890	892	1180	1160	1170	1500	1480	1490	1540	1530	1540
19	910	890	897	1180	1170	1180	1500	1490	1500	1530	1530	1530
20	910	870	900	1190	1170	1180	1500	1490	1500	1530	1530	1530
21	930	910	920	1200	1190	1190	1510	1490	1500	1530	1530	1530
22	930	920	924	1210	1190	1200	1520	1500	1500	1530	1530	1480
23	940	930	934	1220	1200	1210	1510	1500	1500	1520	1520	1500
24	970	930	948	1220	1210	1220	1510	1490	1500	1530	1520	1520
25	960	950	957	1230	1220	1230	1520	1500	1510	1540	1520	1520
26	970	950	966	1240	1230	1240	1520	1510	1510	1520	1510	1520
27	990	960	973	1260	1230	1240	1530	1520	1520	1520	1510	1510
28	990	980	986	1280	1250	1270	1530	1520	1530	1510	1510	1510
29	1000	980	994	1310	1270	1290	1530	1520	1530	1510	1510	1510
30	1010	990	1000	1340	1310	1330	1540	1530	1530	1520	1490	1510
31	1020	1000	1010				1540	1530	1530	1500	1500	1500
MONTH	1020	750	877	1340	1000	1150	1540	1340	1480	1560	1490	1530





## JAMES RIVER BASIN

06470800 BEAR CREEK NEAR OAKES, ND

LOCATION.--Lat 46°13'31", long 98°04'17", in NE1/4NE1/4 sec.28, T.132 N., R.59 W., Dickey County, Hydrologic Unit 10160003, on right bank 80 ft downstream from bridge on ND Highway 13, 6 mi north, and 1 mi east of Oakes.

DRAINAGE AREA.--About 437 mi<sup>2</sup>, contributing.

## WATER-DISCHARGE RECORDS

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

GAGE.--Water-stage recorder. Datum of gage is 1,291.30 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Mar. 18-30, Apr. 10-14, and May 21 to September 30. Records poor.

AVERAGE DISCHARGE.--10 years, 8.71 ft<sup>3</sup>/s, 6,310 acre-ft/yr; median of yearly mean discharges, 5.4 ft<sup>3</sup>/s, 3,900 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,170 ft<sup>3</sup>/s, Apr. 15, 1979, gage height, 11.47 ft; no flow for long periods each year.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of July 1, 1975, reached a stage of 15.00 ft present datum, from floodmark, discharge 4,590 ft<sup>3</sup>/s.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 50 ft<sup>3</sup>/s and maximum (\*):

Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)	Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)
Mar. 26	----	85	ice jam	Apr. 29	1530	*383	*9.17
Apr. 21	1015	260	8.47	May 11	1300	84	6.83

No flow for several months.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.00	.00	17	268	5.5	6.0	16	.00
2	.00	.00	.00	.00	.00	.00	14	193	5.0	6.5	18	.00
3	.00	.00	.00	.00	.00	.00	13	140	4.5	6.0	12	.00
4	.00	.00	.00	.00	.00	.00	13	97	4.0	5.5	7.7	.00
5	.00	.00	.00	.00	.00	.00	15	67	3.5	5.0	4.5	.00
6	.00	.00	.00	.00	.00	.00	16	51	3.0	4.5	2.0	.00
7	.00	.00	.00	.00	.00	.00	14	43	2.8	4.0	1.0	.00
8	.00	.00	.00	.00	.00	.00	12	44	2.5	3.6	.60	.00
9	.00	.00	.00	.00	.00	.00	11	68	2.2	2.9	.30	.00
10	.00	.00	.00	.00	.00	.00	10	62	2.0	2.6	.15	.00
11	.00	.00	.00	.00	.00	.00	9.0	81	1.8	2.2	.00	.00
12	.00	.00	.00	.00	.00	.00	9.0	73	1.6	1.9	.00	.00
13	.00	.00	.00	.00	.00	.00	10	55	1.4	1.5	.07	.00
14	.00	.00	.00	.00	.00	.00	11	44	1.3	1.4	.30	.00
15	.00	.00	.00	.00	.00	.00	12	36	1.2	2.3	.11	.00
16	.00	.00	.00	.00	.00	.00	14	30	1.1	2.1	.11	.00
17	.00	.00	.00	.00	.00	.00	19	25	1.0	1.7	.03	.00
18	.00	.00	.00	.00	.00	.00	21	22	1.3	1.4	.00	.00
19	.00	.00	.00	.00	.00	.50	41	20	1.4	1.3	.00	.50
20	.00	.00	.00	.00	.00	1.0	183	19	1.5	1.2	.00	.40
21	.00	.00	.00	.00	.00	5.0	257	17	1.4	1.2	.00	.50
22	.00	.00	.00	.00	.00	10	258	15	1.2	1.1	.06	.40
23	.00	.00	.00	.00	.00	20	231	13	1.1	1.1	.06	.35
24	.00	.00	.00	.00	.00	35	170	13	1.0	.90	.06	.30
25	.00	.00	.00	.00	.00	50	120	13	.90	1.7	.04	.35
26	.00	.00	.00	.00	.00	80	111	12	1.0	2.2	.02	.30
27	.00	.00	.00	.00	.00	50	156	11	1.2	2.7	.00	.25
28	.00	.00	.00	.00	.00	35	251	11	2.0	2.6	.00	.20
29	.00	.00	.00	.00	.00	30	361	8.1	3.0	2.3	.00	.15
30	.00	.00	.00	.00	.00	25	343	6.8	5.0	5.1	.00	.10
31	.00	.00	.00	.00	.00	18	---	5.8	---	6.7	.00	---
TOTAL	.00	.00	.00	.00	.00	359.50	2722.0	1563.7	66.40	91.20	63.11	3.80
MEAN	.00	.00	.00	.00	.00	11.6	90.7	50.4	2.21	2.94	2.04	.13
MAX	.00	.00	.00	.00	.00	80	361	268	5.5	6.7	18	.50
MIN	.00	.00	.00	.00	.00	.00	9.0	5.8	.90	.90	.00	.00
AC-FT	.00	.00	.00	.00	.00	713	5400	3100	132	181	125	7.5
CAL YR 1985	TOTAL	66.47		MEAN	.18	MAX	15	MIN	.00	AC-FT	132	
WTR YR 1986	TOTAL	4869.71		MEAN	13.3	MAX	361	MIN	.00	AC-FT	9660	

06470800 BEAR CREEK NEAR OAKES, ND--CONTINUED

## WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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)
MAR											
25...	1245	53	1180	--	8.0	1.0	--	--	--	--	--
31...	1700	18	610	7.66	--	10.0	150	3	32	17	62
MAY											
27...	1615	11	1020	--	28.0	22.0	--	--	--	--	--
		SODIUM AD- SORP- TION RATIO (00932)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINEITY LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR											
31...	45	2	14	150	100	40	0.2	12	393	370	0.53
		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											
31...	2	140	90	<1	30	70	0.4	1	<1	200	

## JAMES RIVER BASIN

06470830 JAMES RIVER AT OAKES, ND

LOCATION.--Lat 46°08'14", long 98°08'09", in NW1/4NE1/4NE1/4 sec.30, T.131 N., R.59 W., Dickey County Hydrologic Unit 10160003, on left bank 300 ft downstream from bridge 1.0 mi west of Oakes.

DRAINAGE AREA.--5,320 mi<sup>2</sup>, of which about 3,300 mi<sup>2</sup> is probably noncontributing.

## WATER-QUALITY RECORDS

GAGE.--Water-stage recorder. Datum of gage is 1,280.00 ft above National Vertical Datum of 1929. Flow regulated by Jamestown Reservoir (station 06469000).

PERIOD OF RECORD.--October 1982 to current year.

## PERIOD OF DAILY RECORDS.--

SPECIFIC CONDUCTANCE: March 1982 to current year.

WATER TEMPERATURE: March 1982 to current year.

INSTRUMENTATION.--Water quality monitor since October 1982.

REMARKS.--Long periods of missing record are the result of the monitor probes being frozen in ice or equipment failure. Because of the large percentage of missing or faulty record only daily mean values are presented and all extremes are qualified as observed or recorded.

## EXTREMES FOR PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: Maximum observed, 2,250 microsiemens, Jan. 7, 1986; minimum recorded, 290 microsiemens, Apr. 1, 1984.

WATER TEMPERATURE: Maximum, 27.5°C, July 7, 9, 12, 19, 26, 1985; minimum 0.0°C on many days during the winter months.

## EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURE: Maximum recorded, 25.0°C on many days; minimum, 0.0°C on many days during winter months.

SPECIFIC CONDUCTANCE: Maximum observed, 2,250 microsiemens, Jan. 7; minimum recorded, 470 microsiemens, Apr. 2.

## WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	TUR- BID- ITY (NTU) (00076)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED SATUR- ATION (MG/L) (00301)	HARD- NESS (MG/L AS CACO3) (00900)	NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)
JAN												
07...	1530	5.0	2250	7.85	-20.0	1.5	17	20.2	140	750	57	170
APR												
01...	1800	173	480	8.41	16.0	9.0	--	12.0	102	--	--	--
MAY												
27...	1630	300	770	8.35	28.0	22.0	26	10.0	112	270	31	57
JUL												
08...	1600	60	830	8.08	24.0	23.5	52	5.8	67	280	0	60
AUG												
21...	1500	60	940	8.47	220.0	20.0	30	9.2	98	310	13	69
DATE		MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	SODIUM AD- SORP- TION PERCENT SODIUM RATIO (00932)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	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)
JAN												
07...	80	240	40	4	18	697	19	460	140	0.6	19	1560
MAY												
27...	31	60	31	2	12	239	2.0	150	22	0.2	9.9	498
JUL												
08...	31	69	34	2	14	--	0	140	25	0.2	18	542
AUG												
21...	33	84	36	2	13	295	1.9	160	44	0.3	20	592

06470830 JAMES RIVER AT OAKES, ND--CONTINUED

## WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	SOLIDS, RESIDUE AT 105 DEG. C, SUS- PENDED (MG/L) (00530)	NITRO- GEN, NITRITE TOTAL (MG/L AS N) (00615)	NITRO- GEN, NITRATE 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, AMMONIA DIS- SOLVED (MG/L AS NH4) (71846)	PHOS- PHORUS, TOTAL (MG/L AS P) (00665)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P) (00666)
JAN 07...	1500	2.1	21	40	<0.01	<0.01	<0.10	<0.10	0.11	0.14	--	0.12
APR 01...	--	--	--	38	0.02	--	0.20	--	--	--	0.22	--
MAY 27...	490	0.68	403	46	--	<0.01	--	<0.10	0.05	0.06	--	0.07
JUL 08...	--	0.74	88	126	--	0.02	--	<0.10	0.33	0.43	--	0.14
AUG 21...	600	0.81	96	44	--	<0.01	--	<0.10	0.01	0.01	--	0.12

DATE	PHOS- PHORUS, ORTHO, DIS- SOLVED (MG/L AS P) (00671)	ANTI- MONY, DIS- SOLVED (UG/L AS SB) (01095)	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BARIUM, TOTAL RECOV- ERABLE (UG/L AS BA) (01007)	BARIUM, DIS- SOLVED (UG/L AS BA) (01005)	BERYL- LIUM, TOTAL RECOV- ERABLE (UG/L AS BE) (01012)	BERYL- LIUM, DIS- SOLVED (UG/L AS BE) (01010)	BORON, TOTAL RECOV- ERABLE (UG/L AS B) (01022)	BORON, DIS- SOLVED (UG/L AS B) (01020)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD) (01027)	CADMIUM DIS- SOLVED (UG/L AS CD) (01025)
JAN 07...	0.104	<1	4	3	100	100	<10	<10	--	720	1	<10
APR 01...	--	--	--	--	<100	--	<10	--	100	--	1	--
MAY 27...	0.049	<1	--	3	--	76	--	<0.5	--	140	--	<1
JUL 08...	0.116	<1	--	5	--	95	--	<0.5	--	200	--	<1
AUG 21...	0.114	<1	--	5	--	82	--	<0.5	--	280	--	<1

DATE	CHRO- MIUM, TOTAL RECOV- ERABLE (UG/L AS CR) (01034)	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)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)	NICKEL, TOTAL RECOV- ERABLE (UG/L AS NI) (01067)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, TOTAL (UG/L AS SE) (01147)
JAN 07...	10	<1	--	1	20	<1	150	0.4	4	3	<1
APR 01...	--	--	--	--	--	--	--	--	9	--	--
MAY 27...	--	<1	<3	1	9	1	310	0.2	--	3	--
JUL 08...	--	<1	<3	2	28	<5	890	<0.1	--	4	--
AUG 21...	--	<1	<3	<1	6	<5	120	--	--	3	--

DATE	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG) (01077)	SILVER, DIS- SOLVED (UG/L AS AG) (01075)	THAL- LIUM, TOTAL (UG/L AS TL) (01059)	THAL- LIUM, DIS- SOLVED (UG/L AS TL) (01057)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	CYANIDE TOTAL (MG/L AS CN) (00720)	CYANIDE DIS- SOLVED (MG/L AS CN) (00723)	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)
JAN 07...	<1	<1	<1	--	--	20	<0.01	<0.01	--	--	--
APR 01...	--	<1	--	<1	--	--	<0.01	--	35	16	97

## JAMES RIVER BASIN

06470830 JAMES RIVER AT OAKES, ND--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.0	---	---	---	---	---	---	---	21.5	21.0	22.0	---
2	7.0	---	---	---	---	---	---	---	21.0	22.5	22.0	---
3	7.5	---	---	---	---	---	---	---	21.0	22.0	22.0	---
4	8.5	---	---	---	---	---	---	---	21.0	22.0	21.5	17.5
5	6.5	---	---	---	---	---	---	---	20.5	23.5	---	15.5
6	7.0	4.0	---	---	---	---	---	---	20.0	22.0	---	14.5
7	6.5	2.5	---	---	---	---	---	---	21.0	22.0	---	14.0
8	4.5	2.0	---	---	---	---	---	---	20.5	22.5	---	15.0
9	2.5	2.5	---	---	---	---	---	---	20.5	22.0	---	15.0
10	4.0	2.5	---	---	---	---	---	---	20.5	22.5	---	14.0
11	5.5	2.0	---	---	---	---	---	---	---	23.0	---	14.5
12	8.0	2.0	---	---	---	---	---	---	20.0	22.5	---	15.0
13	8.5	2.0	---	---	---	---	---	---	21.0	22.0	---	13.5
14	7.5	2.0	---	---	---	---	---	---	21.5	21.0	---	12.0
15	7.0	2.0	---	---	---	---	---	---	22.0	21.0	---	11.5
16	7.0	1.5	---	---	---	---	---	---	21.5	21.0	---	12.0
17	8.0	1.5	---	---	---	---	---	---	21.0	21.0	---	12.5
18	8.0	---	---	---	---	---	---	---	21.0	21.0	---	13.0
19	9.0	---	---	---	---	---	---	---	22.0	23.0	---	12.5
20	9.0	---	---	---	---	---	---	---	22.0	22.0	---	13.0
21	9.5	---	---	---	---	---	---	---	22.5	22.5	---	13.5
22	11.0	---	---	---	---	---	---	---	23.0	23.0	---	13.5
23	10.5	---	---	---	---	---	---	---	22.0	22.5	---	13.5
24	8.5	---	---	---	---	---	---	---	21.5	23.0	---	15.0
25	6.0	---	---	---	---	---	---	---	22.0	22.5	---	15.0
26	3.5	---	---	---	---	---	---	---	22.0	22.5	---	16.0
27	---	---	---	---	---	---	---	---	22.0	23.0	---	16.0
28	---	---	---	---	---	---	---	21.0	22.0	23.5	---	15.5
29	---	---	---	---	---	---	---	22.0	22.5	23.0	---	14.0
30	---	---	---	---	---	---	---	22.0	---	23.0	---	14.0
31	---	---	---	---	---	---	---	22.0	---	23.0	---	---
MEAN	---	---	---	---	---	---	---	---	---	22.5	---	---
MAX	---	---	---	---	---	---	---	---	---	23.5	---	---
MIN	---	---	---	---	---	---	---	---	---	21.0	---	---

SPECIFIC CONDUCTANCE (MICROSIEMENS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	883	918	---	---	---	---	---	610	---	749	841	---
2	912	933	---	---	---	---	485	598	---	758	839	---
3	918	946	---	---	---	---	519	609	780	782	841	---
4	901	951	---	---	---	---	544	636	782	798	840	808
5	876	942	---	---	---	---	586	644	786	805	---	782
6	888	943	---	---	---	---	615	634	790	813	---	754
7	901	950	---	---	---	---	620	648	799	827	---	732
8	877	961	---	---	---	---	650	661	801	823	---	730
9	884	979	---	---	---	---	671	662	805	822	---	747
10	908	---	---	---	---	---	690	686	808	830	---	760
11	920	---	---	---	---	---	692	729	808	835	---	743
12	920	---	---	---	---	---	679	725	810	833	---	751
13	901	---	---	---	---	---	687	744	838	841	---	756
14	894	---	---	---	---	---	673	749	880	861	---	764
15	893	---	---	---	---	---	685	753	890	860	---	783
16	902	---	---	---	---	---	679	738	843	848	---	783
17	903	---	---	---	---	---	683	735	816	867	---	800
18	898	---	---	---	---	---	678	750	820	870	---	846
19	893	---	---	---	---	---	614	755	840	875	---	860
20	894	---	---	---	---	---	638	753	810	882	---	922
21	903	---	---	---	---	---	653	746	797	883	---	950
22	927	---	---	---	---	---	667	743	779	893	---	869
23	920	---	---	---	---	---	594	754	765	885	---	805
24	902	---	---	---	---	---	555	753	758	869	---	787
25	898	---	---	---	---	---	562	753	785	857	---	768
26	900	---	---	---	---	---	575	755	768	859	---	714
27	912	---	---	---	---	---	580	757	738	866	---	678
28	925	---	---	---	---	---	588	758	752	876	---	658
29	905	---	---	---	---	---	625	780	752	876	---	653
30	919	---	---	---	---	---	624	786	742	844	---	642
31	933	---	---	---	---	---	---	790	---	840	---	---
MEAN	904	---	---	---	---	---	---	716	---	843	---	---
MAX	933	---	---	---	---	---	---	790	---	893	---	---
MIN	876	---	---	---	---	---	---	598	---	749	---	---



## 06470875 JAMES RIVER AT DAKOTA LAKE DAM NR LUDDEN, ND

LOCATION.--Lat 45°56'52", long 98°10'29", in SE1/4NE1/4NE1/4 sec.34, T.129 N., R.60 W., Dickey County, Hydrologic Unit 10160003, on left bank, 10 ft upstream from dam, 4.5 mi southwest of Ludden and .8 mi upstream from North Dakota-South Dakota state line.

DRAINAGE AREA.--5,480 mi<sup>2</sup>, of which about 3,300 mi<sup>2</sup> are noncontributing.

## WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1981 to current year.

GAGE.--Water-stage recorder and concrete dam control. Datum of gage is 1,280.00 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Nov. 14-16, Mar. 10 to May 13, June 3-30, July 4-7, and Sept. 26-30. Records good except those for periods of estimated daily discharges, which are poor. Flow regulated by upstream reservoirs, Jamestown Reservoir (station 06469000), Pipestem Lake, capacity 147,000 acre-ft, and Lake LaMoure.

AVERAGE DISCHARGE.--5 years, 150 ft<sup>3</sup>/s, 108,700 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,060 ft<sup>3</sup>/s, Apr. 4, 1984, gage height, 13.02 ft, no flow at times during most years.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, about 900 ft<sup>3</sup>/s, May 7, gage height, 11.4 ft; maximum gage height, 11.68 ft, Mar. 18; no flow Oct. 3, 11, 22.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.02	35	15	5.8	6.5	15	440	880	308	115	112	126
2	.05	14	14	5.8	6.5	15	290	860	125	60	98	61
3	.00	20	14	5.8	6.1	15	270	780	200	79	67	85
4	65	7.1	14	5.8	6.5	19	200	730	260	100	57	94
5	7.8	2.9	14	5.8	5.9	23	190	670	250	70	50	90
6	5.7	13	14	5.8	6.0	21	151	750	200	65	39	83
7	17	31	13	5.8	6.0	21	214	830	160	76	68	53
8	25	25	11	4.9	5.4	21	214	800	200	99	48	33
9	3.9	23	12	4.1	6.0	28	152	700	160	63	49	56
10	.01	19	12	4.2	5.9	50	125	750	180	50	46	73
11	.00	17	12	5.5	5.5	200	235	700	180	77	26	74
12	1.6	15	11	5.6	5.3	300	209	600	170	67	25	56
13	1.5	15	11	4.8	5.2	400	142	550	160	81	16	67
14	5.2	18	11	5.1	4.6	500	75	530	170	58	45	72
15	11	18	9.6	5.0	4.2	550	35	500	180	89	19	78
16	4.6	19	9.6	5.1	4.5	580	5.0	480	170	119	69	51
17	16	19	9.6	5.4	3.7	600	23	450	150	89	50	73
18	7.9	23	7.9	5.8	3.7	620	75	420	140	108	23	76
19	7.8	12	7.5	5.6	3.7	600	190	400	130	99	19	108
20	4.8	12	7.5	6.3	4.6	550	230	380	170	84	110	92
21	1.9	12	7.5	6.2	4.3	500	270	350	180	50	59	112
22	.00	12	7.5	6.2	3.4	480	200	320	190	55	102	135
23	.34	12	7.5	6.4	3.4	450	280	300	220	15	73	173
24	19	13	7.5	6.6	3.2	400	500	350	190	93	37	185
25	16	14	7.1	6.3	3.1	500	680	360	120	94	91	219
26	69	15	6.0	5.9	5.2	600	720	340	170	83	130	250
27	14	15	5.9	5.3	10	650	750	320	190	94	73	250
28	4.5	15	5.8	6.1	10	700	780	290	180	78	57	250
29	32	14	5.8	6.3	---	600	760	287	160	71	77	150
30	8.0	15	5.8	6.0	---	580	770	293	140	115	103	200
31	11	---	5.8	6.1	---	550	---	246	---	100	105	---
TOTAL	360.62	495.0	301.9	175.4	148.4	11138	9175.0	16216	5403	2496	1943	3425
MEAN	11.6	16.5	9.74	5.66	5.30	359	306	523	180	80.5	62.7	114
MAX	69	35	15	6.6	10	700	780	880	308	119	130	250
MIN	.00	2.9	5.8	4.1	3.1	15	5.0	246	120	15	16	33
AC-FT	715	982	599	348	294	22090	18200	32160	10720	4950	3850	6790
CAL YR 1985	TOTAL	9971.29		MEAN	27.3	MAX	296	MIN	.00	AC-FT	19780	
WTR YR 1986	TOTAL	51277.32		MEAN	140	MAX	880	MIN	.00	AC-FT	101700	

## JAMES RIVER BASIN

06470875 JAMES RIVER AT DAKOTA LAKE DAM NEAR LUDDEN, ND--CONTINUED

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--October 1982 to current year.

## PERIOD OF DAILY RECORDS.--

WATER TEMPERATURE: October 1982 to current year.  
 SPECIFIC CONDUCTANCE: October 1982 to current year.  
 DISSOLVED OXYGEN: October 1982 to current year.  
 PH: June 1983 to current year.

INSTRUMENTATION.--Water quality monitor since October 1982.

REMARKS.--Unpublished records of daily dissolved oxygen and pH are available in files at the District office.

## EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum, 29.0°C, Aug. 27, 1984; minimum, 0.0°C, several days during winter months each year.  
 SPECIFIC CONDUCTANCE: Maximum recorded, 2,620 microsiemens, Feb. 28, 1986; minimum recorded, 217 microsiemens, July 13, 1983.

## EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURE: Maximum, 28.0°C, June 26; minimum, 0.0°C, several days during winter months.  
 SPECIFIC CONDUCTANCE: Maximum recorded, 2,620 microsiemens, Feb. 28; minimum recorded, 336 microsiemens, April 1.

## WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

		STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	TUR- BID- ITY (NTU) (00076)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	
DATE	TIME												
OCT													
01...	1100	0.1	1100	8.81	6.0	5.0	16	14.2	108	250	15	43	
NOV													
19...	1000	15	1320	8.03	-12.0	2.0	9.3	5.8	41	310	55	59	
JAN													
09...	1000	4.5	1750	7.80	0.0	1.0	6.0	0.5	3	620	50	120	
FEB													
26...	1450	5.1	--	--	5.0	1.0	--	--	--	--	--	--	
APR													
01...	1500	426	410	8.35	15.0	2.5	--	12.0	117	--	--	--	
22...	1130	157	740	--	13.0	7.0	22	14.5	118	230	48	49	
MAY													
02...	0830	855	640	--	0.0	9.0	32	9.2	77	200	50	44	
28...	1330	292	820	8.50	23.0	20.5	6.8	9.8	106	290	45	63	
JUL													
07...	1530	58	800	8.68	29.0	23.0	40	7.8	89	280	0	60	
AUG													
21...	1130	57	860	8.58	19.0	20.0	18	8.2	88	310	48	69	
		MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	PERCENT SODIUM RATIO (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	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)
OCT													
01...	35	130	51	4	14	236		0.7	200	69	0.3	13	688
NOV													
19...	40	130	46	3	14	257		4.6	270	69	0.3	19	762
JAN													
09...	77	180	38	3	18	567	17	360	93	0.4	41		1240
22...	25	58	35	2	9.8	177	--	160	33	0.2	9.6		464
MAY													
02...	23	44	31	1	10	155	--	150	22	0.1	15		410
28...	33	62	30	2	14	248	1.5	160	24	0.2	14		530
JUL													
07...	31	66	33	2	15	--	0	150	20	0.2	13		514
AUG													
21...	33	67	31	2	13	260	1.3	170	32	0.2	18		516

## 06470875 JAMES RIVER AT DAKOTA LAKE DAM NEAR LUDDEN, ND--CONTINUED

## WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	SOLIDS, RESIDUE AT 105 DEG. C, SUS- PENDE (MG/L) (00530)	NITRO- GEN, NITRITE TOTAL (MG/L AS N) (00615)	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, AMMONIA DIS- SOLVED (MG/L AS NH4) (71846)	PHOS- PHORUS, TOTAL (MG/L AS P) (00665)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P) (00666)
OCT 01...	650	0.94	0.19	38	--	0.04	--	0.14	0.94	1.2	--	0.15
NOV 19...	760	1.0	31	14	--	0.01	--	0.10	0.07	0.09	--	0.08
JAN 09...	1200	1.7	15	8	<0.01	<0.01	<0.10	<0.10	2.00	2.6	--	0.80
APR 01...	--	--	--	24	0.01	--	0.20	--	--	--	0.20	--
22...	450	0.63	197	41	0.02	0.01	<0.10	<0.10	0.06	0.08	0.20	0.06
MAY 02...	400	0.56	946	--	--	<0.01	--	<0.10	0.06	0.08	--	0.06
28...	520	0.72	418	29	--	<0.01	--	<0.10	0.03	0.04	--	0.03
JUL 07...	--	0.7	80	70	--	<0.01	--	<0.10	0.04	0.05	--	0.04
AUG 21...	560	0.7	79	29	<0.01	<0.01	<0.10	<0.10	<0.01	--	0.18	0.04
DATE	PHOS- PHORUS, ORTHO, DIS- SOLVED (MG/L AS P) (00671)	ANTI- MONY, TOTAL (UG/L AS SB) (01097)	ANTI- MONY, DIS- SOLVED (UG/L AS SB) (01095)	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BARIUM, TOTAL RECOV- ERABLE (UG/L AS BA) (01007)	BARIUM, DIS- SOLVED (UG/L AS BA) (01005)	BERYL- LIUM, TOTAL RECOV- ERABLE (UG/L AS BE) (01012)	BERYL- LIUM, DIS- SOLVED (UG/L AS BE) (01010)	BORON, TOTAL RECOV- ERABLE (UG/L AS B) (01022)	BORON, DIS- SOLVED (UG/L AS B) (01020)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD) (01027)
OCT 01...	0.12	--	--	--	--	--	--	--	--	--	340	--
NOV 19...	0.069	--	--	--	--	--	--	--	--	--	310	--
JAN 09...	0.696	--	<1	10	6	200	140	<10	0.6	--	410	<1
FEB 26...	--	--	--	--	--	--	--	--	--	--	--	--
APR 01...	--	--	--	--	--	<100	--	<10	--	110	--	<1
22...	0.041	<1	<1	2	2	100	51	<10	<0.5	140	140	<1
MAY 02...	0.033	--	<1	--	2	--	59	--	<0.5	--	120	--
28...	0.013	--	<1	--	<1	--	77	--	<0.5	--	150	--
JUL 07...	0.021	--	<1	--	4	--	96	--	<0.5	--	170	--
AUG 21...	0.028	<1	<1	4	3	100	90	<10	<0.5	290	210	<1
DATE	CADMIUM DIS- SOLVED (UG/L AS CD) (01025)	CHRO- MIUM, TOTAL RECOV- ERABLE (UG/L AS CR) (01034)	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)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)	NICKEL, TOTAL RECOV- ERABLE (UG/L AS NI) (01067)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, TOTAL (UG/L AS SE) (01147)
OCT 01...	--	--	--	--	1	17	3	7	0.3	--	--	--
NOV 19...	--	--	--	--	2	25	<5	190	0.1	--	--	--
JAN 09...	<1	6	<1	--	1	28	<1	5700	0.2	2	5	<1
APR 01...	--	--	--	--	--	--	--	--	--	4	--	--
22...	<1	--	<1	<3	2	18	<1	9	0.1	6	2	<1
MAY 02...	<1	--	<1	<3	2	35	2	19	<0.1	--	4	--
28...	<1	--	<1	<3	<1	3	<5	25	0.2	--	3	--
JUL 07...	<1	--	<1	<3	1	5	<5	10	0.2	--	2	--
AUG 21...	1	--	<1	<3	<1	4	<5	2	0.2	12	1	<1

## JAMES RIVER BASIN

06470875 JAMES RIVER AT DAKOTA LAKE DAM NEAR LUDDEN, ND--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	SELENIUM, DIS-SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOVERABLE (UG/L AS AG) (01077)	SILVER, DIS-SOLVED (UG/L AS AG) (01075)	THALLIUM, TOTAL (UG/L AS TL) (01059)	THALLIUM, DIS-SOLVED (UG/L AS TL) (01057)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)	CYANIDE TOTAL (MG/L AS CN) (00720)	CYANIDE DIS-SOLVED (MG/L AS CN) (00723)	SEDIMENT, DISCHARGE, SUSPENDED (MG/L) (80154)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)	
OCT 01...	<1	--	--	--	--	9	--	--	71	0.02	100	
NOV 19...	<1	--	--	--	--	6	--	--	9	0.38	92	
JAN 09...	<1	<1	<1	--	--	9	<0.01	<0.01	24	0.29	82	
APR 01...	--	<1	--	<1	--	--	<0.01	--	28	32	93	
APR 22...	<1	<1	<1	<1	<1	7	<0.01	<0.01	31	13	94	
MAY 02...	<1	--	<1	--	<1	<3	--	<0.01	93	215	95	
MAY 28...	<1	--	<1	--	--	5	--	<0.01	42	33	99	
JUL 07...	<1	--	<1	--	<1	9	--	<0.01	71	11	100	
AUG 21...	<1	<1	<1	<1	<1	8	<0.01	<0.01	45	6.9	99	
DATE	TIME	ALDRIN, DIS-SOLVED (UG/L) (39331)	ALDRIN, TOTAL (UG/L) (39330)	AME-TRYNE TOTAL (82184)	ATRA-ZINE, TOTAL (UG/L) (39630)	CHLORDANE, DIS-SOLVED (UG/L) (39352)	CHLORDANE, TOTAL (UG/L) (39350)	CYAN-AZINE TOTAL (UG/L) (81757)	DDD, DIS-SOLVED (UG/L) (39361)	DDD, TOTAL (UG/L) (39360)	DDE, DIS-SOLVED (UG/L) (39366)	
APR 22...	1130	<0.01	<0.01	<0.1	0.2	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	
JUL 07...	1530	--	<0.01	<0.1	0.2	--	<0.1	<0.1	--	<0.01	--	
DATE	TIME	DDE, TOTAL (UG/L) (39365)	DDT, DIS-SOLVED (UG/L) (39371)	DDT, TOTAL (UG/L) (39370)	DI-AZINON, DIS-SOLVED (UG/L) (39572)	DI-AZINON, TOTAL (UG/L) (39570)	DI-ELDRIN, DIS-SOLVED (UG/L) (39381)	DI-ELDRIN, TOTAL (UG/L) (39380)	ENDO-SULFAN, TOTAL (UG/L) (39388)	ENDRIN, DIS-SOLVED (UG/L) (39391)	ENDRIN, TOTAL (UG/L) (39390)	ETHION, TOTAL (UG/L) (39398)
APR 22...		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
JUL 07...		<0.01	--	<0.01	--	<0.01	--	<0.01	<0.01	--	<0.01	<0.01
DATE	TIME	HEPTACHLOR, DIS-SOLVED (UG/L) (39411)	HEPTACHLOR, TOTAL (UG/L) (39410)	HEPTACHLOR EPOXIDE, DIS-SOLVED (UG/L) (39421)	HEPTACHLOR EPOXIDE, TOTAL (UG/L) (39420)	LINDANE, DIS-SOLVED (UG/L) (39341)	LINDANE, TOTAL (UG/L) (39340)	MALATHION, DIS-SOLVED (UG/L) (39532)	MALATHION, TOTAL (UG/L) (39530)	METHOXY-CHLOR, DISSOLVED (UG/L) (82350)	METHOXY-CHLOR, TOTAL (UG/L) (39480)	METHYL PARATHION, DIS-SOLVED (UG/L) (39602)
APR 22...		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
JUL 07...		--	<0.01	--	<0.01	--	<0.01	--	<0.01	--	<0.01	--
DATE	TIME	METHYL PARATHION, TOTAL (UG/L) (39600)	MIREX, DIS-SOLVED (UG/L) (39756)	MIREX, TOTAL (UG/L) (39755)	METHYL TRI-THION, TOTAL (UG/L) (39790)	METHYL TRI-THION, DISSOLVED (UG/L) (82344)	NAPHTHALENES, POLY-CHLOR. TOTAL (UG/L) (39250)	PARATHION, DIS-SOLVED (UG/L) (39542)	PARATHION, TOTAL (UG/L) (39540)	PCB, DIS-SOLVED (UG/L) (39517)	PCB, TOTAL (UG/L) (39516)	PCN DISSOLVED (UG/L) (82360)
APR 22...		<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	<0.01	<0.01	<0.1	<0.1	<0.1

## JAMES RIVER BASIN

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06470875 JAMES RIVER AT DAKOTA LAKE DAM NEAR LUDDEN, ND--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	TEMPER- ATURE (DEG C) (00010)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)
AUG			
21...	1130	20.0	860
21...	1200	20.0	860
21...	1201	20.0	860
21...	1202	20.0	860
21...	1203	20.0	850
21...	1204	20.0	850
21...	1205	20.0	860
21...	1206	20.0	860
21...	1207	20.0	850
21...	1208	20.0	860
21...	1209	20.0	860
21...	1210	20.0	860



## JAMES RIVER BASIN

06470875 JAMES RIVER AT DAKOTA LAKE DAM NEAR LUDDEN, ND--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCTOBER			NOVEMBER			DECEMBER			JANUARY		
1	16.5	4.5	6.5	6.5	3.5	5.5	1.5	1.0	1.0	1.5	1.0	1.0
2	8.5	5.5	7.0	6.5	4.0	5.0	1.5	1.5	1.5	1.5	1.5	1.5
3	16.5	1.5	7.5	6.5	4.5	5.5	1.5	1.5	1.5	1.5	1.5	1.5
4	16.0	7.0	8.0	7.5	4.0	5.5	1.5	1.5	1.5	1.5	1.5	1.5
5	8.0	6.5	7.0	6.5	3.5	6.0	2.0	1.5	1.5	1.5	1.5	1.5
6	9.5	4.0	7.5	6.0	3.0	5.0	2.0	1.5	1.5	1.5	1.5	1.5
7	8.0	6.0	7.0				2.0	1.5	1.5	1.5	1.0	1.0
8	6.5	3.5	5.0				2.0	1.5	1.5	1.5	1.0	1.0
9	5.0	2.5	4.0	1.0	.0	.5	2.0	1.5	1.5	1.0	1.0	1.0
10	7.0	4.0	5.0	1.0	.0	.5	2.0	1.5	1.5	1.0	1.0	1.0
11	8.5	4.5	6.5	1.0	.5	1.0	2.0	1.5	1.5	1.0	1.0	1.0
12	9.5	7.5	8.0	1.0	.5	1.0	2.0	1.5	1.5	1.5	.5	1.0
13	10.5	7.5	9.0	1.5	1.0	1.0	1.5	1.0	1.5	1.5	1.0	1.0
14	9.5	6.0	8.0				1.5	1.0	1.5	1.5	1.0	1.5
15	8.5	7.0	7.5				1.5	1.0	1.5	2.0	1.0	1.5
16	9.0	5.5	7.5				1.5	1.0	1.5	1.5	1.0	1.5
17	11.0	6.0	8.5	2.0	1.0	1.5	1.5	1.0	1.0	2.0	1.0	1.5
18	10.0	7.0	8.5	1.5	1.0	1.5	1.5	1.0	1.0	2.0	1.5	1.5
19	12.0	8.0	9.5	2.0	1.0	2.0	1.5	.5	1.0	2.0	1.5	1.5
20	11.5	8.0	9.5	2.0	1.5	1.5	1.5	1.0	1.0	2.0	1.5	1.5
21	11.0	6.5	10.0	2.0	1.5	1.5	1.5	1.0	1.5	1.5	.5	1.0
22	13.0	9.5	11.5				1.5	1.0	1.5	1.5	1.0	1.5
23	12.5	6.5	11.5				1.5	1.0	1.5	1.5	1.0	1.5
24	10.5	7.5	9.0							1.5	1.0	1.5
25	11.0	7.0	9.0							1.5	.5	1.0
26	9.5	7.5	9.0				1.5	1.0	1.0	1.5	.5	1.0
27	8.5	6.5	8.0	2.0	1.5	1.5	1.0	.5	.5	1.5	1.0	1.0
28	11.0	5.5	8.5	1.5	1.5	1.5	1.0	.5	1.0	1.0	1.0	1.0
29	10.5	5.5	9.5	1.5	1.5	1.5	1.5	1.0	1.0	1.0	1.0	1.0
30	8.0	5.5	7.0	1.5	1.0	1.5	1.5	1.0	1.0	1.0	1.0	1.0
31	6.5	3.5	6.0				1.0	1.0	1.0	1.0	1.0	1.0
MONTH	16.5	1.5	8.0	7.5	.0	2.5	2.0	.5	1.5	2.0	.5	1.0

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	FEBRUARY			MARCH			APRIL			MAY		
1	1.0	1.0	1.0	1.5	1.0	1.0	3.5	.0	2.0	11.0	8.0	9.5
2	1.0	1.0	1.0	1.0	1.0	1.0	4.0	2.5	3.5	11.5	7.5	10.0
3	1.0	.5	1.0	1.5	1.0	1.0	4.0	3.0	3.5	14.0	9.0	12.0
4	1.0	.5	1.0	1.5	1.0	1.0	4.5	3.5	4.0	17.0	12.0	14.5
5	1.0	.5	1.0	1.5	1.0	1.0	5.0	4.5	4.5	17.5	13.0	16.0
6	1.0	.5	1.0	1.5	1.0	1.0	9.0	4.0	6.5	13.5	8.5	11.0
7	1.0	.5	.5	1.5	1.0	1.0	11.0	6.5	9.0	10.0	7.5	9.5
8	1.0	.5	.5	1.5	1.0	1.0	10.5	6.5	9.0	9.5	7.5	9.0
9	.5	.5	.5	1.5	1.0	1.0	11.5	8.0	9.0	13.5	7.5	11.0
10	.5	.5	.5	1.0	.0	.0	12.0	9.0	10.0	14.0	12.0	13.0
11	.5	.5	.5	.0	.0	.0	13.0	9.0	11.5	16.5	12.5	14.5
12	1.0	.5	.5	.0	.0	.0	9.5	5.5	7.5	18.0	13.5	16.5
13	1.0	.5	.5	.0	.0	.0	7.0	2.5	4.5	19.0	13.0	17.5
14	1.5	.5	1.0	.0	.0	.0	3.0	.0	1.0	18.0	13.5	17.0
15	1.5	.5	1.0	.0	.0	.0	.5	.0	.0	19.0	16.5	17.5
16	1.5	.5	1.0	.0	.0	.0	2.5	.0	1.5	17.5	14.0	16.0
17	1.0	.5	.5	.0	.0	.0	4.5	2.5	3.5	16.5	13.0	15.0
18	1.0	.5	.5	.5	.0	.0	5.5	4.0	5.0	18.5	12.0	16.0
19	.5	.5	.5	.0	.0	.0	7.5	4.5	6.0	18.0	13.5	16.5
20	.5	.5	.5	.0	.0	.0	7.0	5.0	6.0	18.5	14.0	16.5
21	.5	.5	.5	.5	.0	.0	8.5	4.0	6.0	18.5	13.5	17.0
22	.5	.5	.5	.5	.0	.0	10.0	5.0	8.0	17.5	12.5	16.5
23	.5	.5	.5	.5	.0	.0	13.5	8.0	11.0	16.5	15.0	16.0
24	.5	.5	.5	.5	.0	.0	13.5	9.5	12.5	16.0	13.0	15.5
25	.5	.5	.5	1.0	.0	.5	12.5	8.5	10.5	16.5	12.5	15.5
26	1.0	.5	1.0	1.0	.0	.5	9.0	6.5	8.5	18.5	15.0	17.0
27	1.5	1.0	1.0	1.0	.0	.5	7.5	5.0	6.5	21.0	17.0	19.0
28	1.0	1.0	1.0	1.5	.0	.5	8.5	4.5	6.5	22.5	16.0	20.5
29				1.5	.0	.5	9.0	7.0	8.0	26.0	20.5	24.0
30				2.0	.0	1.0	11.0	7.5	10.0	24.5	19.5	23.0
31				1.5	.5	.5				24.0	19.5	23.0
MONTH	1.5	.5	.5	2.0	.0	.5	13.5	.0	6.5	26.0	7.5	15.5

## 06470875 JAMES RIVER AT DAKOTA LAKE DAM NEAR LUDDEN, ND--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	JUNE			JULY			AUGUST			SEPTEMBER		
1	23.5	17.5	21.5				23.5	21.5	22.0			
2	22.5	17.0	21.5				22.0	19.5	21.0			
3	22.5	18.0	21.0	25.5			23.0	20.0	21.0	21.0	16.5	18.0
4	21.5	20.0	21.0	21.0			22.5	20.5	21.0	19.5	17.5	18.0
5	25.0	16.5	20.0	25.5			24.5	21.5	22.5	17.5	15.0	16.0
6	21.0	17.5	20.0	23.5			24.0	21.5	22.5	16.0	13.5	15.0
7	22.0	17.5	20.5	24.0			23.0	20.5	21.5	16.0	13.0	14.5
8	21.5	19.5	20.5	23.5	22.0	23.0	25.0	20.0	22.5	16.5	13.5	15.0
9	22.0	16.5	20.5	23.5	21.5	22.5	23.5	21.0	22.5	15.5	14.5	15.0
10	21.5	16.5	20.0	25.5	23.0	24.0	21.5	19.5	20.5	14.5	14.0	14.5
11	20.5	16.0	19.0	26.0	23.5	24.5	22.0	18.5	20.0	16.0	13.5	14.5
12	21.0	17.0	19.5	23.5	21.0	22.5	21.5	19.5	20.5	16.5	14.5	15.0
13	21.0	18.0	19.5	23.5	20.0	21.0	22.5	20.5	21.0	14.5	13.0	13.5
14	22.0	19.5	20.5	24.0	21.0	22.5	21.5			13.0	11.0	12.0
15	23.5	16.5	21.5	27.0	23.5	25.0				13.0	10.5	11.5
16	22.5	19.5	21.0	27.0	25.0	26.0						
17	22.0	18.0	21.0	26.5	25.5	26.0						
18	25.0	17.5	22.5	27.0	24.5	25.5				13.5	12.0	13.0
19	26.5	20.0	24.5	26.0	23.5	24.5				13.0	12.0	12.5
20	26.5	23.0	25.0	25.5	21.5	23.5				13.0	12.5	12.5
21	27.5	22.5	25.5	25.0	22.5	23.5				14.0	13.0	13.5
22	26.0	18.5	23.5	25.0	22.0	23.5				14.5	13.0	13.5
23	23.5	17.0	22.5	27.0	22.5	25.0						
24	23.5	16.5	22.0	28.0	24.5	26.0						
25	25.0	16.5	22.5	26.0	24.0	24.5				17.0	15.5	16.5
26	28.0	20.0	25.0	26.0	23.5	24.5				18.0	15.5	16.5
27	27.0	21.5	25.5	27.5	23.5	25.5				18.0	16.0	17.0
28	28.0	19.0	26.0	26.5	24.0	24.5				17.0	15.0	15.5
29	26.0			25.0	22.5	23.5				16.0	14.0	15.0
30				25.5	23.0	24.0				16.0	14.0	15.0
31				24.0	21.5	23.0						
MONTH	28.0	16.0	22.0	28.0	20.0	24.0	25.0	18.5	21.5	21.0	10.5	14.5
YEAR	28.0	.0	9.0									

SPECIFIC CONDUCTANCE (MICROSIEMENS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCTOBER			NOVEMBER			DECEMBER			JANUARY		
1	1140	959	1130	1170	652	1150	1260	1230	1240	1630	1610	1620
2	1150	1010	1130	1180	985	1160				1620	1610	1610
3	1150	980	1140	1190	985	1170				1650	1600	1620
4	1150	985	1140	1180	954	1160	1300	1270	1280	1650	1620	1630
5	1140	980	1130	1170	673	1130	1310	1200	1300	1660	1630	1640
6	1150	673	1140	1150	673	1110	1320	1290	1300	1680	1640	1660
7	1140	975	1140				1330	1290	1310	1700	1660	1680
8	1140	1020	1140				1340	1310	1320			
9	1150	991	1140	1150	810	1080	1340	1320	1330	1750		1730
10	1160	969	1140	1170	885	1110	1340	1320	1330	1750	1480	1730
11	1170	1010	1150	1200	853	1130	1340	1320	1330	1740	1060	1730
12	1170	1110	1160	1210	922	1150	1350	1310	1330	1760	1030	1730
13	1160	996	1150	1220	927	1180	1370	1340	1350	1770	1450	1740
14	1150	964	1130				1400	1350	1370	1780	1460	1730
15	1140	1080	1130				1430	1340	1400	1780	1440	1750
16	1140	964	1130				1430	1340	1400	1760	1480	1740
17	1260	950	1140	1250	731	1180	1440	1340	1410	1750	1420	1730
18	1160	943	1140	1250	938	1190				1740	1460	1720
19	1160	932	1140	1270	1190	1230	1470	1350	1440	1740	1480	1710
20	1150	991	1130	1270	1250	1260	1470	1380	1450	1730	1420	1710
21	1160	668	1140	1280	1250	1270	1530	1380	1460	1720	1430	1700
22	1170	670	1160				1530	1390	1490	1730	1430	1700
23	1180	673	1160				1530	1390	1480	1750	1450	1720
24	1170	975	1150							1760	1490	1730
25	1170	969	1150							1780	1460	1750
26	1160	954	1140				1570	1440	1520	1790	1450	1750
27	1160	969	1140	1270	1240	1260	1570	1490	1550	1800	1460	1760
28	1180	980	1160	1280	1230	1260	1590	1550	1570			
29	1170	663	1150	1280	1250	1260	1590	1560	1570	1860	1440	1820
30	1160	863	1140	1270	1250	1260	1620	1570	1590	1860	1560	1840
31	1160	673	1140				1630	1600	1610	1870	1560	1840
MONTH	1260	663	1140	1280	652	1190	1630	1200	1410	1870	1030	1720



## 06470878 JAMES RIVER AT ND-SD STATE LINE

LOCATION.--Lat 45°56'10", long 98°10'26", in SE1/4SE1/4 sec. 34, T.129 N., R.60 W., Dickey County, Hydrologic Unit 10160003, at bridge on North Dakota-South Dakota state line road 6.5 mi south, and 1 mi west from Ludden.

DRAINAGE AREA.--5,480 mi<sup>2</sup>, approximately, revised, of which about 3,300 mi<sup>2</sup> is probably noncontributing.

## GAGE HEIGHT RECORDS

PERIOD OF RECORD.--October 1981 to current year (gage heights only).

GAGE.--Water-stage recorder. Datum of gage is 1,200 ft above National Geodetic Vertical Datum of 1929.

EXTREMES FOR PERIOD OF RECORD.--Maximum 92.87 ft, Apr. 4, 1984; minimum 87.40 ft, Sept. 3, 1985.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 91.54 ft, Mar. 18; minimum, 87.51 ft, Oct. 8.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	87.73	87.61	87.85	87.96	88.19	88.29	90.33	91.38	89.53	89.17	88.87	88.88
2	87.72	87.69	87.87	87.96	88.21	88.38	89.95	91.32	89.40	89.12	88.85	88.92
3	87.76	87.64	87.87	87.96	88.22	88.49	89.74	91.11	89.28	89.08	88.83	88.91
4	87.53	87.76	87.87	87.96	88.22	88.60	89.51	91.03	89.57	88.93	88.83	88.90
5	87.55	88.05	87.88	87.95	88.22	88.61	89.44	90.92	89.55	88.94	88.85	88.87
6	87.65	87.69	87.90	87.95	88.21	88.62	89.43	91.13	89.44	88.90	88.86	88.86
7	87.53	87.67	87.90	87.94	88.22	88.66	89.32	91.35	89.47	88.88	88.83	88.85
8	87.51	87.52	87.91	87.95	88.22	88.67	89.19	91.32	89.45	88.87	88.83	88.85
9	87.61	87.54	87.92	87.95	88.23	89.31	89.08	91.03	89.34	88.87	88.83	88.84
10	87.78	87.58	87.93	87.95	88.24	89.61	89.05	91.15	89.38	88.86	88.82	88.83
11	87.80	87.62	87.93	87.95	88.24	89.91	89.00	91.03	89.41	88.85	88.82	88.82
12	87.69	87.64	87.94	87.95	88.25	90.01	88.96	90.97	89.34	88.85	88.81	88.82
13	87.71	87.64	87.94	87.94	88.26	90.91	89.01	90.86	89.29	88.85	88.81	88.81
14	87.73	87.63	87.99	87.93	88.26	91.13	88.99	90.70	89.21	88.84	88.80	88.80
15	87.65	87.62	88.00	87.93	88.27	91.25	88.97	90.65	89.21	88.84	88.81	88.81
16	87.75	87.63	87.96	87.93	88.28	91.38	88.72	90.55	89.22	88.84	88.81	88.81
17	87.72	87.63	87.94	87.94	88.28	91.45	88.79	90.43	89.19	88.84	88.80	88.81
18	87.72	87.64	87.93	87.99	88.29	91.54	89.09	90.28	89.15	88.84	88.80	88.81
19	87.72	87.64	87.93	87.98	88.29	91.54	89.56	90.17	89.08	88.83	88.86	88.82
20	87.81	87.66	87.93	87.99	88.29	91.54	89.75	90.10	89.19	88.83	88.86	88.82
21	87.93	87.66	87.98	87.99	88.28	91.54	89.91	90.03	89.28	88.82	88.87	88.82
22	88.14	87.67	87.99	87.99	88.28	91.50	89.79	89.94	89.36	88.82	88.89	88.84
23	87.93	87.68	88.00	87.98	88.26	91.51	89.97	89.89	89.39	88.88	88.90	88.98
24	87.72	87.69	88.01	87.98	88.25	91.52	90.65	89.88	89.37	88.84	88.99	89.14
25	87.74	87.71	88.00	87.99	88.26	91.47	90.87	89.86	89.25	88.83	88.89	89.26
26	87.63	87.72	87.99	87.98	88.27	91.37	91.01	89.77	89.26	88.83	88.88	89.27
27	87.73	87.76	87.97	87.98	88.28	91.28	91.15	89.66	89.34	88.83	88.87	89.30
28	88.08	87.77	87.96	88.06	88.28	91.08	91.20	89.61	89.30	88.82	88.92	89.29
29	87.80	87.81	87.96	88.12	---	90.92	91.09	89.57	89.28	88.84	88.91	89.24
30	87.72	87.83	87.96	88.16	---	90.83	91.25	89.56	89.23	88.87	88.88	89.21
31	87.75	---	87.96	88.17	---	90.58	---	89.51	---	88.86	88.88	---
MEAN	87.74	87.68	87.94	87.98	88.25	90.37	89.76	90.48	89.33	88.88	88.85	88.94
MAX	88.14	88.05	88.01	88.17	88.29	91.54	91.25	91.38	89.57	89.17	88.99	89.30
MIN	87.51	87.52	87.85	87.93	88.19	88.29	88.72	89.51	89.08	88.82	88.80	88.80
CAL YR 1985	MEAN	88.09	MAX	89.46	MIN	87.44						
WTR YR 1986	MEAN	88.85	MAX	91.54	MIN	87.51						



## JAMES RIVER BASIN

06470878 JAMES RIVER AT ND-SD STATE LINE--CONTINUED

## WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1974 to current year.

PERIOD OF DAILY RECORDS.--

WATER TEMPERATURE: October 1974 to current year.

SPECIFIC CONDUCTANCE: October 1979 to current year.

REMARKS.--Water temperatures and specific conductances are measured daily in field by local observer.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum daily, 28.5°C, Aug 5, 6, 1983, June 12, 1976, July 13, 1984; minimum 0.0°C for several days during winter months each year.

SPECIFIC CONDUCTANCE: Maximum, 4,000 microsiemens, Mar. 15, 1979; minimum, 240 microsiemens, Apr. 3, 1984.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURE: Maximum, 27.5°C, July 4; minimum 0.5°C for many days during winter months.

SPECIFIC CONDUCTANCE: Maximum, 2,250 microsiemens, Feb. 27, 28; minimum, 340 microsiemens, Apr. 1, 2.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
ONCE DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.5	6.0	1.0	1.5	1.5	1.0	4.0	10.0	23.0	21.0	22.0	20.5
2	6.5	5.0	1.0	1.0	1.5	1.0	5.0	10.5	21.0	23.0	21.0	19.5
3	9.0	7.0	1.0	1.0	1.5	1.0	5.5	12.5	21.0	23.0	22.0	21.0
4	10.0	6.0	1.5	1.0	1.5	1.0	6.0	14.5	22.0	27.5	22.0	18.5
5	8.0	7.0	2.0	1.0	1.5	1.0	6.5	18.0	22.5	23.5	23.0	17.0
6	7.0	5.0	1.5	1.0	1.5	1.0	7.5	12.0	21.0	23.0	24.0	15.0
7	8.0	3.5	2.0	1.0	1.0	1.0	10.0	11.0	21.0	23.0	23.5	15.0
8	6.0	2.5	1.5	1.0	1.0	1.0	10.0	10.5	21.0	23.0	22.0	15.5
9	4.0	2.0	2.0	1.0	1.0	1.0	11.0	13.5	23.0	23.0	23.0	16.0
10	8.0	2.0	1.5	1.0	1.0	1.5	11.5	13.5	20.0	24.0	21.0	15.5
11	7.0	2.5	1.0	1.0	1.0	1.5	13.0	15.0	19.5	25.5	20.5	15.0
12	9.5	3.5	1.0	1.0	1.0	1.5	12.0	17.0	20.0	23.5	23.0	17.5
13	11.0	3.0	1.0	1.0	1.0	2.0	7.5	18.0	20.0	21.0	22.0	15.0
14	9.0	2.5	1.0	1.0	1.0	2.0	3.5	18.0	21.5	23.5	21.5	11.5
15	8.0	3.0	.5	1.5	1.0	2.5	3.0	18.0	22.0	25.0	23.0	12.0
16	6.5	2.5	.5	2.0	1.0	2.5	6.0	17.0	21.0	26.0	22.5	13.0
17	9.0	2.0	.5	2.0	1.0	2.0	6.0	15.0	21.5	26.5	21.5	14.0
18	8.5	1.5	.5	2.0	1.0	1.5	7.0	16.0	23.0	26.5	21.0	13.5
19	10.0	1.5	.5	2.0	1.0	1.0	8.0	18.5	25.0	26.0	22.0	13.5
20	10.5	1.5	.5	2.0	1.0	1.0	8.0	17.0	25.5	23.0	22.0	14.0
21	10.0	1.5	.5	1.5	1.0	1.0	8.0	17.0	26.0	24.0	20.5	14.5
22	14.0	2.0	1.0	1.0	1.0	2.5	11.5	17.0	20.5	24.0	18.0	15.0
23	13.0	1.5	1.0	1.0	1.0	2.5	12.0	16.5	19.5	24.5	17.5	15.0
24	9.0	2.0	.5	1.0	1.0	2.0	14.5	16.0	22.0	27.0	21.0	15.0
25	8.5	2.0	.5	1.0	1.0	3.0	12.0	18.0	23.0	26.0	20.5	19.0
26	10.0	2.0	1.0	1.0	1.0	2.5	10.0	19.5	25.0	25.5	19.0	17.0
27	9.5	2.0	1.0	1.0	1.0	3.0	8.0	20.0	25.5	24.5	18.0	17.5
28	9.0	1.5	1.0	1.0	1.0	4.5	10.5	21.5	26.0	25.5	17.0	14.5
29	10.0	1.5	1.0	1.0	---	4.0	10.0	22.5	21.0	24.0	19.5	14.0
30	6.5	1.0	1.5	1.0	---	3.0	10.5	23.5	20.0	24.0	20.0	17.5
31	6.0	---	1.5	1.0	---	4.5	---	23.5	---	22.5	21.0	---
MEAN	8.5	3.0	1.0	1.0	1.0	2.0	8.5	16.5	22.0	24.5	21.0	15.5
MAX	14.0	7.0	2.0	2.0	1.5	4.5	14.5	23.5	26.0	27.5	24.0	21.0
MIN	4.0	1.0	.5	1.0	1.0	1.0	3.0	10.0	19.5	21.0	17.0	11.5



## JAMES RIVER BASIN

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06470878 JAMES RIVER AT ND-SD STATE LINE--CONTINUED

SPECIFIC CONDUCTANCE (MICROSIEMENS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
ONCE DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1100	1050	1150	1480	1990	2240	350	580	770	800	840	850
2	1100	1080	1140	1500	2000	2240	350	600	760	800	840	850
3	1100	1090	1150	1510	2010	2140	380	610	770	810	850	850
4	1100	1100	1170	1510	2010	2090	420	620	770	820	870	850
5	1090	1100	1190	1520	2000	1950	460	630	770	810	870	840
6	1050	1110	1200	1550	2020	1870	480	630	770	800	880	830
7	1030	1120	1200	1580	2050	1540	500	630	760	780	880	830
8	1020	1120	1210	1590	2090	1350	540	640	770	760	870	840
9	1010	1120	1150	1580	2100	1100	560	650	780	770	870	850
10	1000	1140	1130	1600	2130	1020	570	650	760	760	870	850
11	1000	1150	1120	1680	2160	810	595	660	750	760	870	850
12	1030	1180	1110	1750	2190	720	600	680	760	760	870	850
13	1050	1200	1100	1750	2200	600	620	700	770	770	870	840
14	1050	1180	1110	1780	2210	500	630	710	770	770	860	830
15	1060	1200	1110	1790	2210	520	660	720	760	760	860	820
16	1050	1180	1110	1800	2210	520	680	730	760	750	870	810
17	1050	1190	1110	1830	2210	520	690	750	760	750	870	840
18	1050	1200	1120	1840	2210	520	680	780	770	750	870	850
19	1050	1210	1120	1850	2210	530	680	740	770	760	860	850
20	1050	1210	1130	1850	2210	530	690	750	760	760	840	840
21	1060	1210	1170	1860	2210	520	700	760	760	770	840	820
22	1060	1190	1210	1860	2210	480	700	770	780	780	820	810
23	1070	1190	1230	1870	2220	470	700	760	790	780	810	800
24	1060	1200	1230	1880	2230	460	690	760	800	780	810	770
25	1060	1200	1240	1880	2230	460	690	760	800	780	810	760
26	1060	1200	1250	1890	2240	450	650	780	820	780	810	770
27	1050	1200	1330	1890	2250	440	590	780	830	790	810	810
28	1040	1200	1410	1900	2250	430	580	800	840	800	810	830
29	1050	1200	1430	1940	---	420	590	800	780	800	820	840
30	1050	1200	1450	1950	---	420	570	800	770	800	830	850
31	1060	---	1460	1960	---	440	---	800	---	800	840	---
MEAN	1050	1160	1200	1750	2150	913	587	711	776	779	848	829
MAX	1100	1210	1460	1960	2250	2240	700	800	840	820	880	850
MIN	1000	1050	1100	1480	1990	420	350	580	750	750	810	760

## JAMES RIVER BASIN

06470980 JAMES RIVER NEAR HECLA, SD

LOCATION.--Lat 45°53'34", long 98°10'13", in SW1/4SE1/4SE1/4 sec. 16, T.128 N., R.61 W., Brown County, SD, Hydrologic Unit 10160003, on left bank 30 ft upstream from bridge on county road 1.0 mi northwest of Hecla, South Dakota and 3.0 mi downstream from the North Dakota - South Dakota border.

DRAINAGE AREA.--5,520 mi<sup>2</sup> approximately, of which about 3,300 mi<sup>2</sup> is probably noncontributing.

## GAGE-HEIGHT RECORDS

PERIOD OF RECORD.--February 1982 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1200.00 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Records of stream velocity and discharge are also collected at this location. These records which have been used to supplement the discharge record for station 06740875, James River at Dakota Lake Dam near Ludden, ND are available in the files of the District office.

EXTREMES FOR PERIOD OF RECORD.--Maximum, 92.38 ft, Apr. 5, 1984; minimum, 87.34 ft, Aug. 28, 1985.

EXTREMES FOR CURRENT YEAR.--Maximum recorded gage height, 91.00 ft, May 1; minimum, 87.41 ft, Oct. 7.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	87.68	87.58	87.94	87.96	88.16	88.30	90.02	90.96	89.29	89.00	88.67	88.70
2	87.67	87.61	87.94	87.97	88.16	88.31	89.68	90.88	89.13	88.95	88.65	88.73
3	87.69	87.58	87.94	87.98	88.16	88.34	89.56	90.67	89.01	88.85	88.64	88.75
4	87.63	87.64	87.96	87.99	88.17	88.36	89.32	90.60	89.29	88.78	88.62	88.73
5	87.61	87.89	87.96	87.99	88.17	88.39	89.26	90.55	89.30	88.76	88.62	88.68
6	87.65	87.63	87.96	87.99	88.18	88.40	89.19	90.72	89.19	88.71	88.61	88.63
7	87.51	87.56	87.97	87.98	88.19	88.42	---	90.91	89.27	88.66	88.58	88.60
8	87.56	87.57	87.97	87.97	88.19	88.43	---	90.91	89.22	88.69	88.56	88.58
9	87.59	87.54	87.98	88.00	88.19	88.47	---	90.64	89.14	88.64	88.56	88.49
10	87.69	87.56	87.99	88.01	88.19	88.66	---	90.75	89.19	88.60	88.49	88.45
11	87.67	87.60	87.99	88.01	88.20	89.21	---	90.65	89.22	88.58	88.49	88.46
12	87.63	87.61	88.00	88.02	88.20	89.79	---	90.61	89.17	88.61	88.46	88.46
13	87.65	87.61	88.01	88.02	88.21	90.15	---	90.52	89.09	88.56	88.48	88.40
14	87.67	87.65	88.02	88.02	88.22	90.37	---	90.38	89.03	88.52	88.44	88.37
15	87.60	87.65	88.02	88.03	88.22	90.51	---	90.33	89.01	88.53	88.46	88.36
16	87.65	87.66	88.02	88.03	88.23	90.61	---	90.25	89.03	88.59	88.39	88.39
17	87.67	87.67	88.02	88.03	88.23	90.69	---	90.14	88.96	88.60	88.36	88.41
18	87.66	87.69	88.01	88.04	88.24	90.77	---	90.00	88.89	88.59	88.41	88.39
19	87.64	87.73	88.01	88.05	88.26	90.78	---	89.88	88.86	88.59	88.54	88.45
20	87.68	87.73	88.00	88.05	88.27	90.78	---	89.81	88.98	88.53	88.66	88.47
21	87.75	87.73	88.00	88.08	88.27	90.78	---	89.74	89.06	88.51	88.65	88.49
22	87.88	87.78	88.00	88.07	88.28	90.79	---	89.64	89.14	88.52	88.73	88.60
23	87.82	87.80	88.00	88.07	88.28	90.82	89.61	89.61	89.17	88.58	88.74	88.74
24	87.68	87.80	87.99	88.10	88.28	90.81	90.22	89.61	89.14	88.54	88.79	88.85
25	87.63	87.84	87.98	88.12	88.28	90.85	90.44	89.59	89.01	88.56	88.71	88.95
26	87.61	87.87	87.98	88.11	88.28	90.84	90.60	89.51	89.05	88.57	88.71	89.00
27	87.64	87.88	87.99	88.11	88.30	90.79	90.77	89.41	89.12	88.56	88.70	89.04
28	87.81	87.89	87.98	88.12	88.30	90.65	90.80	89.35	89.11	88.57	88.73	89.04
29	87.79	87.90	87.97	88.13	---	90.60	90.67	89.32	89.08	88.59	88.72	89.02
30	87.62	87.92	87.97	88.14	---	90.48	90.83	89.30	89.05	88.65	88.69	88.99
31	87.66	---	87.96	88.15	---	90.30	---	89.25	---	88.66	88.70	---
MEAN	87.67	87.71	87.98	88.04	88.23	89.85	---	90.14	89.11	88.63	88.60	88.64
MAX	87.88	87.92	88.02	88.15	88.30	90.85	---	90.96	89.30	89.00	88.79	89.04
MIN	87.51	87.54	87.94	87.96	88.16	88.30	---	89.25	88.86	88.51	88.36	88.36

CAL YR 1985 MEAN 88.04 MAX 89.29 MIN 87.42

## JAMES RIVER BASIN

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06470980 JAMES RIVER NEAR HECLA, SD--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	TUR- BID- ITY (NTU) (00076)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED SATUR- ATION) (00301)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCARB TOT FLD MG/L AS CACO3 (00902)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)
OCT												
01...	0900	0.1	1120	8.80	2.0	5.0	7.0	12.7	97	270	24	47
JAN												
08...	1430	4.5	1780	7.76	--	0.0	5.1	0.5	3	590	25	110
APR												
01...	1100	541	430	8.23	12.0	4.5	--	11.5	86	--	--	--
22...	1430	222	770	--	15.0	9.0	22	15.0	127	250	61	55
MAY												
28...	1000	321	820	8.42	22.0	20.0	17	7.8	84	300	44	63
JUL												
07...	1330	62	800	8.75	30.0	25.0	--	8.3	98	--	--	--
AUG												
21...	0930	84	840	8.44	19.0	20.0	13	7.3	78	310	51	67

DATE	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	SILICA, DIS- SOLVED (MG/L AS SiO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)
OCT												
01...	36	140	52	4	14	242	0.7	200	73	12	761	670
JAN												
08...	77	190	40	3	19	567	19	380	87	130	1240	1300
APR												
22...	28	61	33	2	11	192	--	170	34	8.9	488	480
MAY												
28...	34	62	30	2	14	253	1.8	160	23	14	531	520
AUG												
21...	34	66	31	2	13	256	1.8	160	30	18	540	540

DATE	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	SOLIDS, RESIDUE AT 105 DEG. C, SUS- PENDE (MG/L) (00530)	NITRO- GEN, NITRITE TOTAL (MG/L AS N) (00615)	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)	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)	ANTI- MONY, TOTAL (UG/L AS SB) (01097)
OCT											
01...	1.0	0.21	20	--	0.04	--	0.21	--	0.08	--	--
JAN											
08...	1.7	15	5	<0.01	<0.01	<0.10	<0.10	--	0.44	0.367	
APR											
01...	--	--	18	0.01	--	0.20	--	0.20	--	--	--
22...	0.66	293	--	--	<0.01	--	<0.10	--	0.02	0.009	--
MAY											
28...	0.72	460	30	--	<0.01	--	<0.10	--	0.03	0.021	--
AUG											
21...	0.73	122	31	<0.01	<0.01	<0.10	<0.10	0.18	0.05	0.044	<1

## JAMES RIVER BASIN

06470980 JAMES RIVER NEAR HECLA, SD--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	ANTI-MONY, DIS-SOLVED (UG/L AS SB) (01095)	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA) (01007)	BARIUM, DIS-SOLVED (UG/L AS BA) (01005)	BERYL-LIUM, TOTAL RECOV-ERABLE (UG/L AS BE) (01012)	BERYL-LIUM, DIS-SOLVED (UG/L AS BE) (01010)	BORON, TOTAL RECOV-ERABLE (UG/L AS B) (01022)	BORON, DIS-SOLVED (UG/L AS B) (01020)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD) (01027)	CADMIUM DIS-SOLVED (UG/L AS CD) (01025)
OCT 01...	--	--	--	--	--	--	--	--	330	--	--
JAN 08...	<1	6	4	100	140	<10	0.5	--	410	<1	<1
APR 01...	--	--	--	<100	--	<10	--	80	--	<1	--
APR 22...	<1	--	2	--	58	--	<0.5	--	140	--	<1
MAY 28...	<1	--	3	--	80	--	<0.5	--	160	--	<1
AUG 21...	<1	4	4	100	91	<10	<0.5	240	210	<1	1
DATE	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR) (01034)	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)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI) (01067)	NICKEL, DIS-SOLVED (UG/L AS NI) (01065)	SELE-NIUM, TOTAL (UG/L AS SE) (01147)
OCT 01...	--	--	--	1	12	2	14	0.5	--	--	--
JAN 08...	4	<1	--	1	37	<1	--	0.2	2	--	--
APR 01...	--	--	--	--	--	--	--	--	15	--	--
APR 22...	--	<1	<3	1	6	<1	15	0.1	--	2	--
MAY 28...	--	<1	<3	<1	11	<1	48	0.1	--	3	--
AUG 21...	--	<1	<3	<1	8	<5	11	0.2	3	2	<1
DATE	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG) (01077)	SILVER, DIS-SOLVED (UG/L AS AG) (01075)	THAL-LIUM, TOTAL (UG/L AS TL) (01059)	THAL-LIUM, DIS-SOLVED (UG/L AS TL) (01057)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)	CYANIDE TOTAL (MG/L AS CN) (00720)	CYANIDE DIS-SOLVED (MG/L AS CN) (00723)	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 01...	<1	--	--	--	--	30	--	--	15	0.0	94
JAN 08...	<1	<1	<1	--	--	6	--	<0.01	--	--	--
APR 01...	--	<1	--	<1	--	--	<0.01	--	10	15	89
APR 22...	<1	--	<1	--	<1	7	--	<0.01	48	29	98
MAY 28...	<1	--	<1	--	<1	17	--	<0.01	41	36	98
JUL 07...	--	--	--	--	--	--	--	--	39	6.6	100
AUG 21...	<1	<1	<1	<1	<1	33	<0.01	0.01	38	8.7	97

## 06471200 MAPLE RIVER AT ND-SD STATE LINE

LOCATION.--Lat 45°56'20", long 98°27'08", in SW1/4SE1/4 sec.33, T.129 N., R.62 W., Dickey County, ND, Hydrologic Unit 10160004, on left bank 0.4 mi upstream from State line, 7.8 mi northeast of Frederick, SD, and 15.7 mi upstream from mouth.

DRAINAGE AREA.--716 mi<sup>2</sup> (revised), of which about 332 mi<sup>2</sup> (revised) is probably noncontributing.

## WATER-DISCHARGE RECORDS

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

GAGE.--Water-stage recorder. Elevation of gage is 1,365.00 ft above National Geodetic Vertical Datum of 1929, from topographic map. Prior to June 14, 1962, nonrecording gage at site 0.4 mi downstream at datum 0.94 ft lower.

REMARKS.--Estimated daily discharges: Mar. 8-12 and Apr. 14, 15. Records good except for periods of estimated daily discharges, which are poor. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--30 years, 20.1 ft<sup>3</sup>/s, 14,560 acre-ft/yr; median of yearly mean discharges, 12 ft<sup>3</sup>/s, 8,700 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,930 ft<sup>3</sup>/s, Apr. 11, 1969; maximum gage height, 16.05 ft Apr. 11, 1969, backwater from ice; no flow for long periods in each year.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 50 ft<sup>3</sup>/s and maximum (\*):

Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)	Date	Time	Discharge (ft <sup>3</sup> /s)	Gage height (ft)
Mar. 9	----	180	ice jam	Apr. 30	0430	614	7.28
Apr. 22	1645	*654	*7.42	May 12	0300	264	6.04

No flow for many days.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.00	.00	15	435	19	.74	.12	12
2	.00	.00	.00	.00	.00	.00	13	280	17	.62	.12	12
3	.00	.00	.00	.00	.00	.00	14	202	16	.46	.11	10
4	.00	.00	.00	.00	.00	.00	12	159	18	.35	.09	8.
5	.00	.00	.00	.00	.00	.00	14	122	16	.24	.05	7.9
6	.00	.00	.00	.00	.00	.00	13	102	15	.11	.04	7.0
7	.00	.00	.00	.00	.00	.00	13	81	17	.05	.04	6.2
8	.00	.00	.00	.00	.00	40	13	87	17	.05	.01	5.
9	.00	.00	.00	.00	.00	160	11	118	19	.05	.00	4.6
10	.00	.00	.00	.00	.00	130	10	108	21	.04	.00	4.4
11	.00	.00	.00	.00	.00	100	9.4	157	20	.02	.00	4.5
12	.00	.00	.00	.00	.00	60	9.1	258	17	.03	.00	4.0
13	.00	.00	.00	.00	.00	53	8.9	217	14	.00	.00	4.0
14	.00	.00	.00	.00	.00	48	9.5	161	13	.03	.00	3.5
15	.00	.00	.00	.00	.00	49	10	122	12	.17	.00	4.0
16	.00	.00	.00	.00	.00	49	11	94	9.8	.20	.00	3.3
17	.00	.00	.00	.00	.00	50	16	76	8.2	.24	.00	4.5
18	.00	.00	.00	.00	.00	51	43	63	7.4	.25	.00	3.4
19	.00	.00	.00	.00	.00	53	55	55	6.8	.12	.00	5.5
20	.00	.00	.00	.00	.00	46	60	48	6.3	.06	1.4	6.2
21	.00	.00	.00	.00	.00	44	162	42	5.3	.02	3.5	6.8
22	.00	.00	.00	.00	.00	44	599	36	3.8	.01	16	7.2
23	.00	.00	.00	.00	.00	43	587	34	2.9	.00	19	7.2
24	.00	.00	.00	.00	.00	42	421	34	2.2	.00	26	6.9
25	.00	.00	.00	.00	.00	41	332	32	1.9	.00	34	7.4
26	.00	.00	.00	.00	.00	38	323	31	2.2	.00	32	7.2
27	.00	.00	.00	.00	.00	27	380	29	1.8	.00	23	8.9
28	.00	.00	.00	.00	.00	23	547	28	1.0	.00	17	11
29	.00	.00	.00	.00	---	22	540	26	.75	.00	14	12
30	.00	.00	.00	.00	---	18	591	23	.76	.00	13	12
31	.00	---	.00	.00	---	17	---	21	---	.04	12	---
TOTAL	.00	.00	.00	.00	.00	1248.00	4841.9	3281	312.11	3.90	211.48	207.3
MEAN	.00	.00	.00	.00	.00	40.3	161	106	10.4	.13	6.82	6.91
MAX	.00	.00	.00	.00	.00	160	599	435	21	.74	34	12
MIN	.00	.00	.00	.00	.00	.00	8.9	21	.75	.00	.00	3.3
AC-FT	.00	.00	.00	.00	.00	2480	9600	6510	619	7.7	419	411
CAL YR 1985	TOTAL	541.89		MEAN	1.48	MAX	77	MIN	.00	AC-FT	1070	
WTR YR 1986	TOTAL	10105.69		MEAN	27.7	MAX	599	MIN	.00	AC-FT	20040	



## DISCHARGE MEASUREMENTS AT PARTIAL RECORD 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 floodflow 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 are presented in a table of annual maximum stage and discharge at crest-stage stations. Discharge measurements made at miscellaneous sites for both low flow and high flow are given in a second table.

Crest-stage partial-record stations

The following table contains annual maximum discharge for crest-stage stations. A crest-stage gage is a device which will register the peak stage occurring between inspections of the gage. A stage-discharge relation for each gage is developed from discharge measurements made by indirect measurements of peak flow or by current meter. The date of the maximum discharge is not always certain, but it is usually determined by comparison with nearby continuous-record stations, weather records, or local inquiry. Only the maximum discharge for each water year is given. Information on some lower floods may have been obtained, but is not published herein. The years given in the period of record represent water years for which the annual maximum has been determined.

Annual maximum discharge at crest-stage partial-record stations							
Station No.	Station Name	Location	Drainage area (mi <sup>2</sup> )	Period of record	Date	Annual Gage height (ft)	Maximum Discharge (ft <sup>3</sup> /s)
RED RIVER OF THE NORTH BASIN							
05052100	Richland County Drain #65 nr Great Bend, ND	Lat 46°05'41", long 96°47'01", in NE¼ NE¼ NE¼ sec.11, T.130 N., R.49 W., Richland County, Hydrologic Unit 09020105, at bridge on county road 4 mi south of Great Bend.	38	#1981-85, 1986	3-24-86	b6.60	a120
05056225	Webster Coulee at Webster, ND	Lat 48°16'55", long 98°53'45", in SW¼ SW¼ SW¼ sec.33, T.156 N., R.64 W., Ramsey County, Hydrologic Unit 09020201, 3/4 mi west of Webster.	670	1980-86	8-09-86	6.70	a50
05060510	Cass County Drain #52 nr Amenia, ND	Lat 46°58'41", long 97°11'52", in SE¼ SE¼ SE¼ sec.36, T.141 N., R.52 W., Cass County, Hydrologic Unit 09020204, on left bank 40 ft upstream on county road, 1.2 mi east of Amenia.	13.5	#1981-85, 1986	3-20-86	b5.85	a100
05060550	Rush River nr Prosper, ND	Lat 46°57'59", long 97°03'04", in NE¼ SE¼ SE¼ sec.1, T.140 N., R.51 W., Cass County, Hydrologic Unit 09020204, on right bank 30 ft upstream on county road, 1.5 mi west of Prosper.	170	#1981-85, 1986	7-13-86	9.69	a660
05060570	Lower Branch Rush River nr Prosper, ND	Lat 46°56'30", long 96°59'18", in NE¼ NE¼ SE¼ sec.16, T.140 N., R.50 W., Cass County, Hydrologic Unit 09020204, on right bank 60 ft upstream on county road, 2 mi southeast of Prosper.	35.8	#1981-85, 1986	3-24-86	b8.60	a370
05083000	Turtle River at Manvel, ND	Lat 48°04'43", long 97°11'03", in SE¼ sec.10, T.153 N., R.51 W., Grand Forks County, Hydrologic Unit 09020307, on left bank 10 ft downstream from bridge on State Highway No. 33, 0.3 mi west of Manvel, and 10 mi upstream from mouth.	613	#1945-70, 1972-73, 1980-86	3-25-86	b15.04	a710
05083500	Red River of the North at Oslo, MN	Lat 48°11'40", long 97°08'30", in SW¼ SW¼ sec.36, T.155 N., R.51 W., Walsh County, Hydrologic Unit 09020306, on bridge crossing the Red River 0.5 mi west of Oslo, MN.	31,200	#1936-37, #1941-43, #1945-60, 1985-86	4-03-86	34.20	a30,000

# - Operated as a continuous-record gaging station

a - Estimate

b - Backwater from ice

## Annual maximum discharge at crest-stage partial-record stations--continued

Annual maximum discharge at crest-stage partial-record stations--continued							Annual Maximum
Station No.	Station Name	Location	Drainage area (mi <sup>2</sup> )	Period of record	Date	Gage height (ft)	Dis-charge (ft <sup>3</sup> /s)
RED RIVER OF THE NORTH--CONTINUED							
05089500	Cart Creek at Mountain, ND	Lat 48°40'37", long 97°51'41", in SW <sup>1</sup> / <sub>4</sub> sec.15, T.160 N., R.56 W., Pembina County, Hydrologic Unit 09020310, on right bank 50 ft downstream from bridge on State Highway 32, 0.7 mi south of Mountain.	16.9	#1954-84, 1985-86	3-23-86	b4.20	a90
05102490	Red River of the North at Pembina, ND	Lat 48°58'17", long 97°14'16", in NE <sup>1</sup> / <sub>4</sub> sec.4, T.163 N., R.51 W., Pembina County, Hydrologic Unit 09020311, on bridge crossing the Red River 0.2 mi north of Pembina.	40,200	1985-86	4-08-86	771.60	c34,300
KNIFE RIVER BASIN							
06339490	Elm Creek near Golden Valley, ND	Lat 47°06'25", long 102°03'05", in SE <sup>1</sup> / <sub>4</sub> NW <sup>1</sup> / <sub>4</sub> sec. 23, T.142 N., R.90 W., Mercer County, Hydrologic Unit 10130201 on right bank 60 ft upstream from highway bridge 13.5 mi south of Golden Valley.	82.0	#1967-86 1984-86	3-02-86	7.67	250
06340200	West Branch Otter Creek near Beulah, ND	Lat 47°08'05", long 101°39'35", in NW <sup>1</sup> / <sub>4</sub> NW <sup>1</sup> / <sub>4</sub> SW <sup>1</sup> / <sub>4</sub> sec.12, T.142 N., R.87 W., Oliver County, Hydrologic Unit 10130201, on right bank 10 mi northeast of Beulah.	26.5	#1965-83, 1984-86	3-02-86	6.36	261
HEART RIVER BASIN							
06343000	Heart River near South Heart, ND	Lat 46°51'56", long 102°56'53", in NE <sup>1</sup> / <sub>4</sub> SE <sup>1</sup> / <sub>4</sub> SW <sup>1</sup> / <sub>4</sub> sec.8, T.139 N., R.97 W., Stark County, Hydrologic Unit 10130202, on left bank 1.7 mi downstream from North Creek, 2 mi east of South Heart and 5.5 mi upstream from Edward Arthur Patterson Lake.	311	#1965-84, 1985-86	3-01-86	15.79	2,400
06348300	Heart River at Stark bridge near Judson, ND	Lat 46°42'11", long 101°12'45", in SE <sup>1</sup> / <sub>4</sub> SW <sup>1</sup> / <sub>4</sub> SW <sup>1</sup> / <sub>4</sub> sec. 6, T. 137 N., R. 83 W., Morton County, Hydrologic Unit 10130203, at Stark bridge, 9.5 mi southeast of Judson	---	1986	3-4-86	34.32	8,200

# - Operated as a continuous-record gaging station

a - Estimate

b - Backwater from ice

c - Discharge determined using record from station 2 mi downstream

## DISCHARGE MEASUREMENTS AT PARTIAL RECORD AND MISCELLANEOUS SITES

Miscellaneous discharge measurement sites

Measurements of streamflow at points other than gaging stations are given in the following table.

Discharge measurements made at miscellaneous sites during water year 1986						
Stream	Tributary to	Location	Drainage area (mi <sup>2</sup> )	Measured previously (water years)	Measurements	
					Date	Discharge (ft <sup>3</sup> /s)
RED RIVER OF THE NORTH BASIN						
Mauvais Coulee Tributary No. 3 near Cando, ND 05056060	Mauvais Coulee	Lat 48°27'28", long 99°14'06", in NW¼ NW¼ sec.6, Towner County at bridge 2.1 mi south of Cando.	60.2	1955-69	3-23-86	854.0
					3-25-86	90.0
					3-27-86	11.2
					4-02-86	41.2
					4-23-86	17.8
					5-15-86	4.83
					6-03-86	8.34
					6-25-86	0.39
					7-18-86	0.48
					7-22-86	0.31
Webster Coulee at Webster, ND 05056225	Red River of the North	Lat 48°16'55", long 98°53'45", in SW¼ SW¼ SW¼ sec. 33, T.156 N., R.64 W., Ramsey County, Hydrologic Unit 09020201, 3/4 mi west of Webster.	670	1983-85	12-03-85	0.0
					2-24-86	29.7
					7-08-86	0.0
					8-11-86	45.0
St. Joe Coulee near Webster, ND 05056244	Big Coulee	Lat 48°19'23", long 99°00'19", in NE¼ NE¼ sec.21, T.156 N., R.65 W., Ramsey County, on downstream side of bridge, 6.5 mi northwest of Webster.	---	---	3-24-86	108
					4-02-86	33.9
					4-23-86	8.64
					5-13-86	8.50
					5-21-86	0.11
					7-17-86	21.9
Calio Coulee near Starkweather, ND 05056247	Chain Lake	Lat 48°23'58", long 99°02'46", in NE¼ NE¼ sec.28, T.157 N., R.67 W., in Towner County, at bridge 6 mi southwest of Starkweather.	130	---	8-12-86	0.16
					3-17-86	2.54
					3-23-86	90.8
					3-24-86	69.9
					3-27-86	75.3
					4-02-86	13.2
					4-23-86	8.89
					5-15-86	.60
					6-03-86	0.0
					6-25-86	0.0
					7-15-86	7.77
					7-18-86	5.71
					7-22-86	1.48
Comstock Coulee near Minnewaukan, ND 05056403	Devils Lake	Lat 48°06'33", long 99°13'35", in SE¼ SE¼ sec. 29, T.154 N., R.67 W., Benson County, Hydrologic Unit 09020201, 2.8 mi north of Minnewaukan.	58	---	7-29-86	1.93
					8-07-86	6.86
					8-20-86	0.0
					9-26-86	0.0
					3-17-86	84.6
					3-18-86	55.9
					3-23-86	24.8
					4-03-86	9.22
					4-23-86	9.83
					5-13-86	3.88
Heart River at Stark Bridge near Judson, ND	Missouri River	Lat 46°42'11", long 101°12'45", in SE¼ SW¼ SW¼ sec. 6, T.137 N., R.83 W., Morton County, Hydrologic Unit 10130203 at Stark bridge, 9.5 mi southeast of Judson.	---	1985	6-03-86	0.0
					6-25-86	80.01
					7-22-86	80.20
					7-29-86	3.41
					8-07-86	80.05
					8-21-86	80.01
					9-26-86	0.0
					b3-02-85	3020
					b3-21-85	269
					b3-26-85	131
Heart River at Ingalls Bridge near Judson, ND	Missouri River	Lat 46°47'15", long 101°12'45", in SW¼ NW¼ sec. 15, T.138 N., R.83 W., Morton County, Hydrologic Unit 10130203 at bridge 8 mi southeast of Judson.	---	1985	3-02-86	3020
					3-04-86	8010
					3-17-86	1020
					b3-26-85	92.2
					3-02-86	2790
					3-04-86	7700
					3-17-86	1070

a - estimate

b - not previously published

## Discharge measurements made at miscellaneous sites during water year 1986--Continued

Discharge measurements made at miscellaneous sites during water year 1980--Continued					Measurements	
Stream	Tributary to	Location	Drainage area (mi <sup>2</sup> )	Measured previously (water years)	Date	Discharge (ft <sup>3</sup> /s)
APPLE CREEK BASIN						
Long Lake Creek near Moffit, ND 06349210	Long Lake	Lat 46°37'13", long 100°15'15" in SE¼ SE¼ SE¼ sec. 5, T.136 N., R.76 W., Burleigh County, Hydrologic Unit 10130103 at bridge on county road 4.5 mi southeast of Moffit.	---	1984-85	b3-19-85	76.5
					b4-03-85	10.5
					b5-01-85	9.02
					b6-19-85	3.77
					ab9-17-85	.14
					3-04-86	212
					3-18-86	125
JAMES RIVER BASIN						
Pipestem Creek below Pipestem Dam near Jamestown, ND 06469425	James River	Lat 46°57'00", long 98°45'26" on south line sec.9, T.140 N., R.64 W., Stutsman County, below Pipestem Reservoir embankment on county highway 3 mi northwest of Jamestown.	1010	1974-76 1978-79 1983-84	6-04-86	33.2
					4-28-86	52.0

a - estimate

b - not previously published

## ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

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. These data are collected usually less than quarterly. Samples collected at sites other than gaging stations and partial-record stations to give better areal coverage in a river basin are referred to as miscellaneous sites.

## WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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)
RED RIVER OF THE NORTH BASIN											
05052100 RICHLAND COUNTY DRAIN #65 NEAR GREAT BEND, ND (LAT 46 05 41N LONG 096 47 01W)											
MAR 1986 26...	1525	103	510	7.90	--	6.5	210	100	50	21	14
05056060 MAUVAIS COULEE TRIB NO. 3 NR CANDU, ND (LAT 48 27 20N LONG 099 12 40W)											
MAR 1986 25...	1030	90	320	7.50	--	4.0	130	30	30	13	9.5
05056225 WEBSTER COULEE AT WEBSTER, ND (LAT 48 16 55N LONG 098 53 45W)											
APR 1986 01...	1725	30	890	--	--	--	--	--	--	--	--
05056244 ST. JOE COULEE NR WEBSTER, ND (LAT 48 19 23N LONG 099 00 19W)											
MAR 1986 24...	1015	108	360	7.20	-2.0	2.0	140	30	38	11	13
APR 02...	1355	34	610	--	4.0	3.5	--	--	--	--	--
23...	1630	8.6	660	--	16.5	19.0	--	--	--	--	--
MAY 13...	1730	8.5	--	--	21.5	20.5	--	--	--	--	--
21...	1340	0.11	--	--	26.5	15.5	--	--	--	--	--
JUL 17...	1555	22	1110	--	25.0	23.0	--	--	--	--	--
AUG 12...	1515	0.16	495	--	28.5	26.0	--	--	--	--	--
05056247 CALIO COULEE NR STARKWEATHER, ND (LAT 48 23 58N LONG 099 02 46W)											
MAR 1986 24...	1420	70	380	7.40	--	--	150	33	34	15	15
05056403 COMSTOCK COULEE NR MINNEWAUKAN, ND (LAT 48 06 33N LONG 099 13 41W)											
MAR 1986 23...	1200	25	448	7.30	-2.5	1.0	140	38	30	15	18
05060510 CASS COUNTY DRAIN #52 NEAR AMENIA, ND (LAT 46 58 41N LONG 097 11 52W)											
MAR 1986 25...	0001	8.8	268	7.70	14.0	9.0	110	26	27	11	7.0
05060550 RUSH RIVER NEAR PROSPER, ND (LAT 46 57 59N LONG 097 03 04W)											
MAR 1986 25...	1210	418	350	7.70	--	0.5	140	39	33	13	12
05060570 LOWER BRANCH RUSH RIVER NEAR PROSPER, ND (LAT 46 56 30N LONG 096 59 18W)											
MAR 1986 25...	0950	130	218	7.70	--	0.5	85	12	21	8.0	7.0
05083000 TURTLE RIVER AT MANVEL, ND (LAT 48 04 43N LONG 097 11 03W)											
MAR 1986 28...	1630	500	1860	6.53	14.0	4.5	400	260	97	38	210
05083500 RED RIVER OF THE NORTH AT OSLO, MN (LAT 48 11 35N LONG 097 08 25W)											
APR 1986 03...	1720	29800	425	6.55	5.0	5.0	190	57	44	19	10



## WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	PERCENT SODIUM (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (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 SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
RED RIVER OF THE NORTH BASIN--CONTINUED											
05052100 RICHLAND COUNTY DRAIN #65 NEAR GREAT BEND, ND (LAT 46 05 41N LONG 096 47 01W)											
MAR 1986 26...	12	0.4	11	110	130	6.4	0.1	11	343	310	0.47
05056060 MAUVAIS COULEE TRIB NO. 3 NR CANDU, ND (LAT 48 27 20N LONG 099 12 40W)											
MAR 1986 25...	13	0.4	12	99	47	3.5	0.1	15	203	190	0.28
05056225 WEBSTER COULEE AT WEBSTER, ND (LAT 48 16 55N LONG 098 53 45W)											
APR 1986 01...	--	--	--	--	--	--	--	--	--	--	--
05056244 ST. JOE COULEE NR WEBSTER, ND (LAT 48 19 23N LONG 099 00 19W)											
MAR 1986 24...	15	0.5	13	110	50	5.9	0.1	20	244	220	0.33
APR 02...	--	--	--	--	--	--	--	--	--	--	--
23...	--	--	--	--	--	--	--	--	--	--	--
MAY 13...	--	--	--	--	--	--	--	--	--	--	--
21...	--	--	--	--	--	--	--	--	--	--	--
JUL 17...	--	--	--	--	--	--	--	--	--	--	--
AUG 12...	--	--	--	--	--	--	--	--	--	--	--
05056247 CALIO COULEE NR STARKWEATHER, ND (LAT 48 23 58N LONG 099 02 46W)											
MAR 1986 24...	17	0.6	9.4	110	56	2.8	0.1	20	246	220	0.33
05056403 COMSTOCK COULEE NR MINNEWAUKAN, ND (LAT 48 06 33N LONG 099 13 41W)											
MAR 1986 23...	21	0.7	11	99	75	2.2	0.1	15	248	230	0.34
05060510 CASS COUNTY DRAIN #52 NEAR AMENIA, ND (LAT 46 58 41N LONG 097 11 52W)											
MAR 1986 25...	11	0.3	7.8	87	27	3.4	0.1	17	170	150	0.23
05060550 RUSH RIVER NEAR PROSPER, ND (LAT 46 57 59N LONG 097 03 04W)											
MAR 1986 25...	15	0.5	8.9	97	47	5.7	0.1	13	223	190	0.3
05060570 LOWER BRANCH RUSH RIVER NEAR PROSPER, ND (LAT 46 56 30N LONG 096 59 18W)											
MAR 1986 25...	14	0.3	6.7	74	12	2.6	0.2	17	130	120	0.18
05083000 TURTLE RIVER AT MANVEL, ND (LAT 48 04 43N LONG 097 11 03W)											
MAR 1986 28...	52	5	14	140	280	320	0.3	16	1110	1100	1.5
05083500 RED RIVER OF THE NORTH AT OSLO, MN (LAT 48 11 35N LONG 097 08 25W)											
APR 1986 03...	10	0.3	7.6	130	62	7.6	0.2	13	260	240	0.35

## WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

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)
RED RIVER OF THE NORTH BASIN--CONTINUED										
05052100 RICHLAND COUNTY DRAIN #65 NEAR GREAT BEND, ND (LAT 46 05 41N LONG 096 47 01W)										
MAR 1986 26...	3	60	40	<1	25	60	0.4	1	<1	290
05056060 MAUVAIS COULEE TRIB NO. 3 NR CANDU, ND (LAT 48 27 20N LONG 099 12 40W)										
MAR 1986 25...	2	50	70	<1	14	90	0.3	1	<1	140
05056225 WEBSTER COULEE AT WEBSTER, ND (LAT 48 16 55N LONG 098 53 45W)										
APR 1986 01...	--	--	--	--	--	--	--	--	--	--
05056244 ST. JOE COULEE NR WEBSTER, ND (LAT 48 19 23N LONG 099 00 19W)										
MAR 1986 24...	7	40	90	<1	16	20	0.1	2	1	140
APR 02...	--	--	--	--	--	--	--	--	--	--
23...	--	--	--	--	--	--	--	--	--	--
MAY 13...	--	--	--	--	--	--	--	--	--	--
21...	--	--	--	--	--	--	--	--	--	--
JUL 17...	--	--	--	--	--	--	--	--	--	--
AUG 12...	--	--	--	--	--	--	--	--	--	--
05056247 CALIO COULEE NR STARKWEATHER, ND (LAT 48 23 58N LONG 099 02 46W)										
MAR 1986 24...	5	100	50	<1	13	20	0.1	2	1	150
05056403 COMSTOCK COULEE NR MINNEWAUKAN, ND (LAT 48 06 33N LONG 099 13 41W)										
MAR 1986 23...	2	80	110	<1	23	60	0.2	1	<1	160
05060510 CASS COUNTY DRAIN #52 NEAR AMENIA, ND (LAT 46 58 41N LONG 097 11 52W)										
MAR 1986 25...	4	60	120	<1	14	10	0.1	1	<1	35
05060550 RUSH RIVER NEAR PROSPER, ND (LAT 46 57 59N LONG 097 03 04W)										
MAR 1986 25...	4	80	150	<1	22	110	0.1	1	<1	200
05060570 LOWER BRANCH RUSH RIVER NEAR PROSPER, ND (LAT 46 56 30N LONG 096 59 18W)										
MAR 1986 25...	5	40	170	<1	13	10	0.2	1	<1	19
05083000 TURTLE RIVER AT MANVEL, ND (LAT 48 04 43N LONG 097 11 03W)										
MAR 1986 28...	2	330	50	1	94	330	0.2	2	<1	1100
05083500 RED RIVER OF THE NORTH AT OSLO, MN (LAT 48 11 35N LONG 097 08 25W)										
APR 1986 03...	2	50	60	<1	15	30	<0.1	2	<1	150

## WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	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)
RED RIVER OF THE NORTH BASIN--CONTINUED											
05092200 PEMBINA COUNTY DRAIN 20 NR GLASSTON, ND (LAT 48 41 49N LONG 097 23 03W)											
OCT 1985											
16...	1225	1.8	1300	--	1.0	1.0	--	--	--	--	--
MAR 1986											
26...	1635	43	325	--	3.0	1.0	--	--	--	--	--
APR											
02...	1700	5.6	690	--	0.0	5.0	--	--	--	--	--
MAY											
05...	1635	4.4	770	--	22.0	19.0	--	--	--	--	--
JUL											
14...	1835	21	385	--	23.0	27.0	--	--	--	--	--
KNIFE RIVER BASIN											
06339490 ELM CREEK NR GOLDEN VALLEY, ND (LAT 47 06 25N LONG 102 03 05W)											
MAR 1986											
01...	1505	160	440	7.50	10.0	0.5	63	--	12	8.0	61
06340200 WEST BRANCH OTTER CREEK NR BEULAH, ND (LAT 47 08 05N LONG 101 39 35W)											
FEB 1986											
28...	1557	48	380	7.51	5.0	0.5	72	1	14	9.0	45
APR											
21...	1441	9.7	1420	--	16.0	10.0	--	--	--	--	--
JUL											
21...	1527	1.3	1780	--	31.0	26.0	--	--	--	--	--
HEART RIVER BASIN											
06343000 HEART RIVER NR SOUTH HEART, ND (LAT 46 51 56N LONG 102 56 53W)											
MAR 1986											
08...	1720	153	650	7.90	6.0	1.0	120	19	24	14	89
JUN											
30...	1345	869	760	--	25.0	16.0	--	--	--	--	--

## WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

	SODIUM AD- SORP- TION	POTAS- SIUM, DIS- SOLVED	ALKA- LITY LAB	SULFATE DIS- SOLVED	CHLO- RIDE, DIS- SOLVED	FUO- RIDE, DIS- SOLVED	SILICA, DIS- SOLVED	SOLIDS, RESIDUE AT 180 DEG. C	SUM OF CONSTI- TUENTS,	SOLIDS, DIS- SOLVED
PERCENT DATE	(00932)	(00931) RATIO	(MG/L AS K)	(CACO3) AS SO4	(MG/L AS CL)	(MG/L AS F)	(MG/L AS SIO2)	(70300) (MG/L)	(70301) (MG/L)	(70303) (TONS PER AC-FT)
RED RIVER OF THE NORTH BASIN--CONTINUED										
OCT 16... MAR 26... APR 02... MAY 05... JUL 14...	-- -- -- -- -- -- -- -- -- --	-- -- -- -- -- -- -- -- -- --	-- -- -- -- -- -- -- -- -- --	-- -- -- -- -- -- -- -- -- --	-- -- -- -- -- -- -- -- -- --	-- -- -- -- -- -- -- -- -- --	-- -- -- -- -- -- -- -- -- --	-- -- -- -- -- -- -- -- -- --	-- -- -- -- -- -- -- -- -- --	-- -- -- -- -- -- -- -- -- --
05092200 PEMBINA COUNTY DRAIN 20 NR GLASTON, ND (LAT 48 41 49N LONG 097 23 03W)										
OCT 16... MAR 26... APR 02... MAY 05... JUL 14...	-- -- -- -- -- -- -- -- -- --	-- -- -- -- -- -- -- -- -- --	-- -- -- -- -- -- -- -- -- --	-- -- -- -- -- -- -- -- -- --	-- -- -- -- -- -- -- -- -- --	-- -- -- -- -- -- -- -- -- --	-- -- -- -- -- -- -- -- -- --	-- -- -- -- -- -- -- -- -- --	-- -- -- -- -- -- -- -- -- --	-- -- -- -- -- -- -- -- -- --
KNIFE RIVER BASIN										
MAR 01...	63	3	11	78	120	2.0	0.1	5.0	267	270 0.36
06339490 ELM CREEK NR GOLDEN VALLEY, ND (LAT 47 06 25N LONG 102 03 05W)										
FEB 28... APR 21... JUL 21...	53 -- --	2 -- --	11 -- --	72 -- --	96 -- --	0.8 -- --	0.1 -- --	4.9 -- --	243 -- --	220 -- -- 0.33
06340200 WEST BRANCH OTTER CREEK NR BEulah, ND (LAT 47 08 05N LONG 101 39 35W)										
FEB 28... APR 21... JUL 21...	53 -- --	2 -- --	11 -- --	72 -- --	96 -- --	0.8 -- --	0.1 -- --	4.9 -- --	243 -- --	220 -- -- 0.33
HEART RIVER BASIN										
MAR 08... JUN 30...	60 --	4 --	7.0 --	99 --	200 --	7.9 --	0.1 --	6.6 --	447 --	410 -- 0.61
06343000 HEART RIVER NR SOUTH HEART, ND (LAT 46 51 56N LONG 102 56 53W)										





## STATION RECORDS, GROUND WATER

## GROUND-WATER LEVELS

## BENSON COUNTY

480228098482501. Local number, 153-063-30CBC.

LOCATION.--Lat 48°02'28", long 098°48'25", Hydrologic Unit 09020201.

Owner: North Dakota State Water Commission.

AQUIFER.--Spiritwood.

WELL CHARACTERISTICS.--Drilled observation well, diameter 1.25 in, depth 200 ft, cased to 137 ft, plastic pipe, No. 18 slot screen set 137 to 143 ft below land-surface datum.

INSTRUMENTATION.--Measured quarterly using a steel tape.

DATUM.--Altitude of land-surface datum is 1,445 ft. Measuring point: Top of casing 2.00 ft above land-surface datum.

PERIOD OF RECORD.--June 1970 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 13.75 ft below land-surface datum, May 25, 1983; lowest measured, 22.30 ft below land-surface datum, Mar. 3, 1971.

## WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 6	14.70	FEB 24	14.94	JULY 8	14.31	SEPT 18	14.60

## BENSON COUNTY

480958099154801. Local number, 154-067-15BBB.

LOCATION.--Lat 48°09'58", long 099°15'48", Hydrologic Unit 09020201.

Owner: North Dakota State Water Commission.

AQUIFER.--Spiritwood.

WELL CHARACTERISTICS.--Drilled observation well, diameter 1.25 in, depth 180 ft, cased to 147 ft, plastic pipe, No. 18 slot screen set 147 to 153 ft below land-surface datum.

INSTRUMENTATION.--Measured quarterly using a steel tape.

DATUM.--Altitude of land-surface datum is 1,475 ft. Measuring point: Top of casing 2.00 ft above land-surface datum.

PERIOD OF RECORD.--June 1970 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 30.19 ft below land-surface datum, May 26, 1983; lowest measured, 33.80 ft below land-surface datum, Mar. 15, 1978.

## WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 5	31.00	APR 3	31.31	SEPT 16	30.80

## BENSON COUNTY

481041099442701. Local number, 154-071-11AAD1.

LOCATION.--Lat 48°10'41", long 099°44'27", Hydrologic Unit 09020202.

Owner: North Dakota State Water Commission.

AQUIFER.--Fox Hills Sandstone.

WELL CHARACTERISTICS.--Drilled observation well, diameter 1.25 in, depth 100 ft, cased to 42 ft, plastic pipe, No. 12 slot screen set 42 to 45 ft below land-surface datum.

INSTRUMENTATION.--Measured quarterly using a steel tape.

DATUM.--Altitude of land-surface datum is 1,590 ft. Measuring point: Top of casing 2.0 ft (0.61 m) above land-surface datum.

PERIOD OF RECORD.--August 1968 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 5.41 ft below land-surface datum, July 12, 1982; lowest measured, 9.67 ft below land-surface datum, Nov. 28, 1983.

## WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 4	7.79	MAY 21	7.19	JULY 9	6.89	SEPT 16	7.37

## BOWMAN COUNTY

461534103491701. Local number, 132-105-16BDB.

LOCATION.--Lat 46°15'34", long 103°49'17", Hydrologic Unit 10110203.

Owner: North Dakota State Water Commission.

AQUIFER.--Hell Creek-Fox Hills Sandstone.

WELL CHARACTERISTICS.--Drilled observation well, diameter 2 in, depth 475 ft, cased to 441 ft, steel pipe, No. 12 slot screen set 441 to 459 ft below land-surface datum.

INSTRUMENTATION.--Measured annually, during late November or early December, using a steel tape.

DATUM.--Altitude of land-surface datum is 3,010 ft. Measuring point: Top of casing 3.40 ft above land-surface datum.

PERIOD OF RECORD.--September 1971 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 270.15 ft below land-surface datum, Feb. 25, 1973; lowest measured, 272.07 ft below land-surface datum, Sept. 11, 1985.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	WATER LEVEL
DEC 4	271.93

## BURLEIGH COUNTY

464943100305801. Local number, 139-078-27CBB.

LOCATION.--Lat 46°49'43", long 100°30'58", Hydrologic Unit 10130103.

Owner: North Dakota State Water Commission.

AQUIFER.--McKenzie.

WELL CHARACTERISTICS.--Drilled observation well, diameter 1.25 in, depth 255 ft, cased to 200 ft, plastic pipe, slotted 200 to 220 ft below land-surface datum, gravel packed.

INSTRUMENTATION.--Measured on a six-week schedule, except during the winter, using a steel tape.

DATUM.--Altitude of land-surface datum is 1,713. Measuring point: Top of casing 1.90 ft above land-surface datum.

PERIOD OF RECORD.--August 1962 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 22.30 ft below land-surface datum, June 17, 1970; lowest measured, 32.44 ft below land-surface datum, Aug. 26, 1977.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 10	24.52	APR 23	23.32	JUNE 20	23.34	AUG 25	23.41
MAR 24	23.68	MAY 30	23.28	JULY 22	23.26	SEPT 15	23.39

## CASS COUNTY

464359096541301. Local number, 138-049-29CCC.

LOCATION.--Lat 46°43'59", long 096°54'13", Hydrologic Unit 09020105.

Owner: North Dakota State Water Commission.

AQUIFER.--West Fargo.

WELL CHARACTERISTICS.--Drilled observation well, diameter 1.25 in, depth 317 ft, cased to 278 ft, plastic pipe, screens set at 278 to 280 ft below land-surface datum.

INSTRUMENTATION.--Measured monthly using a steel tape.

COOPERATION.--Record provided by the North Dakota State Water Commission since 1983.

DATUM.--Altitude of land-surface datum is 912 ft. Measuring point: Top of casing 1.80 ft above land-surface datum.

PERIOD OF RECORD.--August 1964 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 33.90 ft below land-surface datum, Oct. 1, 1964, lowest measured, 58.00 ft below land-surface datum, Aug. 30, 1986.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 26	56.88	MAY 10	57.07	JULY 4	57.63	AUG 30	58.00
DEC 7	57.17	JUNE 7	57.29	AUG 2	57.79		

## GROUND-WATER LEVELS

## DIVIDE COUNTY

485649103155701. Local number, 163-097-15BCC.

LOCATION.--Lat 48°56'49", long 103°15'57", Hydrologic Unit 09010001.

Owner: North Dakota State Water Commission.

AQUIFER.--Yellowstone.

WELL CHARACTERISTICS.--Drilled observation well, diameter 2 in, depth 575 ft, cased to 546 ft, steel pipe, No. 12 slot screen set 546 to 558 ft below land-surface datum.

INSTRUMENTATION.--Measured quarterly using a steel tape.

DATUM.--Altitude of land-surface datum is 1,915 ft. Measuring point: Top of casing 1.50 ft above land-surface datum.

PERIOD OF RECORD.--January 1973 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 10.31 ft below land-surface datum, June 5, 1979; lowest measured, 13.75 ft below land-surface datum, Aug. 20, 1986.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 4	13.31	FEB 11	13.36	MAY 6	13.24	AUG 20	13.75

## DUNN COUNTY

471323102290101. Local number, 143-093-09BCB.

LOCATION.--Lat 47°13'23", long 102°29'01", Hydrologic Unit 10130201.

Owner: North Dakota State Water Commission.

AQUIFER.--Sentinel Butte.

WELL CHARACTERISTICS.--Drilled observation well, diameter 2 in, depth 965 ft, cased to 378 ft, steel pipe, No. 12 slot screen set 378 to 396 ft below land-surface datum.

INSTRUMENTATION.--Measured quarterly using a steel tape.

DATUM.--Altitude of land-surface datum is 2,133 ft. Measuring point: Top of casing 2.10 ft above land-surface datum.

PERIOD OF RECORD.--February 1974 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 92.12 ft below land-surface datum, June 7, 1984; lowest measured, 93.79 ft below land-surface datum, June 22, 1981.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 25	92.15	JUNE 12	92.90	SEPT 9	92.64

## EDDY COUNTY

473720098592401. Local number, 148-065-19DAA.

LOCATION.--Lat 47°37'20", long 098°59'24", Hydrologic Unit 10160001.

Owner: North Dakota State Water Commission.

AQUIFER.--New Rockford.

WELL CHARACTERISTICS.--Drilled observation well, diameter 1.25 in, depth 242 ft, cased to 220 ft, plastic pipe, slotted from 210 to 220 ft below land-surface datum.

INSTRUMENTATION.--Measured on a six-week schedule, except during the winter, using a steel tape.

DATUM.--Altitude of land-surface datum is 1,526 ft. Measuring point: Top of casing 1.90 ft above land-surface datum.

PERIOD OF RECORD.--September 1964 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 43.40 ft below land-surface datum, Sept. 6, 1983; lowest measured, 50.49 ft below land-surface datum, Sept. 6, 1978.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 11	46.43	JULY 10	45.46	AUG 18	45.88	OCT 8	45.48
JUNE 3	44.99						

## EMMONS COUNTY

463632100171901. Local number, 136-076-07CBC.

LOCATION.--Lat 46°36'32", long 100°17'19", Hydrologic Unit 10130103.

Owner: North Dakota State Water Commission.

AQUIFER.--Long Lake.

WELL CHARACTERISTICS.--Drilled observation well, diameter 1.25 in, depth 150 ft, cased to 117 ft, plastic pipe, No. 12 slot screen set at 117 to 123 ft below land-surface datum.

INSTRUMENTATION.--Measured quarterly using a steel tape.

DATUM.--Altitude of land-surface datum is 1,735 ft. Measuring point: Top of casing 2.00 ft above land-surface datum.

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

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 0.73 ft below land-surface datum, July 13, 1984; lowest measured, 8.32 ft below land-surface datum, Sept. 1, 1977.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 10	3.26	MAR 10	2.30	JUNE 17	1.69	SEPT 23	1.00

## GRAND FORKS COUNTY

474957097343501. Local number, 150-054-04CCD.

LOCATION.--Lat 47°49'57", long 097°34'35", Hydrologic Unit 09020307.

Owner: North Dakota State Water Commission.

AQUIFER.--Elk Valley.

WELL CHARACTERISTICS.--Drilled observation well, diameter 1.25 in, depth 126 ft, cased to 40 ft, plastic pipe, No. 12 slot screen set 40 to 43 ft below land-surface datum.

INSTRUMENTATION.--Measured quarterly using a steel tape.

DATUM.--Altitude of land-surface datum is 1,127 ft. Measuring point: Top of casing 1.80 ft, above land-surface datum.

PERIOD OF RECORD.--September 1965 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 2.48 ft below land-surface datum, May 6, 1966; lowest measured, 7.96 ft below land-surface datum, Mar. 7, 1977.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 29	4.71	MAR 11	6.19	JUNE 5	3.45

## GRIGGS COUNTY

471612098113101. Local number, 144-059-20CCC.

LOCATION.--Lat 47°16'12", long 098°11'31", Hydrologic Unit 09020203.

Owner: North Dakota State Water Commission.

AQUIFER.--Spiritwood.

WELL CHARACTERISTICS.--Drilled observation well, diameter 1.25 in, depth 240 ft, cased to 158 ft, plastic pipe, No. 25 slot screen set 158 to 161 ft below land-surface datum.

INSTRUMENTATION.--Measured quarterly using a steel tape.

COOPERATION.--Record provided by the North Dakota State Water Commission since 1975.

DATUM.--Altitude of land-surface datum is 1,430 ft. Measuring point: Top of casing 2.0 ft above land-surface datum.

PERIOD OF RECORD.--September 1971 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 45.84 ft below land-surface datum, Apr. 5, 1977; lowest measured, 86.99 ft below land-surface datum, Aug. 10, 1976.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 18	53.44	APR 22	50.80	JULY 8	54.62	SEPT 10	54.33



## GROUND-WATER LEVELS

## GRIGGS COUNTY

473425098232901. Local number, 147-061-01CCC.

LOCATION.--Lat 47°34'25", long 098°23'29", Hydrologic Unit 09020203.

Owner: North Dakota State Water Commission.

AQUIFER.--Spiritwood.

WELL CHARACTERISTICS.--Drilled observation well, diameter 1.25 in, depth 340 ft, cased to 237 ft, plastic pipe, No. 25 slot screen set 237 to 240 ft below land-surface datum.

INSTRUMENTATION.--Measured monthly except during the winter, using a steel tape.

COOPERATION.--Record provided by the North Dakota State Water Commission since 1977.

DATUM.--Altitude of land-surface datum is 1,525 ft. Measuring point: Top of casing 2.00 ft above land-surface datum.

PERIOD OF RECORD.--September 1971 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 26.72 ft below land-surface datum, May 16, 1984; lowest measured, 96.10 ft below land-surface datum, Aug. 12, 1975.

## WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 18	27.82	APR 21	26.99	JULY 9	56.47	SEPT 11	31.15

## GRIGGS COUNTY

473600098065901. Local number, 148-059-36AAB.

LOCATION.--Lat 47°36'00", long 098°06'59", Hydrologic Unit 09020203.

Owner: North Dakota State Water Commission.

AQUIFER.--McVillie.

WELL CHARACTERISTICS.--Drilled observation well, diameter 1.25 in, depth 180 ft, cased to 137 ft, plastic pipe, No. 12 slot screen set 137 to 143 ft below land-surface datum.

INSTRUMENTATION.--Measured quarterly using a steel tape.

COOPERATION.--Record provided by the North Dakota State Water Commission since 1984.

DATUM.--Altitude of land-surface datum is 1,320 ft. Measuring point: Top of casing 2.00 ft above land-surface datum.

PERIOD OF RECORD.--October 1971 to December 1982, April 1985 to present.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, +0.77 ft above land-surface datum, Sept. 11, 1986; lowest 12.09 ft below land-surface datum, Aug. 9, 1978.

## WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 17	10.59	APR 22	6.44	JULY 9	6.60	SEPT 11	-0.77

## HETTINGER COUNTY

463153102521001. Local number, 135-097-04DCA.

LOCATION.--Lat 46°31'53", long 102°52'10", Hydrologic Unit 10130204.

Owner: North Dakota State Water Commission.

AQUIFER.--Fox Hills Sandstone.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in, depth 1,790 ft, cased to 1,320 ft, steel pipe, open hole.

INSTRUMENTATION.--Measured quarterly using a steel tape. Water-level recorder prior to May 1974.

DATUM.--Altitude of land-surface datum is 2,567 ft. Measuring point: Top of casing 0.70 ft above land-surface datum.

PERIOD OF RECORD.--September 1968 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 141.87 ft below land-surface datum, Dec. 31, 1968; lowest measured, 144.20 ft below land-surface datum, Nov. 26, 1969.

## WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 5	143.15	MAR 14	142.97	JUNE 2	143.07	SEPT 2	142.28



## KIDDER COUNTY

470638099324301. Local number, 142-070-16DDD.

LOCATION.--Lat 47°06'38", long 099°32'43", Hydrologic Unit 10130103.

Owner: North Dakota State Water Commission.

AQUIFER.--Long Lake.

WELL CHARACTERISTICS.--Drilled observation well, diameter 1.25 in, depth 84 ft, cased to 70 ft, plastic pipe, No. 18 slot screen set 70 to 73 ft below land-surface datum.

INSTRUMENTATION.--Measured monthly, except during the winter, using a steel tape.

COOPERATION.--Record provided by the North Dakota State Water Commission since 1979.

DATUM.--Altitude of land-surface datum is 1,810 ft. Measuring point: Top of casing 1.90 ft above land-surface datum.

PERIOD OF RECORD.--November 1965 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 19.94 ft below land-surface datum, Dec. 4, 1976; lowest measured, 26.03 ft below land-surface datum, Aug. 27, 1982.

## WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 18	22.22	APR 22	21.54	JULY 18	21.71	SEPT 12	22.15
MAR 24	21.81	MAY 20	21.47	AUG 14	22.78		

## MC LEAN COUNTY

473752101055301. Local number, 148-082-23BBB.

LOCATION.--Lat 47°37'52", long 101°05'53", Hydrologic Unit 10130101.

Owner: North Dakota State Water Commission.

AQUIFER.--Lake Nettle.

WELL CHARACTERISTICS.--Drilled observation well, diameter 1.25 in, depth 300 ft, cased to 198 ft, plastic pipe, No. 24 slot screen set 198 to 204 ft below land-surface datum.

INSTRUMENTATION.--Measured monthly, except during the winter, using a steel tape.

COOPERATION.--Record provided by the North Dakota State Water Commission since December 1984.

DATUM.--Altitude of land-surface datum is 1,880 ft. Measuring point: Top of casing 2.30 ft above land-surface datum.

PERIOD OF RECORD.--December 1969 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 36.50 ft below land-surface datum, Mar. 31, 1983, and June 27, 1984; lowest measured, 42.30 ft below land-surface datum, Dec. 2, 1970.

## WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 2	37.34	MAR 14	37.56	JULY 2	37.01	SEPT 10	36.81
NOV 6	37.30	APR 23	37.01	JULY 31	36.82		
DEC 6	37.27	JUNE 4	37.10	AUG 8	36.84		

## OLIVER COUNTY

470642101162701. Local number, 142-084-24BBA.

LOCATION.--Lat 47°06'42", long 101°16'27", Hydrologic Unit 10130101.

Owner: North Dakota State Water Commission.

AQUIFER.--Fox Hills Sandstone.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in, depth 1,295 ft, cased to 966 ft, steel pipe, open ended.

INSTRUMENTATION.--Measured quarterly using a steel tape.

DATUM.--Altitude of land-surface datum is 2,006 ft. Measuring point: Top of casing 2.00 ft above land-surface datum.

PERIOD OF RECORD.--January 1968 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 197.04 ft below land-surface datum, Dec. 8, 1972; lowest measured, 200.87 ft below land-surface datum, Sept. 2, 1986.

## WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 21	199.52	APR 23	199.40	JUNE 10	199.55	SEPT 2	200.87
DEC 4	199.48						

### GROUND-WATER LEVELS

## PEMBINA COUNTY

485239097501702. Local number, 162-056-01CCC2.

LOCATION.--Lat 48°52'39", long 097°50'17", Hydrologic Unit 09020313.

Owner: North Dakota State Water Commission

AQUIFER.--Icelandic.

WELL CHARACTERISTICS.--Drilled observation well, diameter 1.25 in, depth 40 ft, cased to 37 ft, plastic pipe, No. 12 slot screen set 37 to 40 ft below land-surface datum.

No. 12 slot screen set 37 to 40 ft below land-surface datum.

INSTRUMENTATION.--Measured quarterly using a steel tape.

DATUM.--Altitude of land-surface datum is 988 ft. Measuring point: Top of casing 1.8 ft above land-surface datum.

PERIOD OF RECORD.--October 1969 to current year.

EXTREMES FOR PERIOD OF RECORD.---Highest water level measured, 4.65 ft below land-surface datum, May 21, 1970;  
lowest measured, 8.10 ft below land-surface datum, Mar. 8, 1985.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 4	6.56	MAR 4	7.19

## PIERCE COUNTY

475323100092101. Local number, 151-074-20AAA.

LOCATION.--Lat 47°53'23", long 100°09'21", Hydrologic Unit 09020202.

Owner: North Dakota State Water Commission.

AQUIFER.--New Rockford.

WELL CHARACTERISTICS.--Drilled observation well, diameter 1.25 in, depth 320 ft, cased to 256 ft, plastic pipe, No. 18 slot screen set 256 to 259 ft below land-surface datum.

No. 18 slot screen set 256 to 259 ft below land-surface datum.

INSTRUMENTATION.-- Measured quarterly using a steel tape.

DATUM.--Altitude of land-surface datum is 1,605 ft. Measuring point: Top of casing 2.00 ft above land-surface datum.

PERIOD OF RECORD.--November 1968 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 28.08 ft below land-surface datum, Nov. 29, 1976;  
lowest measured, 31.73 ft below land-surface datum, Dec. 10, 1968.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 3	30.32	JUNE 3	30.84	AUG 18	31.30

**RICHLAND COUNTY**

462633097163402. Local number, 134-052-06CCD2.

LOCATION.--Lat 46°26'33", long 097°16'34", Hydrologic Unit 09020204.

Owner: North Dakota State Water Commission.

AQUIFER.--Sheyenne Delta.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in, depth 40 ft, cased to 30 ft, plastic pipe, slotted 30 to 40 ft below land-surface datum.

slotted 30 to 40 ft below land-surface datum.

INSTRUMENTATION.--Water level recorder October 1965 to current year. Prior to February 1972 only 5-day low and EOM water levels are available.

EOM water levels are available.

DATUM.--Altitude of land-surface datum is 1,067 ft. Measuring point: Top of casing 0.65 ft above land-surface datum.

REMARKS.--Key well reported in monthly Water Resources Review.

PERIOD OF RECORD.--September 1963 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 0.78 ft below land-surface datum, May 13, 1972; lowest recorded, 8.73 ft below land-surface datum, Feb. 8, 1977. May have been lower during period of missing record, Jan. 17 to Feb. 7, 1977.

DEPTH BELOW LAND SURFACE (WATER LEVEL) (FEET), WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986  
MAXIMUM VALUES (DAILY-LOW WATER-LEVEL)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	7.75	7.61	7.79	7.95	8.03	8.02	4.94	2.49	3.93	4.88	5.68	5.88
10	7.74	7.68	7.82	7.97	8.03	7.90	4.83	2.06	4.22	5.23	5.85	6.03
15	7.58	7.70	7.84	7.94	8.07	7.61	3.54	2.57	4.35	5.44	6.01	5.30
20	7.56	7.74	7.88	7.93	8.12	7.07	2.38	2.94	4.26	4.89	6.26	4.31
25	7.57	7.75	7.89	7.96	8.14	6.25	2.68	2.71	4.90	5.46	5.39	4.36
EOM	7.60	7.76	7.93	7.99	8.16	5.61	2.06	3.59	4.93	5.15	5.86	4.36
WTR YR 1986		HIGHEST	1.78	MAY 9	LOWEST	8.16	FEB 27-28					

## STARK COUNTY

465755102410701. Local number, 140-095-08AAA.

LOCATION.--Lat 46°57'55", long 102°41'07", Hydrologic Unit 10130204.

Owner: North Dakota State Water Commission.

AQUIFER.--Sentinel Butte.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in, depth 160 ft, cased to 80 ft, plastic pipe, open ended.

INSTRUMENTATION.--Measured monthly using a steel tape.

DATUM.--Altitude of land-surface datum is 2,419 ft. Measuring point: Top of casing 1.70 ft above land-surface datum.

REMARKS.--Key well reported in monthly Water Resources Review.

PERIOD OF RECORD.--December 1968 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 15.61 ft below land-surface datum, June 19, 1970; lowest measured, 20.41 ft below land-surface datum, Mar. 21, 1969.

## WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 23	18.87	JAN 21	18.99	APR 22	16.94	JULY 25	16.59
NOV 25	18.93	FEB 20	19.12	MAY 21	16.88	AUG 22	17.18
DEC 19	19.12	MAR 21	17.23	JUNE 20	17.16	SEPT 22	17.56

## STEELE COUNTY

471601097371001. Local number, 144-055-26BBB.

LOCATION.--Lat 47°16'01", long 097°37'10", Hydrologic Unit 09020109.

Owner: North Dakota State Water Commission.

AQUIFER.--Galesburg.

WELL CHARACTERISTICS.--Drilled observation well, diameter 1.25 in, depth 300 ft, cased to 53 ft, plastic pipe, slotted 53 to 68 ft below land-surface datum.

INSTRUMENTATION.--Measured monthly, except during the winter, using a steel tape.

COOPERATION.--Record provided by the North Dakota State Water Commission since 1982.

DATUM.--Altitude of land-surface datum is 1,160 ft. Measuring point: Top of casing 2.00 ft above land-surface datum.

PERIOD OF RECORD.--June 1970 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 16.20 ft below land-surface datum, Apr. 23, 1984; lowest measured, 24.33 ft below land-surface datum, Aug. 6, 1980.

## WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 6	22.55	MAY 4	20.26	JULY 4	21.86	AUG 31	20.58
NOV 3	22.42	JUNE 11	19.98	AUG 2	20.74	SEPT 28	20.20

## STUTSMAN COUNTY

463846098274101. Local number, 137-062-26DDD.

LOCATION.--Lat 46°38'46", long 098°27'41", Hydrologic Unit 10160003.

Owner: North Dakota State Water Commission.

AQUIFER.--Spiritwood.

WELL CHARACTERISTICS.--Drilled observation well, diameter 1.25 in, depth 240 ft, cased to 157 ft, plastic pipe, No. 12 slot screen set 157 to 163 ft below land-surface datum.

INSTRUMENTATION.--Measured monthly, except during the winter, using a steel tape.

COOPERATION.--Record provided by the North Dakota State Water Commission since 1982.

DATUM.--Altitude of land-surface datum is 1,455 ft. Measuring point: Top of casing 1.80 ft above land-surface datum.

PERIOD OF RECORD.--September 1970 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 15.20 ft below land-surface datum, Sept. 6, 1979; lowest measured, 20.67 ft below land-surface datum, May 28, 1973.

## WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 3	18.83	APR 3	19.36	JULY 2	18.37	SEPT 3	17.89
NOV 5	18.90	MAY 8	18.88	AUG 7	18.07		

## TRAILL COUNTY

473228097051501. Local number, 147-051-22BBB.

LOCATION.--Lat 47°32'28", long 097°05'15", Hydrologic Unit 09020301.

Owner: North Dakota State Water Commission.

AQUIFER.--Hillsboro.

WELL CHARACTERISTICS.--Drilled observation well, diameter 1.25 in, depth 103 ft, cased to 97 ft, plastic pipe, No. 18 slot screen set 97 to 100 ft below land-surface datum.

INSTRUMENTATION.--Measured quarterly using a steel tape.

DATUM.--Altitude of land-surface datum is 925 ft. Measuring point: Top of casing 2.40 ft above land-surface datum.

PERIOD OF RECORD.--August 1965 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, +1.90 ft above land-surface datum, July 4, 1979; lowest measured, 7.27 ft below land-surface datum, Aug. 17, 1965.

## WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 2	0.96	MAY 22	1.17	JULY 21	0.69	SEPT 3	0.12
APR 13	0.65						

## WALSH COUNTY

481657097473601. Local number, 156-056-36CCC1.

LOCATION.--Lat 48°16'57", long 097°47'36", Hydrologic Unit 09020308.

Owner: North Dakota State Water Commission.

AQUIFER.--Fordville.

WELL CHARACTERISTICS.--Drilled observation well, diameter 1.25 in, depth 280 ft, cased to 27 ft, plastic pipe, No. 18 slot screen set 27 to 30 ft below land-surface datum.

INSTRUMENTATION.--Measured quarterly using a steel tape.

DATUM.--Altitude of land-surface datum is 1,145 ft. Measuring point: Top of casing 1.85 ft above land-surface datum.

PERIOD OF RECORD.--May 1968 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 5.03 ft below land-surface datum, June 29, 1981; lowest measured, 6.98 ft below land-surface datum, Mar. 11, 1985.

## WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 13	6.24	MAR 11	6.42	JUNE 5	6.08

## WALSH COUNTY

482408097443201. Local number, 157-055-21DBC.

LOCATION.--Lat 48°24'08", long 097°44'32", Hydrologic Unit 09020301.

Owner: North Dakota State Water Commission.

AQUIFER.--Dakota Formation.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in, depth 496 ft, cased to 491 ft, steel pipe, screen set 491 to 496 ft below land-surface datum.

INSTRUMENTATION.--Measured quarterly using a steel tape.

DATUM.--Altitude of land-surface datum is 975 ft. Measuring point: Top of casing at land-surface datum.

PERIOD OF RECORD.--May 1968 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 88.84 ft below land-surface datum, Mar. 9, 1982; lowest measured, 92.75 ft below land-surface datum, Sept. 17, 1974.

## WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 21	90.72	DEC 12	91.47	MAR 7	90.79	JUNE 5	90.79



## WALSH COUNTY

482449098095801. Local number, 157-058-18DDD.

LOCATION.--Lat 48°24'49", long 098°09'58", Hydrologic Unit 09020308.

Owner: North Dakota State Water Commission.

AQUIFER.--Pierre Shale.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in, depth 140 ft, cased to 80 ft, plastic pipe, slotted screen set 80 to 100 ft below land-surface datum.

INSTRUMENTATION.--Measured quarterly using a steel tape.

DATUM.--Altitude of land-surface datum is 1,580 ft. Measuring point: Top of casing 1.00 ft above land-surface datum.

PERIOD OF RECORD.--June 1968 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, +0.89 ft above land-surface datum, Dec. 5, 1972; lowest measured, 9.15 ft below land-surface datum, Mar. 14, 1977.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 2	3.04	DEC 12	3.19	MAR 11	5.06	JUNE 5	1.55

## WARD COUNTY

480912101090301. Local number, 154-082-24ABA.

LOCATION.--Lat 48°09'12", long 101°09'03", Hydrologic Unit 09010001.

Owner: North Dakota State Water Commission.

AQUIFER.--Lower Souris.

WELL CHARACTERISTICS.--Drilled observation well, diameter 1.25 in, depth 115 ft, cased to 10 ft, plastic pipe, slotted screen set 10 to 40 ft below land-surface datum.

INSTRUMENTATION.--Measured quarterly using a steel tape.

DATUM.--Altitude of land-surface datum is 1,850 ft. Measuring point: Top of casing 1.70 ft above land-surface datum.

PERIOD OF RECORD.--January 1964 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 10.84 ft below land-surface datum (corrected), June 17, 1965; lowest measured, 14.54 ft below land-surface datum, Sept. 29, 1986.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 4	14.23	MAR 29	12.70	JUNE 28	13.69	SEPT 29	14.54
DEC 8	14.13						

## WELLS COUNTY

474419099371201. Local number, 149-070-09DAA1.

LOCATION.--Lat 47°44'19", long 099°37'12", Hydrologic Unit 10160001.

Owner: North Dakota State Water Commission.

AQUIFER.--New Rockford.

WELL CHARACTERISTICS.--Drilled observation well, diameter 1.25 in, depth 283 ft, cased to 177 ft, plastic pipe, slotted 177 to 197 ft below land-surface datum.

INSTRUMENTATION.--Measured quarterly using a steel tape.

DATUM.--Altitude of land-surface datum is 1,610 ft. Measuring point: Top of casing 1.80 ft above land-surface datum.

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

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 64.34 ft below land-surface datum, Nov. 28, 1984; lowest measured, 66.65 ft below land-surface datum, Mar. 15, 1967.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 2	64.85	JUNE 3	64.42	AUG 18	64.67



## GROUND-WATER LEVELS

## WILLIAMS COUNTY

483048103373101. Local number, 158-100-17ADA.

LOCATION.--Lat 48°30'48", long 103°37'31", Hydrologic Unit 10110102.

Owner: North Dakota State Water Commission.

AQUIFER.--Little Muddy.

WELL CHARACTERISTICS.--Drilled observation well, diameter 1.25 in, depth 52 ft, cased to 35 ft, plastic pipe, slotted 35 to 43 ft below land-surface datum.

INSTRUMENTATION.--Measured quarterly using a steel tape.

DATUM.--Altitude of land-surface datum is 1,987 ft. Measuring point: Top of casing 2.00 ft above land-surface datum.

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

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 18.02 ft below land-surface datum, June 5, 1979; lowest measured, 21.91 ft below land-surface datum, Aug. 28, 1985.

## WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 4	20.33	FEB 11	20.13	MAY 7	20.14	AUG 20	21.74

## QUALITY OF GROUND WATER

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WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

STATION NUMBER	LOCAL IDENTIFIER	COUNTY	GEO-LOGIC UNIT	DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH (STAND-ARD UNITS) (00400)	TEMPER-ATURE, AIR (DEG C) (00020)
BENSON COUNTY								
475224098443202	151-063-29AAC2	005	112WRCK	09-24-86	1445	420	7.60	--
475827099061501	152-066-21AAD	005	112MNKN	09-22-86	1520	1400	7.90	--
480357099481901	153-071-17DDD1	005	112ESMD	09-24-86	1135	700	7.80	--
481001099132201	154-067-11DDD1	005	112SPRD	09-24-86	1240	680	7.80	--
482212099475801	156-071-04BBA	005	112PLLK	09-24-86	0940	385	7.80	--
BOWMAN COUNTY								
461202103005001	130-099-01BBB	011	125TGRV	09-03-86	1430	2550	8.80	19.0
460645103021801	130-099-03ADD	011	125TGRV	09-05-86	1200	6650	8.30	10.0
460705103025601	130-099-03BAA	011	125TGRV	09-05-86	1030	6100	8.80	10.0
460645103033302	130-099-04ADD2	011	125TGRV	09-19-86	1145	6900	6.80	13.0
460705103041101	130-099-04BAA	011	125TGRV	09-19-86	1600	4110	7.10	17.0
461355103055701	131-099-19DDD	011	125TGRV	09-18-86	1530	3660	8.00	9.5
460902103043601	131-099-21CCB	011	125HRMN	09-10-86	1055	1680	7.20	10.5
461355103043303	131-099-21CCC3	011	125TGRV	09-10-86	1330	1700	8.90	12.0
460856103024401	131-099-22DCC1	011	125TGRV	09-11-86	1510	4010	7.20	21.0
		011	125TGRV	09-11-86	1511	4010	7.20	21.0
460856103020701	131-099-23CCC1	011	125TGRV	09-04-86	1735	1290	8.80	18.0
460856103020702	131-099-23CCC2	011	125HRMN	09-04-86	1700	2600	8.30	18.0
460804103010101	131-099-26DDC1	011	125HRMN	09-03-86	1715	1350	8.60	17.0
460830103021601	131-099-27ADD	011	125TGRV	09-11-86	1145	1460	8.80	15.0
460843103032001	131-099-27BBC1	011	125TGRV	09-18-86	1250	5390	8.00	11.5
460843103032003	131-099-27BBC3	011	125TGRV	09-18-86	1340	1580	8.90	11.5
460823103030301	131-099-27CAB	011	125TGRVL	09-18-86	1050	3800	7.00	11.0
460816103032701	131-099-27CBC1	011	125HRMN	09-12-86	1310	2600	7.90	15.0
460816103032702	131-099-27CBC2	011	125TGRV	09-12-86	1200	2600	7.60	15.0
460830103044504	131-099-29ADD4	011	125TGRVL	09-10-86	1600	1750	8.00	12.5
460849103054101	131-099-29BBA	011	125TGRVL	09-17-86	1615	4400	7.80	16.0
460834103055501	131-099-29BCC	011	125TGRV	09-17-86	1450	1710	9.20	17.0
460804103052301	131-099-29CDD	011	125HRMN	09-17-86	1215	11300	6.70	16.5
460725103051301	131-099-32DBC	011	125TGRV	09-19-86	1400	2810	7.70	18.0
460757103021601	131-099-34AAA	011	125TGRVL	09-18-86	0945	9150	9.20	12.0
460744103014801	131-099-35BDB	011	125TGRV	09-16-86	1140	1330	8.90	10.5
BURLEIGH COUNTY								
464246100465901	137-080-04DBB	015	112BMCK	07-22-86	1315	2100	7.50	--
464741100450001	138-080-02CCC	015	112BMCK	07-22-86	1040	2200	7.60	--
464457100462802	138-080-28AAA2	015	112BMCK	07-22-86	1400	850	7.60	28.0
464943100305801	139-078-27CBB	015	112GCDF	07-22-86	0810	1650	7.90	--
465856100551801	140-081-05AAA	015	112WGCL	07-10-86	0950	1900	7.60	--
CASS COUNTY								
463926096513801	137-049-27BBC	017	112WFRG	09-04-86	1215	1050	8.10	--
464537096512901	138-049-22BBA	017	112WFRG	09-04-86	1400	828	8.20	--
470818097294104	142-054-03DDD4	017	112PAGE	09-05-86	0915	600	7.80	--
471326097332902	143-054-08BBB2	017	112PAGE	09-05-86	1015	650	7.80	--
CAVALIER COUNTY								
484534098254401	161-060-21BBB	019	211PIRR	09-25-86	0935	630	7.40	--
DICKEY COUNTY								
455946098224803	129-061-07CCC3	021	112FLDL	08-27-86	0850	1350	7.40	--
455848098194901	129-061-21BAA	021	112NRVL	08-27-86	0755	3500	7.50	--
460124098233501	129-062-01BAA	021	112FLDL	08-27-86	0950	1250	7.40	--
460409098212801	130-061-17CCC	021	112ELDL	08-27-86	1325	1500	7.40	--
460311098212801	130-061-29BBB	021	112ELDL	08-27-86	1240	1500	7.40	--
460311098224301	130-061-30BBB	021	112ELDL	08-27-86	1200	1310	7.40	--
460225098251301	130-062-26CCC	021	112ELDL	08-27-86	1030	1750	8.50	--
460917098140302	131-060-18DDD2	021	112GLPH	08-27-86	1525	1000	7.50	--
EDDY COUNTY								
474858098363101	150-062-16BBB	027	112WRCK	09-23-86	0940	458	7.30	--
474721098314601	150-062-24DDC	027	112WRCK	09-23-86	1020	850	7.30	--
LA MOURE COUNTY								
462632098442301	134-064-09BAB	045	112EDGL	08-26-86	1555	900	8.30	--
462632098444101	134-064-09BBB	045	112EDGL	08-26-86	1220	590	7.80	--

## QUALITY OF GROUND WATER

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

STATION NUMBER	DATE	TEMPER- ATURE (DEG C) (00010)	OXYGEN, DIS- SOLVED (MG/L) (00300)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)
BENSON COUNTY										
475224098443202	09-24-86	8.5	--	210	--	54	17	130	340	2.1
475827099061501	09-22-86	10.0	--	500	33	89	67	470	460	17
480357099481901	09-24-86	8.0	--	290	19	73	26	230	270	7.1
481001099132201	09-24-86	7.5	--	340	120	93	26	210	220	4.0
482212099475801	09-24-86	8.5	--	210	16	58	15	170	190	2.3
BOWMAN COUNTY										
461202103005001	09-03-86	7.5	1.9	62	62	10	9.0	400	507	5.1
460645103021801	09-05-86	11.5	3.5	250	250	31	40	2800	428	13
460705103025601	09-05-86	7.0	1.7	140	140	23	19	1800	289	10
460645103033302	09-19-86	7.0	3.6	1700	1700	190	300	6000	188	14
460705103041101	09-19-86	9.5	2.4	560	560	90	80	3700	355	14
461355103055701	09-18-86	7.5	3.0	450	450	57	75	1400	458	12
460902103043601	09-10-86	7.0	--	910	910	200	100	2800	295	9.5
461355103043303	09-10-86	7.5	10.2	52	52	12	5.4	250	598	3.0
460856103024401	09-11-86	7.0	1.8	1600	1600	290	210	4200	476	13
	09-11-86	7.0	1.8	1700	1200	310	220	3800	490	15
460856103020701	09-04-86	7.5	11.6	28	28	6.3	3.0	160	645	2.3
460856103020702	09-04-86	7.0	--	50	50	10	6.0	500	450	5.6
460804103010101	09-03-86	7.5	--	16	16	3.7	1.7	100	428	2.7
460830103021601	09-11-86	6.5	6.5	22	22	4.7	2.4	160	581	2.7
460843103032001	09-18-86	6.0	6.6	520	520	90	70	5100	732	40
460843103032003	09-18-86	6.0	3.0	29	29	8.4	1.9	300	716	2.2
460823103030301	09-18-86	6.0	2.6	1900	1900	320	270	3600	562	7.5
460816103032701	09-12-86	8.0	--	290	290	50	40	2500	456	8.0
460816103032702	09-12-86	8.0	--	290	290	53	38	2600	465	8.8
460830103044504	09-10-86	7.0	--	120	120	21	15	970	482	13
460849103054101	09-17-86	6.5	2.2	600	600	100	85	1800	313	13
460834103055501	09-17-86	7.0	1.0	20	20	5.2	1.6	150	607	3.1
460804103052301	09-17-86	7.0	16.5	2700	2700	350	440	11000	743	15
460725103051301	09-19-86	10.5	--	520	520	82	76	3300	411	13
460757103021601	09-18-86	6.5	4.8	2000	2000	210	350	1900	126	21
4607441030114801	09-16-86	8.0	1.2	29	29	6.9	2.8	200	568	2.2
BURLEIGH COUNTY										
464246100465901	07-22-86	10.0	--	530	--	64	89	2100	860	9.4
464741100450001	07-22-86	10.0	--	250	--	59	24	540	650	8.6
464457100462802	07-22-86	9.0	--	320	3	85	25	620	310	4.7
464943100305801	07-22-86	8.5	--	210	--	52	20	450	640	9.0
465856100551801	07-10-86	8.5	--	460	--	110	44	1200	800	11
CASS COUNTY										
463926096513801	09-04-86	8.5	--	210	--	42	25	370	270	5.8
464537096512901	09-04-86	--	--	170	--	42	15	260	220	4.4
470818097294104	09-05-86	7.0	--	310	130	89	20	450	170	8.7
471326097332902	09-05-86	7.5	--	370	32	90	34	240	330	6.1
CAVALIER COUNTY										
484534098254401	09-25-86	8.0	--	220	--	47	25	300	260	3.8
DICKEY COUNTY										
455946098224803	08-27-86	8.5	--	470	130	120	41	720	340	12
455848098194901	08-27-86	8.5	--	160	--	44	13	600	310	16
460124098233501	08-27-86	8.0	--	420	40	120	29	670	380	13
460409098212801	08-27-86	8.0	--	520	170	150	36	810	350	14
460311098212801	08-27-86	8.5	--	390	4	110	29	730	390	13
460311098224301	08-27-86	8.0	--	460	84	130	33	740	380	12
460225098251301	08-27-86	8.5	--	480	140	130	38	920	340	14
460917098140302	08-27-86	8.5	--	550	230	140	49	660	321	7.0
EDDY COUNTY										
474858098363101	09-23-86	7.5	--	230	3	66	16	.0 140	230	2.4
474721098314601	09-23-86	7.5	--	410	130	98	40	390	280	4.6
LA MOURE COUNTY										
462632098442301	08-26-86	10.0	--	83	--	20	8.0	290	360	8.2
462632098444101	08-26-86	9.5	--	270	45	65	27	210	230	3.6

## WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

STATION NUMBER	DATE	ALKA- LINTY LAB (MG/L AS CAC03) (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)	RESIDUE AT 180 DEG. C SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)
BENSON COUNTY										
475224098443202	09-24-86	340	45	1.7	0.1	28	262	360	0.36	6
475827099061501	09-22-86	460	290	35	0.2	25	948	950	1.3	2
480357099481901	09-24-86	270	90	3.4	0.2	28	454	430	0.62	1
481001099132201	09-24-86	220	140	6.7	0.1	28	424	440	0.58	8
482212099475801	09-24-86	190	16	0.6	0.1	25	232	330	0.32	8
BOWMAN COUNTY										
461202103005001	09-03-86	507	790	27	1.7	6.0	2080	1700	2.8	--
460645103021801	09-05-86	428	3400	17	1.1	9.2	5950	5500	8.1	--
460705103025601	09-05-86	289	3000	75	64	9.1	5250	4900	7.1	--
460645103033302	09-19-86	188	4500	20	0.2	8.0	6900	6500	9.4	--
460705103041101	09-19-86	355	2000	9.9	0.3	14	3560	3200	4.8	--
461355103055701	09-18-86	458	1500	30	1.1	7.7	3140	2700	4.3	--
460902103043601	09-10-86	295	700	12	0.4	11	1450	1300	2.0	--
461355103043303	09-10-86	598	470	24	2.5	8.2	1400	1300	1.9	--
460856103024401	09-11-86	476	2200	44	0.4	5.3	3580	3500	4.9	--
	09-11-86	490	2200	40	0.4	6.5	3670	3600	5.0	3
460856103020701	09-04-86	645	210	23	4.6	8.4	1120	980	1.5	--
460856103020702	09-04-86	450	880	6.6	2.0	6.9	2220	1800	3.0	--
460804103010101	09-03-86	428	280	6.0	2.3	8.7	970	880	1.3	--
460830103021601	09-11-86	581	270	21	3.8	7.9	1190	1000	1.6	--
460843103032001	09-18-86	732	2400	14	0.9	17	4580	4300	6.2	--
460843103032003	09-18-86	716	440	37	4.2	8.4	1400	1300	1.9	--
460823103030301	09-18-86	562	2100	20	0.3	12	3560	3400	4.8	--
460816103032701	09-12-86	456	940	7.9	0.7	7.3	1920	1800	2.6	--
460816103032702	09-12-86	465	940	8.2	1.0	7.5	2180	1800	3.0	--
460830103044504	09-10-86	482	460	6.4	0.4	8.9	1260	1200	1.7	--
460849103054101	09-17-86	313	2200	8.4	0.5	11	3820	3500	5.2	--
460834103055501	09-17-86	607	320	6.7	1.3	8.5	1250	1100	1.7	--
460804103052301	09-17-86	743	7500	12	0.3	9.8	11700	11000	15.9	--
460725103051301	09-19-86	411	1200	6.5	0.4	10	2480	2100	3.4	--
460757103021601	09-18-86	126	6300	44	0.7	6.2	9700	9100	13.2	--
460744103014801	09-16-86	568	380	31	4.0	8.2	1170	1100	1.6	--
BURLEIGH COUNTY										
464246100465901	07-22-86	860	170	21	0.1	18	933	1100	1.3	8
464741100450001	07-22-86	650	460	48	0.8	27	1390	1400	1.9	4
464457100462802	07-22-86	310	140	4.5	0.5	16	487	540	0.66	17
464943100305801	07-22-86	640	370	59	0.5	29	1220	1300	1.7	1
465856100551801	07-10-86	800	220	62	0.5	26	1120	1300	1.5	4
CASS COUNTY										
463926096513801	09-04-86	270	72	120	0.2	1.6	568	570	0.77	<1
464537096512901	09-04-86	220	49	95	0.5	26	483	480	0.66	<1
470818097294104	09-05-86	170	50	0.8	0.1	30	380	320	0.52	20
471326097332902	09-05-86	330	36	0.6	0.3	23	398	400	0.54	4
CAVALIER COUNTY										
484534098254401	09-25-86	260	50	6.6	0.2	29	387	380	0.53	<1
DICKEY COUNTY										
455946098224803	08-27-86	340	400	9.6	0.2	18	910	950	1.2	<1
455848098194901	08-27-86	310	2.5	910	0.5	17	1860	1800	2.5	12
460124098233501	08-27-86	380	260	24	0.2	27	777	840	1.1	7
460409098212801	08-27-86	350	450	20	0.2	26	856	1100	1.2	19
460311098212801	08-27-86	390	370	18	0.2	27	952	1000	1.3	<1
460311098224301	08-27-86	380	320	15	0.2	30	851	900	1.2	<1
460225098251301	08-27-86	340	410	120	0.2	29	1110	1200	1.5	10
460917098140302	08-27-86	321	230	4.2	0.2	26	654	680	0.89	13
EDDY COUNTY										
474858098363101	09-23-86	230	17	1.7	0.2	31	267	280	0.36	<1
474721098314601	09-23-86	280	190	14	0.4	31	497	580	0.68	7
LA MOURE COUNTY										
462632098442301	08-26-86	360	68	38	0.4	27	567	570	0.77	21
462632098444101	08-26-86	230	74	11	0.1	28	380	370	0.52	4



## QUALITY OF GROUND WATER

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

STATION NUMBER	DATE	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)
BENSON COUNTY										
47522408443202	09-24-86	<1	2800	<1	7	450	0.1	1	1	130
47582709061501	09-22-86	330	60	1	140	320	<0.1	2	1	470
48035709481901	09-24-86	80	260	1	52	180	0.1	3	1	230
48100109132201	09-24-86	10	1000	1	23	550	0.1	4	1	210
48221209475801	09-24-86	10	20	<1	10	300	<0.1	2	1	170
BOWMAN COUNTY										
46120213005001	09-03-86	1400	30	--	50	60	--	28	--	400
46064513021801	09-05-86	1200	40	--	110	190	--	<1	--	2800
46070513025601	09-05-86	870	420	--	100	50	--	1	--	1800
46064513033302	09-19-86	4900	9600	--	450	3400	--	5	--	6000
46070513041101	09-19-86	3800	1800	--	260	660	--	4	--	3700
46135513055701	09-18-86	910	20	--	70	60	--	6	--	1400
46090213043601	09-10-86	320	63	--	55	220	--	3	--	2800
46135513043303	09-10-86	1100	300	--	55	47	--	2	--	250
46085613024401	09-11-86	500	50	--	110	580	--	21	--	4200
	09-11-86	300	80	1	110	450	<0.1	30	<1	3800
46085613020701	09-04-86	1300	610	--	50	60	--	2	--	160
46085613020702	09-04-86	830	220	--	40	30	--	5	--	500
46080413010101	09-03-86	920	310	--	44	40	--	5	--	100
46083013021601	09-11-86	1200	220	--	59	100	--	5	--	160
46084313032001	09-18-86	1500	40	--	110	320	--	<1	--	5100
46084313032003	09-18-86	1300	1300	--	58	98	--	7	--	300
46082313030301	09-18-86	1300	90	--	90	3500	--	2	--	3600
46081613032701	09-12-86	1600	30	--	50	50	--	1	--	2500
46081613032702	09-12-86	1600	40	--	60	70	--	4	--	2600
46083013044504	09-10-86	1000	30	--	50	30	--	1	--	970
46084913054101	09-17-86	840	30	--	90	270	--	2	--	1800
46083413055501	09-17-86	830	69	--	50	13	--	4	--	150
46080413052301	09-17-86	11000	310	--	220	700	--	6	--	11000
46072513051301	09-19-86	3300	50	--	160	280	--	5	--	3300
46075713021601	09-18-86	1500	40	--	160	170	--	14	--	1900
46074413014801	09-16-86	1200	310	--	62	59	--	3	--	200
BURLEIGH COUNTY										
46424610465901	07-22-86	150	400	2	83	<1	<0.1	2	<1	2100
46474110450001	07-22-86	1200	440	1	94	310	<0.1	3	<1	540
46445710462802	07-22-86	80	14000	<1	39	710	<0.1	1	<1	620
46494310305801	07-22-86	1400	270	<1	160	330	<0.1	<1	<1	450
46585610551801	07-10-86	710	60	<1	78	240	<0.1	2	<1	1200
CASS COUNTY										
46392606513801	09-04-86	460	20	<1	22	70	0.1	15	<1	370
46453706512901	09-04-86	460	20	<1	31	70	0.2	17	<1	260
47081807294104	09-05-86	90	20	<1	35	500	0.1	9	<1	450
47132607332902	09-05-86	30	20	1	13	70	0.1	7	<1	240
CAVALIER COUNTY										
48453408254401	09-25-86	90	50	<1	38	10	<0.1	1	3	300
DICKEY COUNTY										
45594608224803	08-27-86	510	6600	<1	160	820	0.1	8	1	720
45584808194901	08-27-86	2300	210	<1	170	160	<0.1	50	1	600
46012408233501	08-27-86	540	4800	<1	150	1100	<0.1	12	1	670
46040908212801	08-27-86	470	4700	1	180	970	<0.1	20	1	810
46031108212801	08-27-86	600	2800	1	160	990	0.1	10	1	730
46031108224301	08-27-86	470	1200	<1	160	1300	<0.1	12	1	740
46022508251301	08-27-86	580	640	<1	170	580	<0.1	28	1	920
46091708140302	08-27-86	80	2700	1	62	710	0.2	4	<1	660
EDDY COUNTY										
47485808363101	09-23-86	30	440	<1	9	820	<0.1	1	1	140
47472108314601	09-23-86	60	320	1	62	1500	<0.1	5	1	390
LA MOURE COUNTY										
46263208442301	08-26-86	540	70	<1	97	70	0.1	20	1	290
46263208444101	08-26-86	50	1200	<1	14	340	<0.1	3	--	210



## WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

STATION NUMBER	LOCAL IDENTIFIER	COUNTY	GEO-LOGIC UNIT	DATE	TIME	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH (STAND-ARD) (00400)	TEMPER-ATURE, AIR (DEG C) (00020)
LA MOURE COUNTY								
462546098444101	134-064-09CCC	045	112EDGL	08-26-86	1135	750	8.10	--
462539098440401	134-064-16ABB1	045	112EDGL	08-26-86	1100	900	7.80	--
462447098423901	134-064-22ABA	045	112EDGL	08-26-86	0935	850	7.60	--
462434098432601	134-064-22BCB	045	112EDGL	08-26-86	0835	1150	7.30	--
463610098444001	136-064-09CCC1	045	112NRVL	08-28-86	1215	1900	7.90	--
MERCER COUNTY								
472330102105501	145-090-08CBB	057	112GMCK	07-10-86	1320	1100	9.70	21.0
NELSON COUNTY								
474714098290201	150-061-29AAA	063	112SPRD	09-23-86	1120	1060	7.50	--
RAMSEY COUNTY								
475743098341201	152-062-27AAA	071	112SNDL	09-24-86	1650	1600	7.90	--
480351098552303	153-064-19AAB3	071	112SPRD	09-22-86	1350	1040	7.90	--
481929098392601	156-062-20BBB	071	211PIRR	09-24-86	1720	1110	8.40	--
RANSOM COUNTY								
461838097553402	133-058-25BBA2	073	112EGLV	09-04-86	1000	800	7.50	--
462400097552502	134-058-24CDC2	073	112EGLV	09-03-86	1535	550	7.90	--
RICHLAND COUNTY								
462425096441202	134-048-20ADD2	077	112CLFX	09-03-86	0940	3000	7.20	--
462633097163402	134-052-06CCD2	077	112SNDL	09-03-86	1050	1050	7.60	--
462921097115501	135-052-22DAD	077	112SNDL	09-03-86	1305	550	7.70	--
SARGENT COUNTY								
460120097591802	129-058-06AAA2	081	112OKES	09-04-86	0830	500	7.50	--

STATION NUMBER	DATE	TEMPER-ATURE (DEG C) (00010)	OXYGEN, DIS-SOLVED (MG/L) (00300)	HARD-NESS (MG/L) AS CAC03 (00900)	HARD-NESS NONCAR-BONATE (MG/L) AS CAC03 (95902)	CALCIUM DIS-SOLVED (MG/L) AS CA (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L) AS MG (00925)	STRON-TIUM, DIS-SOLVED (UG/L) AS SR (01080)	ALKA-LINITY LAB (MG/L) AS CAC03 (90410)	POTAS-SIUM, DIS-SOLVED (MG/L) AS K (00935)
LA MOURE COUNTY										
462546098444101	08-26-86	8.5	--	100	--	27	8.0	230	350	6.6
462539098440401	08-26-86	9.0	--	480	250	110	49	360	230	4.1
462447098423901	08-26-86	7.0	--	300	--	34	34	310	400	6.7
462434098432601	08-26-86	9.0	--	400	66	100	37	330	340	7.3
463610098444001	08-28-86	9.0	--	170	--	43	14	460	510	8.4
MERCER COUNTY										
472330102105501	07-10-86	9.0	--	280	--	69	25	690	360	6.5
NELSON COUNTY										
474714098290201	09-23-86	7.5	--	220	--	54	21	410	410	8.7
RAMSEY COUNTY										
475743098341201	09-24-86	12.5	--	840	430	230	64	800	410	9.8
480351098552303	09-22-86	12.0	--	600	110	140	60	240	480	9.1
481929098392601	09-24-86	11.5	--	56	--	14	5.0	160	520	5.8
RANSOM COUNTY										
461838097553402	09-04-86	9.0	--	400	180	110	31	430	220	4.7
462400097552502	09-03-86	9.0	--	270	44	72	21	190	220	2.5
RICHLAND COUNTY										
462425096441202	09-03-86	9.0	--	810	490	160	100	1100	320	12
462633097163402	09-03-86	13.0	--	470	180	130	35	730	290	12
462921097115501	09-03-86	11.5	--	270	--	62	29	330	280	3.7
SARGENT COUNTY										
460120097591802	09-04-86	9.0	--	270	120	75	20	250	150	3.7

## QUALITY OF GROUND WATER

WATER-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

STATION NUMBER	DATE	ALKA- LINIT LAB (MG/L AS CACO3) (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)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)
LA MOURE COUNTY										
462546098444101	08-26-86	350	50	4.3	0.4	29	477	480	0.65	40
462539098440401	08-26-86	230	260	15	0.1	26	644	630	0.88	3
462447098423901	08-26-86	400	68	14	0.1	28	461	540	0.63	<1
462434098432601	08-26-86	340	280	44	0.1	26	797	830	1.1	2
463610098444001	08-28-86	510	340	100	0.4	27	1100	1200	1.5	6
MERCER COUNTY										
472330102105501	07-10-86	360	380	0.9	0.5	25	890	940	1.2	2
NELSON COUNTY										
474714098290201	09-23-86	410	150	3.5	0.3	36	673	680	0.92	<1
RAMSEY COUNTY										
475743098341201	09-24-86	410	430	16	0.2	34	1070	1100	1.5	2
480351098552303	09-22-86	480	12	2.7	0.1	32	485	550	0.66	<1
481929098392601	09-24-86	520	93	1.3	0.3	29	698	710	0.95	<1
RANSOM COUNTY										
461838097553402	09-04-86	220	170	13	0.1	27	519	520	0.71	6
462400097552502	09-03-86	220	42	1.3	0.1	29	309	310	0.42	11
RICHLAND COUNTY										
462425096441202	09-03-86	320	1000	220	1.2	28	2120	2100	2.9	<1
462633097163402	09-03-86	290	110	22	0.1	28	537	580	0.73	50
462921097115501	09-03-86	280	9.5	9.0	0.2	28	301	320	0.41	1
SARGENT COUNTY										
460120097591802	09-04-86	150	7.4	0.0	0.1	25	165	230	0.22	7
STATION NUMBER	DATE	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)
LA MOURE COUNTY										
462546084444101	08-26-86	350	70	<1	69	750	0.1	32	1	230
46253908440401	08-26-86	30	2800	<1	19	520	<0.1	3	1	360
46244708423901	08-26-86	110	1700	<1	40	340	<0.1	3	1	310
46243408432601	08-26-86	150	1100	<1	50	380	0.1	4	1	330
46361008444001	08-28-86	690	130	<1	110	180	0.4	9	<1	460
MERCER COUNTY										
47233012105501	07-10-86	120	1100	<1	40	140	<0.1	2	<1	690
NELSON COUNTY										
47471408290201	09-23-86	640	570	<1	130	50	<0.1	3	1	410
RAMSEY COUNTY										
47574308341201	09-24-86	60	70	1	130	4500	0.1	6	1	800
48035108552303	09-22-86	60	20	1	23	10	<0.1	1	1	240
48192908392601	09-24-86	950	30	<1	120	80	0.2	3	1	160
RANSOM COUNTY										
46183807553402	09-04-86	70	1400	1	24	740	0.2	3	<1	430
46240007552502	09-03-86	70	70	1	12	560	0.1	3	<1	190
RICHLAND COUNTY										
46242506441202	09-03-86	780	910	1	200	220	0.2	6	<1	1100
46263307163402	09-03-86	280	1300	1	73	410	0.2	7	<1	730
46292107115501	09-03-86	40	240	1	14	910	0.2	4	<1	330
SARGENT COUNTY										
46012007591802	09-04-86	50	780	<1	18	440	0.2	4	<1	250

## CHEMICAL QUALITY OF PRECIPITATION

379

## RED RIVER OF THE NORTH BASIN

484714097442301 ICELANDIC STATE PARK, ND  
(National Trends Network precipitation-quality station)

LOCATION.--Lat 48°47'14", long 97°44'23", in SW1/4NW1/4SW1/4 sec. 10, T.161 N., R.55 W., Pembina County, Hydrologic Unit 09020313, at Icelandic State Park 5.6 mi west of Cavalier.

PERIOD OF RECORD.--October 1983 to current year (weekly composite).

INSTRUMENTATION.--The composite sample collector is an Aerochem Metrics<sup>1</sup>/ model 301 wet/dry precipitation collector mounted on ground surface. Precipitation quantity is determined by a Belfort<sup>1</sup>/ model 5-780 recording rain gage equipped with an event recorder and an Alter-type wind screen. The recording rain gage is installed 20 ft east of the sample collector with gage mouth and collector bucket elevations of 50.75 in above land surface. A nonrecording National Weather Service rain gage is installed 28 ft south of the composite sample collector as a quality check on weekly composite precipitation volume.

REMARKS.--Data presented are provisional analyses by the Central Analytical Laboratory of the Illinois State Water Survey and have not completed quality-assurance review by the National Atmospheric Deposition Program. Unless noted starting and ending time for composite period is 9:00 a.m.

COOPERATION.--Onsite observers are provided by the North Dakota State Parks and Recreation Department.

## PRECIPITATION-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

PERIOD OF COLLECTION	PRECIP- ITATION TOTAL INCHES/ WEEK (00046)	COL- LECTOR EFFI- CIENCY WET DEPOSITION PERCENT (82284)	PH (STAND- ARD UNITS) (00400)	SPE- CIFIC CON- DUCT- ANCE ( S/CM) (00095)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)
10/01 to 10/09	--	--	5.36	6.5	0.132
10/09 to 10/15	0.14	100	5.28	6.9	0.130
10/15 to 10/22	<0.01	>200	5.18*	9.5*	0.225
10/22 to 10/29	0.05	80	6.78*	32.7*	1.328
10/29 to 11/05	0.35	91	5.56	8.6	0.283
11/05 to 11/12	0.07	>14	6.74*	25.5*	--
11/12 to 11/19	0.55	>1.8	--	--	--
11/19 to 11/26	0.72	>1.4	6.46*	11.6*	--
11/26 to 12/03	0.0	0.0	--	--	--
12/03 to 12/10	0.0	0.0	5.62*	--	--
12/10 to 12/17	<0.01	100	--	--	--
12/17 to 12/24	0.17	24	4.81*	11.4*	0.155
12/24 to 01/01	<0.01	<100	6.54*	11.6*	0.213
01/01 to 01/07	0.10	<10	--	--	--
01/07 to 01/14	0.0	0.0	--	--	--
01/14 to 01/21	0.10	<10	--	--	--
01/21 to 01/28	0.12	<8.33	--	--	--
01/28 to 02/04	0.08	62	4.21	35.3	0.482
02/04 to 02/11	0.08	25	6.04*	10.0*	0.344
02/11 to 02/18	0.0	0.0	--	--	--
02/18 to 02/25	0.13	38	4.98	4.8	0.100
02/25 to 03/04	0.0	0.0	--	--	--
03/04 to 03/11	0.12	33	6.18*	8.6*	0.245
03/11 to 03/18	0.0	0.0	--	--	--
03/18 to 03/25	0.11	91	5.72	16.1	0.553
03/25 to 04/01	0.07	171	6.58	21.6	2.511
04/01 to 04/08	0.06	83	6.06	21.3	0.839
04/08 to 04/15	0.30	3	6.51*	28.4*	0.983

<sup>1</sup>/ The use of brand names in this report is for identification purposes only and does not imply endorsement by the U.S. Geological Survey.

\* Data are laboratory determinations by the Central Analytical Laboratory of the Illinois State Water Survey. Nondesignated data are field determinations.

## CHEMICAL QUALITY OF PRECIPITATION

## RED RIVER OF THE NORTH BASIN

484714097442301 ICELANDIC STATE PARK, ND--CONTINUED  
(National Trends Network precipitation-quality station)

PRECIPITATION-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

PERIOD OF COLLECTION	PRECIP- ITATION TOTAL INCHES/ WEEK (00046)	COL- LECTOR EFFI- CIENCY WET DEPOSITION PERCENT (82284)	PH (STAND- ARD UNITS) (00400)	SPE- CIFIC CON- DUCT- ANCE ( $\mu$ S/CM) (00095)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)
04/15 to 04/22	1.19	103	4.87	12.1	0.144
04/22 to 04/29	1.37	83	5.37	4.6	0.047
04/29 to 05/06	0.70	100	5.76	6.9	0.203
05/06 to 05/13	1.60	100	5.79	8.7	0.134
05/13 to 05/20	0.02	150	7.01*	5.7*	1.448
05/20 to 05/27	<0.01	<.1	5.91*	19.6*	--
05/27 to 06/03	1.23	97	5.77	12.3	0.635
06/03 to 06/10	0.07	--	5.94	21.7	0.992
06/10 to 06/17	0.14	100	4.82	21.3	0.504
06/17 to 06/24	1.43	101	5.61	6.7	0.283
06/24 to 07/01	<0.01	>300	5.22*	15.6*	0.968
07/01 to 07/08	1.23	102	6.28	7.2	0.335
07/08 to 07/15	3.50	97	5.93	5.7	0.082
07/15 to 07/22	0.65	103	5.57	4.2	0.153
07/22 to 07/29	2.00	101	5.83	3.3	0.109
07/29 to 08/05	0.60	108	5.93	6.5	0.337
08/05 to 08/12	0.32	106	5.88	4.9	0.251
08/12 to 08/19	<0.01	<.1	--	--	--
08/19 to 08/26	0.25	100	5.06	4.3	0.075
08/26 to 09/02	0.25	104	5.72	6.5	0.248
09/02 to 09/09	0.17	100	5.97	4.3	0.078
09/09 to 09/16	0.08	100	6.30	16.6	1.017
09/16 to 09/23	0.72	101	5.46	4.4	0.206
09/23 to 09/30	0.90	99	5.42	4.6	0.129

\* Data are laboratory determinations by the Central Analytical Laboratory of the Illinois State Water Survey. Nondesignated data are field determinations.

## CHEMICAL QUALITY OF PRECIPITATION

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## RED RIVER OF THE NORTH BASIN

484714097442301 ICELANDIC STATE PARK, ND--CONTINUED  
(National Trends Network precipitation-quality station)

## PRECIPITATION-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

PERIOD OF COLLECTION	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P) (00666)
10/01 to 10/09	0.040	0.023	0.020	0.51	0.05	<0.02	<0.01	<0.001
10/09 to 10/15	0.037	0.007	0.024	0.80	0.17	0.26	0.15	<0.001
10/15 to 10/22	0.075	0.011	0.061	0.86	0.17	<0.05	0.33	<0.003
10/22 to 10/29	0.284	0.274	0.372	4.96	0.62	1.58	0.71	<0.001
10/29 to 11/05	0.061	0.028	0.047	0.89	0.05	0.35	0.24	<0.001
11/05 to 11/12	--	--	--	--	--	--	--	--
11/12 to 11/19	--	--	--	--	--	--	--	--
11/19 to 11/26	--	--	--	--	--	--	--	--
11/26 to 12/03	--	--	--	--	--	--	--	--
12/03 to 12/10	--	--	--	--	--	--	--	--
12/10 to 12/17	--	--	--	--	--	--	--	--
12/17 to 12/24	0.048	0.030	0.087	0.88	0.14	<0.02	0.34	0.004
12/24 to 01/01	0.073	0.059	0.176	0.88	0.44	<0.12	<0.05	0.022
01/01 to 01/07	--	--	--	--	--	--	--	--
01/07 to 01/14	--	--	--	--	--	--	--	--
01/14 to 01/21	--	--	--	--	--	--	--	--
01/21 to 01/28	--	--	--	--	--	--	--	--
01/28 to 02/04	0.212	0.117	0.188	3.06	0.30	1.20	1.16	<0.003
02/04 to 02/11	0.228	0.095	0.373	0.87	0.70	<0.06	0.16	0.014
02/11 to 02/18	--	--	--	--	--	--	--	--
02/18 to 02/25	0.033	0.106	0.104	0.30	0.22	<0.02	0.13	0.007
02/25 to 03/04	--	--	--	--	--	--	--	--
03/04 to 03/11	0.081	0.020	0.062	1.22	0.10	0.42	0.19	<0.003
03/11 to 03/18	--	--	--	--	--	--	--	--
03/18 to 03/25	0.086	0.033	0.070	2.51	0.12	1.16	0.54	<0.003
03/25 to 04/01	0.574	0.435	0.284	1.70	0.07	0.09	0.24	<0.003
04/01 to 04/08	0.214	0.047	0.241	2.71	0.28	0.61	0.58	<0.003
04/08 to 04/15	0.178	0.054	0.158	3.65	0.30	<0.08	0.59	<0.016
04/15 to 04/22	0.028	0.017	0.027	1.47	0.06	0.36	0.24	<0.003
04/22 to 04/29	0.011	0.004	0.033	0.35	0.05	<0.02	0.05	<0.003
04/29 to 05/06	0.034	0.017	0.024	0.81	<0.03	0.26	0.19	0.003
05/06 to 05/13	0.025	0.021	0.046	0.83	0.06	0.10	0.21	0.007
05/13 to 05/20	0.326	0.092	0.155	2.67	0.17	1.07	0.62	0.007
05/20 to 05/27	--	--	--	--	--	--	--	--
05/27 to 06/03	0.123	0.058	0.048	0.97	0.07	0.55	0.26	<0.003
06/03 to 06/10	0.255	0.172	0.114	2.55	0.25	1.44	0.85	<0.003
06/10 to 06/17	0.122	0.116	0.113	2.77	0.17	0.82	0.59	<0.003
06/17 to 06/24	0.052	0.029	0.021	0.66	<0.03	0.38	0.23	<0.003
06/24 to 07/01	0.253	0.074	0.204	1.74	0.30	<0.02	0.58	0.007
07/01 to 07/08	0.070	0.052	0.030	0.62	0.07	<0.02	0.21	0.003
07/08 to 07/15	0.019	0.029	0.035	0.56	0.06	<0.02	<0.01	<0.003
07/15 to 07/22	0.028	0.024	0.025	0.54	<0.03	0.13	0.11	<0.003
07/22 to 07/29	0.030	0.013	0.016	0.30	<0.03	0.14	0.10	<0.003
07/29 to 08/05	0.088	0.054	0.042	0.68	0.08	<0.02	<0.01	0.003
08/05 to 08/12	0.064	0.059	0.032	0.64	0.10	0.14	0.12	<0.003
08/12 to 08/19	--	--	--	--	--	--	--	--
08/19 to 08/26	0.024	0.060	0.028	0.43	0.06	0.09	0.11	<0.003
08/26 to 09/02	0.081	0.092	0.074	0.76	0.05	<0.02	<0.01	0.007
09/02 to 09/09	0.021	0.019	0.179	0.41	0.04	<0.02	0.06	<0.003
09/09 to 09/16	0.271	0.118	0.044	2.52	0.13	0.60	0.54	<0.003
09/16 to 09/23	0.045	0.021	0.052	0.44	0.06	0.15	0.17	<0.003
09/23 to 09/30	0.017	0.025	0.040	0.65	<0.03	<0.02	0.12	<0.003



## CHEMICAL QUALITY OF PRECIPITATION

## JAMES RIVER BASIN

470732099140204 WOODWORTH, ND  
(National Trends Network precipitation-quality station)

LOCATION.--Lat 47°14'32", long 99°14'02", in SE1/4SW1/4SW1/4 sec.12, T.142 N., R.68 W., Stutsman County, Hydrologic Unit 10160002, at U.S. Fish and Wildlife Service Northern Prairie Wildlife Research Center, Woodworth Experiment Station, 2.8 mi east and 1 mi south of Woodworth.

PERIOD OF RECORD.--November 1983 to current year (weekly composite).

INSTRUMENTATION.--The composite sample collector is an Aerochem Metrics<sup>1</sup>/ model 301 wet/dry precipitation collector mounted on ground surface. Precipitation quantity is determined by a Belfort <sup>1</sup>/ model 5-780 recording rain gage equipped with an event recorder and an Alter-type wind screen. The recording rain gage is installed 17 ft east of the sample collector with gage mouth and collector bucket elevations of 50.75 in above land surface. A nonrecording Weather Service rain gage is installed 17 ft east of the recording rain gage as a quality check on weekly composite precipitation volume.

REMARKS.--The station is located 295 ft west of an event sample-collection station operated by the North Dakota State Health Department. Continuously recording meteorological instrumentation for air temperature, wind speed, and wind direction are installed 9.8 ft above land surface at the event station. Data presented are provisional analyses by the Central Analytical Laboratory of the Illinois State Water Survey and have not completed quality-assurance review by the National Atmospheric Deposition Program. Unless noted starting and ending time for composite periods is 9:00 a.m.

COOPERATION.--Onsite observers are provided by the U.S. Fish and Wildlife Service.

## PRECIPITATION-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

PERIOD OF COLLECTION	PRECIP- ITATION TOTAL INCHES, WEEK (00046)	COL- ECTOR EFFI- CIENCY WET DEPOSITION PERCENT (82284)	PH (STAND- ARD UNITS) (00400)	SPEC- IFIC CON- DUCT- ANCE ( S/CM) (00095)	CALCIUM DIS- SOLVED (MG/L) AS CA) (00915)
10/01 to 10/08	1.22	59	4.54	19.0	0.288
10/08 to 10/15	0.21	71	4.31	11.1	0.229
10/15 to 10/22	<0.01	100	--	--	--
10/22 to 10/29	0.36	89	4.77	12.2	0.236
10/29 to 11/05	0.08	100	5.15	19.2	0.381
11/05 to 11/12	<0.01	100	--	--	--
11/12 to 11/19	0.15	6.7	6.62*	11.9*	<0.274
11/19 to 11/26	<0.01	100	--	--	--
11/26 to 12/03	<0.01	100	--	--	--
12/03 to 12/10	<0.01	0.0	--	--	--
12/10 to 12/17	0.01	200	6.36*	48.1*	3.625
12/17 to 12/24	0.01	200	--	--	--
12/24 to 01/01	0.03	33	7.52*	81.9*	2.028
01/01 to 01/07	0.0	0.0	6.69*	5.6*	0.671
01/07 to 01/14	0.0	0.0	6.47*	12.0*	0.819
01/14 to 01/21	0.05	120	5.26	7.0	0.298
01/21 to 01/28	<0.01	100	--	--	--
01/28 to 02/04	0.09	11	--	--	--
02/04 to 02/11	0.0	0.0	5.22*	45.6*	0.956
02/11 to 02/18	0.0	0.0	--	--	--
02/18 to 02/25	0.0	0.0	4.82*	100.5*	--
02/25 to 03/04	0.0	0.0	6.77*	--	--
03/04 to 03/11	0.0	0.0	--	--	--
03/11 to 03/18	0.0	0.0	--	--	--
03/18 to 03/25	0.02	100	7.19*	31.2*	2.515
03/25 to 04/01	0.0	0.0	6.89*	8.2*	0.925
04/01 to 04/08	0.75	97	5.41	11.9	0.123
04/08 to 04/17	0.36	100	5.41	11.2	0.305

<sup>1</sup>/ The use of brand names in this report is for identification purposes only and does not imply endorsement by the U.S. Geological Survey.

\* Data are laboratory determinations by the Central Analytical Laboratory of the Illinois State Water Survey. Nondesignated data are field determinations.

## CHEMICAL QUALITY OF PRECIPITATION

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## JAMES RIVER BASIN

470732099140204 WOODWORTH, ND--CONTINUED  
 (National Trends Network precipitation-quality station)

PRECIPITATION-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

PERIOD OF COLLECTION	PRECIP- ITATION TOTAL INCHES, WEEK (00046)	COL- ECTOR EFFI- CIENCY WET DEPOSITION PERCENT (82284)	PH (STAND- ARD UNITS) (00400)	SPEC- IFIC CON- DUCT- ANCE ( s/CM) (00095)	CALCIUM DIS- SOLVED (MG/L) AS CA (00915)
04/17 to 04/22	0.90	110	4.74	10.0	0.145
04/22 to 04/29	0.70	97	5.29	6.8	0.094
04/29 to 05/06	0.12	75	5.54	8.0	0.466
05/06 to 05/13	0.50	102	5.91	11.3	0.323
05/13 to 05/20	<0.01	100	6.67*	18.2*	0.427
05/20 to 05/27	0.58	100	5.84	5.3	0.124
05/27 to 06/03	0.0	0.0	6.00*	2.3*	0.050
06/03 to 06/10	0.06	83	5.93	15.9	0.777
06/10 to 06/17	0.40	98	5.79	7.5	0.232
06/17 to 06/24	1.42	96	5.92	7.7	0.363
06/24 to 07/01	0.68	96	5.88	5.9	0.299
07/01 to 07/08	0.57	58	5.58	12.3	0.518
07/08 to 07/15	--	--	5.93	6.4	0.070
07/15 to 07/22	0.66	98	5.36	10.8	0.266
07/22 to 07/29	1.69	97	5.42	6.0	0.153
07/29 to 08/05	0.06	100	6.47	31.2	0.832
08/05 to 08/12	0.57	102	6.21	7.2	0.423
08/12 to 08/19	0.84	89	4.91	13.6	0.289
08/19 to 08/26	0.33	97	5.64	6.6	0.270
08/26 to 09/02	0.31	100	5.31	10.8	0.312
09/02 to 09/09	0.0	0.0	6.19*	2.0*	0.176
09/09 to 09/16	1.89	102	5.16	5.1	0.138
09/16 to 09/23	1.75	98	4.95	8.7	0.061
09/23 to 09/30	0.75	105	5.68	8.6	0.551

\* Data are laboratory determinations by the Central Analytical Laboratory of the Illinois State Water Survey. Nondesignated data are field determinations.

## CHEMICAL QUALITY OF PRECIPITATION

## JAMES RIVER BASIN

470732099140204 WOODWORTH, ND--CONTINUED  
(National Trends Network precipitation-quality station)

PRECIPITATION-QUALITY DATA, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986

PERIOD OF COLLECTION	MAGNE- SIUM, DIS- SOLVED (MG/L) (00925)	POTAS- SIUM, DIS- SOLVED (MG/L) AS K) (00935)	SODIUM DIS- SOLVED (MG/L) AS NA) (00930)	SULFATE DIS- SOLVED (MG/L) AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L) AS CL) (00940)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L) AS N) (00608)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L) AS N) (00631)	PHOS- PHORUS, DIS- SOLVED (MG/L) AS P) (00666)
10/01 to 10/08	0.039	0.033	0.026	1.32	0.07	0.24	0.27	<0.001
10/08 to 10/15	0.057	0.026	0.035	0.78	0.05	0.22	0.20	<0.001
10/15 to 10/22	--	--	--	--	--	--	--	--
10/22 to 10/29	0.047	0.038	0.038	1.32	0.04	0.42	0.16	<0.001
10/29 to 11/05	0.050	0.050	0.122	1.49	0.25	<0.02	0.04	<0.001
11/05 to 11/12	--	--	--	--	--	--	--	--
11/12 to 11/19	<0.091	<0.091	0.152	<0.91	<0.91	<0.47	<0.21	<0.030
11/19 to 11/26	--	--	--	--	--	--	--	--
11/26 to 12/03	--	--	--	--	--	--	--	--
12/03 to 12/10	--	--	--	--	--	--	--	--
12/10 to 12/17	0.813	0.389	0.480	5.25	0.45	<0.05	1.62	0.019
12/17 to 12/24	--	--	--	--	--	--	--	--
12/24 to 01/01	0.353	0.585	0.434	2.02	0.50	<0.16	<0.07	<0.010
01/01 to 01/07	0.045	0.308	0.066	0.20	0.14	<0.02	<0.01	0.003
01/07 to 01/14	0.133	0.105	0.157	1.32	0.14	0.05	0.52	<0.003
01/14 to 01/21	0.082	0.310	0.210	1.85	0.37	0.33	0.25	<0.003
01/21 to 01/28	--	--	--	--	--	--	--	--
01/28 to 02/04	--	--	--	--	--	--	--	--
02/04 to 02/11	0.230	0.441	0.635	1.84	1.10	<0.14	0.73	0.031
02/11 to 02/18	--	--	--	--	--	--	--	--
02/18 to 02/25	--	--	--	--	--	--	--	--
02/25 to 03/04	--	--	--	--	--	--	--	--
03/04 to 03/11	--	--	--	--	--	--	--	--
03/11 to 03/18	--	--	--	--	--	--	--	--
03/18 to 03/25	0.349	0.392	0.480	2.85	0.75	0.99	0.92	<0.009
03/25 to 04/01	0.182	0.182	0.076	0.13	0.10	0.05	0.04	<0.003
04/01 to 04/08	0.026	0.015	0.014	1.78	0.04	0.70	0.32	<0.003
04/08 to 04/17	0.037	0.058	0.042	0.95	0.10	0.54	0.31	<0.003
04/17 to 04/22	0.019	0.035	0.028	1.71	0.06	0.58	0.33	<0.003
04/22 to 04/29	0.018	0.010	0.017	0.45	0.04	0.25	0.12	<0.003
04/29 to 05/06	0.091	0.057	0.108	1.42	0.13	0.26	0.32	0.003
05/06 to 05/13	0.054	0.045	0.051	1.50	0.09	0.68	0.38	<0.003
05/13 to 05/20	0.171	<0.128	0.768	<1.28	<1.28	<0.66	<0.29	<0.142
05/20 to 05/27	0.026	0.007	0.019	0.61	0.04	0.46	0.15	<0.003
05/27 to 06/03	0.014	<0.003	0.050	<0.03	0.04	0.05	<0.01	<0.003
06/03 to 06/10	0.209	0.148	0.099	1.42	0.22	1.13	0.85	<0.003
06/10 to 06/17	0.052	0.044	0.052	1.07	0.09	0.28	0.23	<0.003
06/17 to 06/24	0.069	0.053	0.081	0.86	0.12	0.57	0.32	<0.003
06/24 to 07/01	0.055	0.028	0.052	0.62	0.10	<0.02	0.22	<0.003
07/01 to 07/08	0.092	0.076	0.127	1.42	0.25	0.08	0.48	<0.003
07/08 to 07/15	0.021	0.165	0.022	0.66	0.04	0.45	0.14	0.050
07/15 to 07/22	0.047	0.039	0.046	1.85	0.08	0.69	0.40	<0.003
07/22 to 07/29	0.020	0.025	0.024	0.53	0.04	0.02	0.21	<0.003
07/29 to 08/05	0.204	0.288	0.430	3.48	0.37	1.38	0.64	0.010
08/05 to 08/12	0.092	0.060	0.024	0.85	0.08	0.45	0.29	<0.003
08/12 to 08/19	0.042	0.073	0.044	1.13	0.10	0.76	0.49	<0.003
08/19 to 08/26	0.060	0.049	0.133	1.04	0.08	0.53	0.32	<0.003
08/26 to 09/02	0.081	0.054	0.047	1.11	0.12	0.48	0.28	<0.003
09/02 to 09/09	0.049	0.012	0.044	<0.03	0.04	<0.02	<0.01	0.003
09/09 to 09/16	0.028	0.020	0.042	0.76	<0.03	<0.02	0.09	0.003
09/16 to 09/23	0.010	0.012	0.025	0.60	<0.03	0.17	0.15	<0.003
09/23 to 09/30	0.060	0.129	0.067	0.70	0.06	<0.02	<0.01	<0.003

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## FACTORS FOR CONVERTING INCH-POUND UNITS TO INTERNATIONAL SYSTEM UNITS (SI)

The following factors may be used to convert the inch-pound units published herein to the International System of Units (SI). This report contains both the inch-pound and SI unit equivalents in the station manuscript descriptions.

Multiply inch-pound units	By	To obtain SI units
<i>Length</i>		
inches (in)	$2.54 \times 10^1$	millimeters (mm)
	$2.54 \times 10^{-2}$	meters (m)
feet (ft)	$3.048 \times 10^{-1}$	meters (m)
miles (mi)	$1.609 \times 10^0$	kilometers (km)
<i>Area</i>		
acres	$4.047 \times 10^3$	square meters (m <sup>2</sup> )
	$4.047 \times 10^{-1}$	square hectometers (hm <sup>2</sup> )
	$4.047 \times 10^{-3}$	square kilometers (km <sup>2</sup> )
square miles (mi <sup>2</sup> )	$2.590 \times 10^0$	square kilometers (km <sup>2</sup> )
<i>Volume</i>		
gallons (gal)	$3.785 \times 10^0$	liters (L)
	$3.785 \times 10^0$	cubic decimeters (dm <sup>3</sup> )
	$3.785 \times 10^{-3}$	cubic meters (m <sup>3</sup> )
million gallons	$3.785 \times 10^3$	cubic meters (m <sup>3</sup> )
	$3.785 \times 10^{-3}$	cubic hectometers (hm <sup>3</sup> )
cubic feet (ft <sup>3</sup> )	$2.832 \times 10^1$	cubic decimeters (dm <sup>3</sup> )
	$2.832 \times 10^{-2}$	cubic meters (m <sup>3</sup> )
cfs-days	$2.447 \times 10^3$	cubic meters (m <sup>3</sup> )
	$2.447 \times 10^{-3}$	cubic hectometers (hm <sup>3</sup> )
acre-feet (acre-ft)	$1.233 \times 10^3$	cubic meters (m <sup>3</sup> )
	$1.233 \times 10^{-3}$	cubic hectometers (hm <sup>3</sup> )
	$1.233 \times 10^{-6}$	cubic kilometers (km <sup>3</sup> )
<i>Flow</i>		
cubic feet per second (ft <sup>3</sup> /s)	$2.832 \times 10^1$	liters per second (L/s)
	$2.832 \times 10^1$	cubic decimeters per second (dm <sup>3</sup> /s)
	$2.832 \times 10^{-2}$	cubic meters per second (m <sup>3</sup> /s)
gallons per minute (gal/min)	$6.309 \times 10^{-2}$	liters per second (L/s)
	$6.309 \times 10^{-2}$	cubic decimeters per second (dm <sup>3</sup> /s)
	$6.309 \times 10^{-5}$	cubic meters per second (m <sup>3</sup> /s)
million gallons per day	$4.381 \times 10^1$	cubic decimeters per second (dm <sup>3</sup> /s)
	$4.381 \times 10^{-2}$	cubic meters per second (m <sup>3</sup> /s)
<i>Mass</i>		
tons (short)	$9.072 \times 10^{-1}$	megagrams (Mg) or metric tons



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